Draft Environmental Impact Statement for the Noble Ball Hill Windpark Towns of Villenova and Hanover

Chautauqua County, New York

September 2008 • Volume III

Prepared for:

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ENVIRONMENTAL SOUND SURVEY AND NOISE IMPACT ASSESSMENT

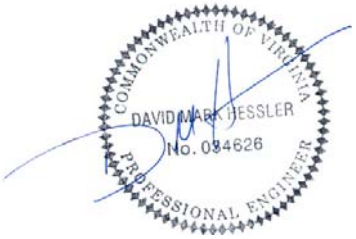
NOBLE BALL HILL WINDPARK

TOWNS OF VILLENOVA AND HANOVER
CHAUTAUQUA COUNTY, NY

PREPARED FOR:

Noble Environmental Power

Prepared by:



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1.0 INTRODUCTION

Hessler Associates, Inc. has been retained by Noble Environmental Power to evaluate potential noise impacts from the proposed Noble Ball Hill Windpark Project on residents in the vicinity of the Project Area, which is located in Chautauqua County, NY mostly within the boundaries of the Town of Villenova and partially in the Town of Hanover. Current plans call for the installation of approximately 60 wind turbines each with a nominal electrical output of 1.5 MW. It is anticipated that the General Electric Model 1.5sle wind turbine generator will be used. This model has a 77 m diameter, three-bladed rotor and is normally mounted on an 80 m tubular steel tower.

The study essentially consisted of two phases: a background sound level survey and a computer modeling analysis of future turbine sound levels. The field survey of existing sound levels at the site was necessary to determine how much natural masking noise there might be - as a function of wind speed - at the nearest residences to the project. The relevance of this is that high levels of background noise due to wind-induced natural sounds, such as tree rustle, would act to reduce or preclude the audibility of the wind farm, while low levels of natural noise would permit operational noise from the turbines to be more readily perceptible. For a broadband noise source the audibility of and potential impact from the new noise is a function of how much, if at all, it exceeds the pre-existing background level.

In the second phase of the project an analytical noise model of the project was developed to predict the sound level contours associated with the project over the site area and thereby determine if any nearby residents might be able to hear the turbines above the pre-existing background level and, if so, what the likelihood of an adverse impact might be.

In addition to local regulatory noise limits, the primary basis for evaluating potential project noise impacts is the Program Policy *Assessing and Mitigating Noise Impacts* issued by the New York State Department of Environmental Conservation (NYSDEC), Feb. 2001. This assessment procedure looks at potential noise impacts in relative rather than absolute terms by comparing expected future sound levels (developed from modeling) to the pre-existing level of background sound (determined from field measurements). The procedure essentially defines a cumulative increase in overall sound level of 6 dBA as the threshold between no significant impact and a potentially adverse impact.

Apart from these state and local metrics a further assessment of the expected impact is also discussed based on field research studies specifically on wind turbine noise that are now becoming available in the professional literature.

2.0 BACKGROUND SOUND LEVEL SURVEY

2.1 OBJECTIVE AND MEASUREMENT QUANTITIES

The purpose of the survey was to determine what minimum environmental sound levels are consistently present and available at the nearest potentially sensitive receptors to mask or obscure potential noise from the project under wintertime, leaf-off conditions (when environmental sound levels are typically at a minimum). A number of statistical sound levels were measured in consecutive 10 minute intervals over the entire survey. Of these, the average (Leq) and residual (L90) levels are the most meaningful.

The average, or equivalent energy sound level (Leq), is literally the average sound level over each measurement interval. This is the "typical" sound level most likely to be observed at any given moment.

The L90 statistical sound level, on the other hand, is commonly used to conservatively quantify background sound levels. The L90 is the sound level exceeded during 90% of the measurement interval and has the quality of filtering out sporadic, short-duration noise events thereby capturing the quiet lulls between such events. It is this consistently present "background" level that forms a conservative, or "worst-case" basis for evaluating the audibility of a new source.

An additional factor that is important in establishing the minimum background sound level available to mask potential wind turbine noise is the natural sound generated by the wind itself. Wind turbines only operate and produce noise when the wind exceeds a minimum cut-in speed of about 4 m/s (measured at a reference elevation of 10 m). Turbine sound levels increase with wind speed up to about 8 m/s when the sound produced reaches a maximum and no longer increases with wind speed. Consequently, at moderate to high speeds when turbine noise is most significant the level of natural masking noise is normally also relatively high due to tree or grass rustle thus reducing the perceptibility of the turbines. In order to quantify this effect, wind speed was measured over the entire sound level survey period at a met tower (Tower 38) within the site area for later correlation to the sound data.

2.2 SITE DESCRIPTION AND MEASUREMENT POSITIONS

The proposed turbines in the Noble Ball Hill Windpark are spread out over an area of roughly 13 square miles within the Towns of Villenova and Hanover, NY. The site area is rural and can be characterized as consisting of numerous scattered residences – usually located the along the roads that traverse the Project area - interspersed with farms of various sizes. The distribution and density of wind turbine locations over the site area are fairly uniform with the units generally proposed in the vacant areas between roadways and homes.

The site topography is moderately hilly with the turbines located on various high points. The bulk of the turbines in the center of the Project Area are planned for the top of Ball Hill and Round Top Hill, which together form essentially a raised round plateau with the fairly flat summit. In terms of vegetation, the area is mostly open but interspersed with isolated wooded areas.

Because of the fairly homogeneous nature of the site, background sound level measurement locations were chosen to evenly cover and represent the entire area as shown in **Graphic A**. The specific positions are listed below along with photographs of each location. All of the positions were selected to be close to and representative of nearest residences to the turbines, which are mostly located at relatively high elevations in open settings exposed to the wind.

Position 1 – 9120 Round Top Road
Monitor 1 was located on a tree roughly 30 ft. south of the tree-lined driveway to this house. This area was moderately sheltered from the wind by surrounding evergreen trees.

Figure 2.2.1 *Position 1 Looking N towards Driveway*

Figure 2.2.2 *Position 1 Looking S*

Position 2 – Junction of Villenova and Round Top Roads
Monitor 2 was positioned on a tree in a thinly wooded area just off Villenova Road not far from its intersection with Round Top Road.

Figure 2.2.3 *Position 2 Looking NE*
House on Round Top Road visible in Background.

Figure 2.2.4 *Position 2 Looking S towards Villenova Road*

Position 3 –Ball Hill Road (Near 9609)
The monitor was located on a utility pole adjacent to Ball Hill Road. Most of the houses along this and many other roads in the Project area are situated fairly close to the road and exposed to what is mostly intermittent traffic noise.

Figure 2.2.5 *Position 3 Looking W towards Nearest House*

Position 4 – 9633 Ball Hill Road
Monitor 4 was attached to a post in the front yard of the home. This location is open and exposed on top of the Ball Hill plateau.

Figure 2.2.6 *Position 4 Looking SE towards the House*

Figure 2.2.7 *Position 4 Looking NW*

Position 5 – Dye Road (Near 9830)
The meter was attached to a utility pole in an open field across from 9830 Dye Road.

Figure 2.2.8 *Position 5 Looking NE towards Nearest Homes*

Figure 2.2.9 *Position 5 Looking NW*

Position 6 – 547 Rt. 39 (Hanover)
Monitor 6 was attached to an isolated tree near the house and adjacent to large open field.

Figure 2.2.10 *Position 6 Looking W towards House*

Figure 2.2.11 *Position 6 Looking NE*

2.3 INSTRUMENTATION AND SURVEY DURATION

Rion NL Series sound level meters (NL-32, and NL-22) ANSI Type 1 and 2 (respectively) sound level meters were used at all positions. Each meter was enclosed in a watertight case fitted with a 12" microphone boom.

The microphones were protected from wind-induced self-noise by oversized 180 mm (7") diameter foam windscreens (ACO Model WS7-80T). The microphones were also situated at a fairly low elevation of about 1 m above grade to minimize their exposure to wind. As illustrated later in Figure 2.6.1 (p. 16) wind speed normally diminishes rapidly close to the ground, theoretically going to zero at the surface. At a height of 1 m the microphones were typically exposed to relatively low wind speeds of about 3 or 4 m/s during the wind conditions of greatest interest (6 to 8 m/s as measured at the IEC standard height of 10 m above grade). Wind tunnel experiments [Ref. 14] for this type of windscreen demonstrate that self-generated wind noise affects only the extreme lower frequencies and, except in very high wind conditions, has little or no influence on the measured A-weighted level (the quantity sought in the survey). Consequently,

the measured A-weighted values are not affected in any significant way by self-generated contamination.

All equipment was field calibrated at the beginning of the survey and again at the end of the survey. The observed calibration drift of all the instruments was less than +/- 0.4 dB.

The survey was carried out over roughly a 2 week period from March 26 to April 8, 2008 during wintertime conditions.

2.4 SURVEY WEATHER CONDITIONS

Weather conditions during the survey period were highly variable with, for example, periods of below average temperatures and calm winds followed by unusually warm and stormy conditions. A period of high winds and rain occurred around April 1. The general conditions of temperature, barometric pressure and wind for the survey period are shown in the chart below (Figure 2.4.1) as observed at Dunkirk, NY, about 10 miles west of the site.

It is important to note that the survey was carried out during the winter when the trees were bare. Environmental sound levels are typically at an annual minimum during this time of year. In the summer, for example, leaves rustling in the wind and nocturnal insect noises often greatly increase the average daily sound level.

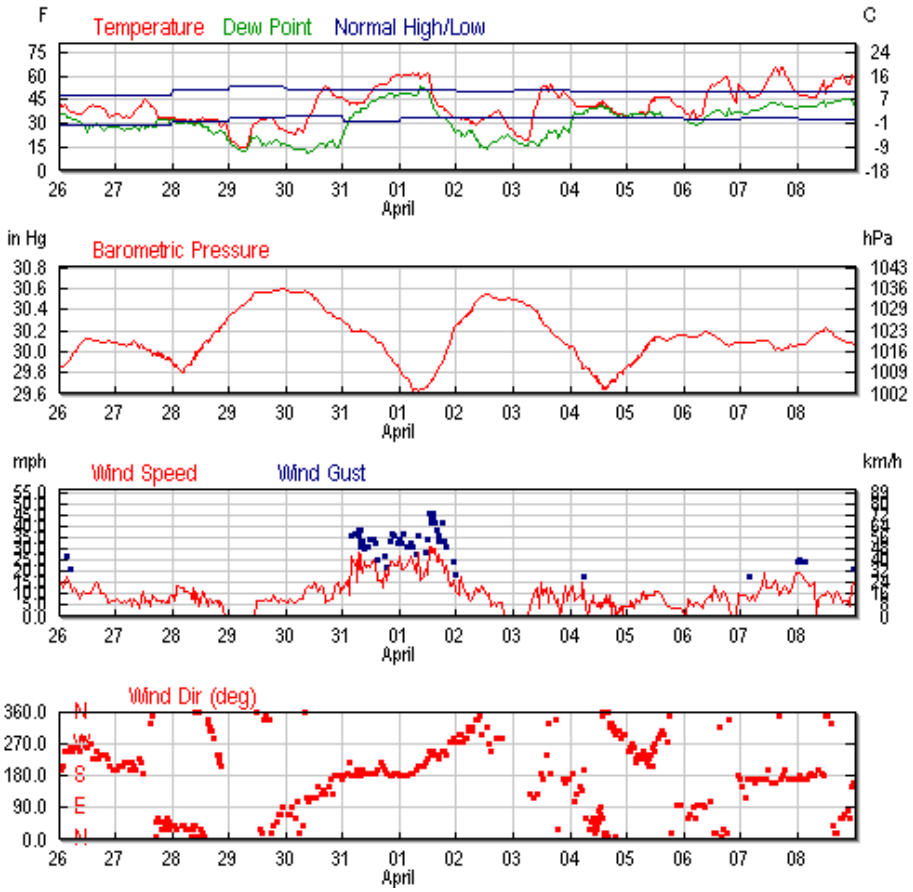


Figure 2.4.1 *General Weather Data for the Survey Period as Observed in Dunkirk, NY*

The wind speed at the site itself was measured at two met towers (38 and 54) distributed over the Project area. The dataset from Tower 38, located in the center of the site on Ball Hill, was complete whereas numerous blank periods were contained in the Tower 54 results. Consequently, the Tower 54 data were neglected in the analysis. The figure below, Figure 2.4.2, shows the 10 minute average wind speeds measured by anemometers at four elevations on Tower 38 normalized to a standard elevation of 10 m per IEC 61400 [Ref. 1] Equation 7 using a roughness length of 0.05, which is associated with "farmland with some vegetation".

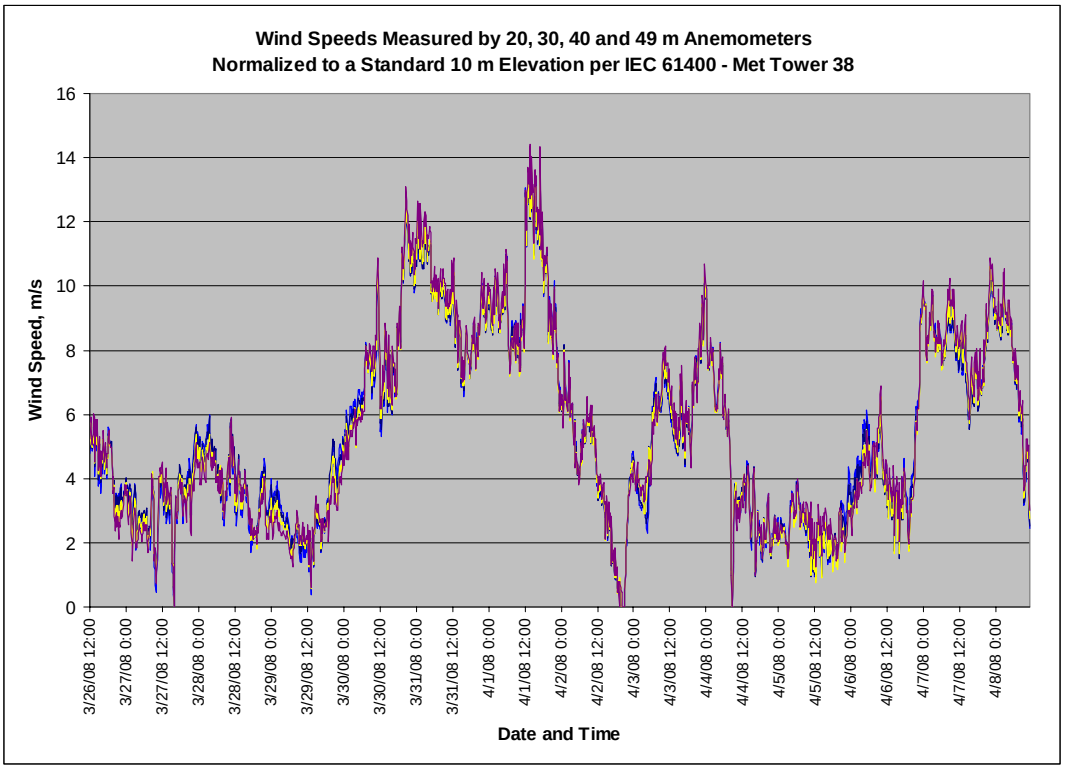


Figure 2.4.2 *Measured Wind Speeds at the Site during Sound Survey Period*

Figure 2.4.2 shows that the IEC wind gradient formula, which has parabolic shape, is valid over a wide variety of weather conditions observed over 14 days since all four of the anemometer readings essentially convert to the same 10 m value. Any significant variance between the four normalized readings would indicate that the wind speed gradient was significantly different from the idealized IEC curve – but, at least for this survey period, the four values almost always overlay each other. Because of this agreement the average value, plotted in Figure 2.4.3, will be taken as the design 10 m wind speed.

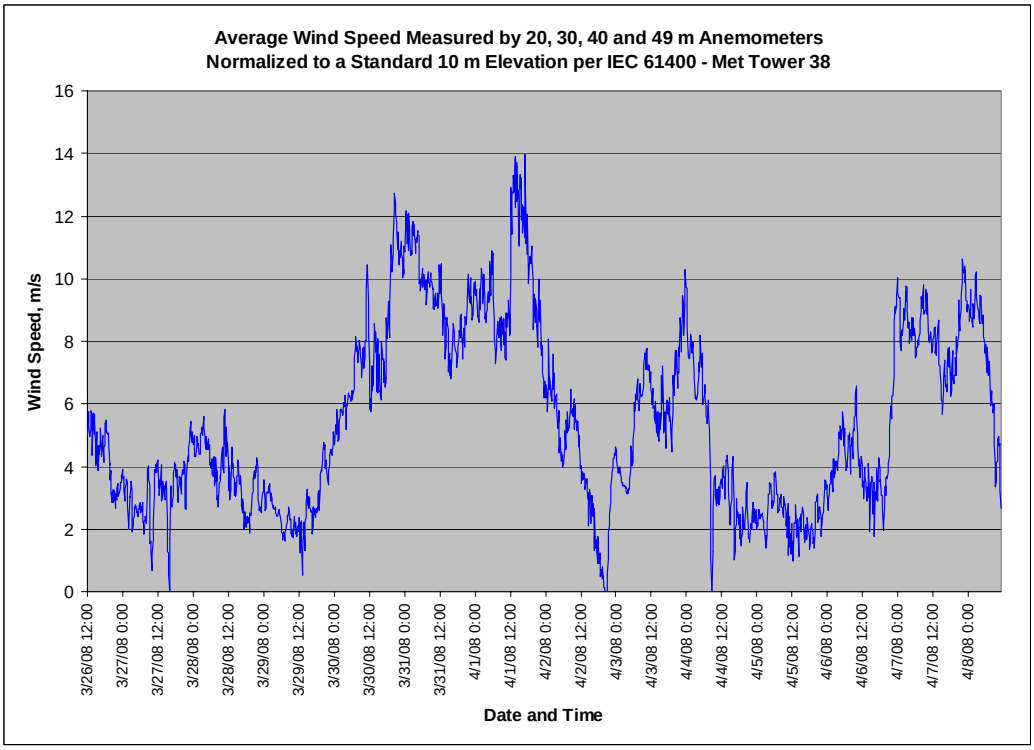


Figure 2.4.3 *Design Site Wind Speed at 10 m during Sound Survey Period*

2.5 OVERALL SURVEY RESULTS

As discussed above in Section 2.1 the L90, or residual, sound level is a conservative measure of background sound levels in the sense that it filters out short-duration, sporadic noise events that cannot be relied upon to provide consistent and continual masking noise to obscure potential turbine noise. This level represents the quiet, momentary lulls between all relatively short duration events, such as cars passing by or tractor activity in a neighboring field. As such, it is the near "worst-case" background level with regard to evaluating potential impacts from a new source.

The L90 sound levels over consecutive 10 minute periods for all 6 positions are plotted below for the survey.

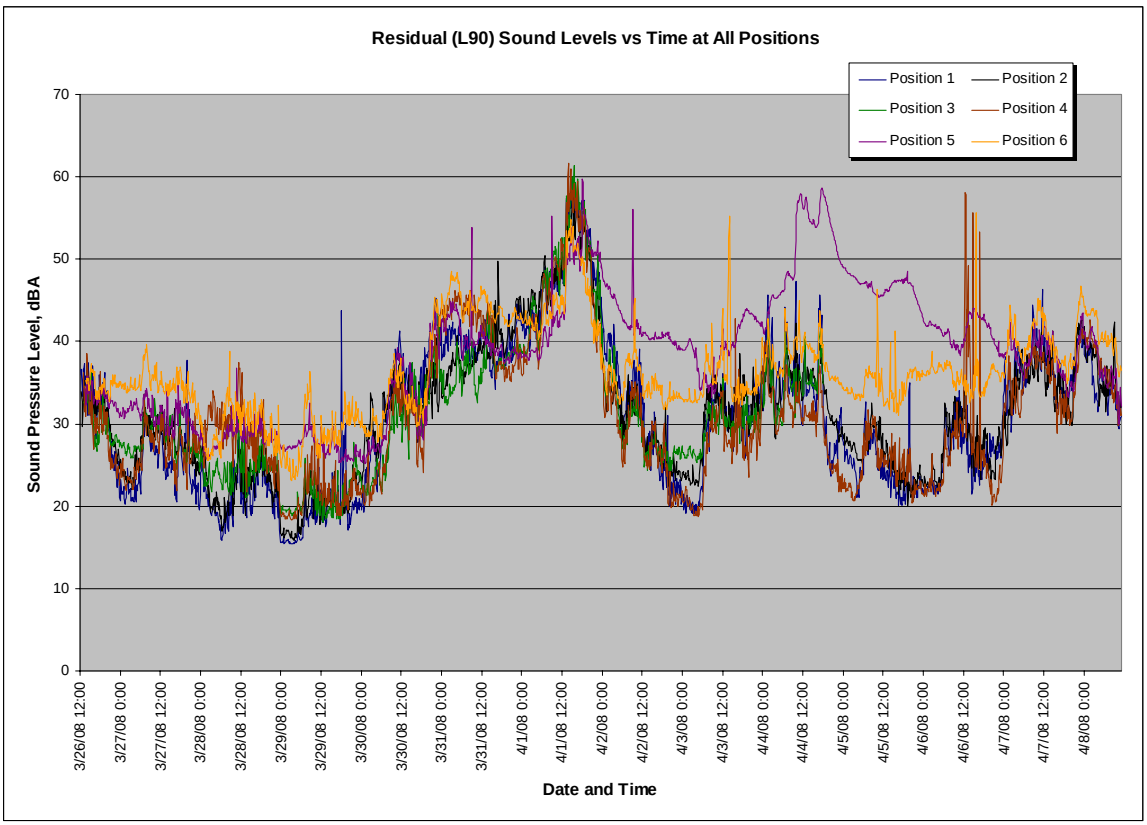


Figure 2.5.1 *10 minute L90 Sound Levels at All Monitoring Positions*

This plot shows that sound levels at Positions 1 through 4 are of the same general order of magnitude and follow the same temporal trends but that Positions 5 and 6 exhibit higher levels most of the time. It is unclear why the level at Position 6, for example, would be above the apparent mean since Position 4 (brown trace) was in an even more exposed and elevated location that Position 6. The odd peak in noise at Position 5 around April 4th is clearly anomalous and unrepresentative of the site area as a whole. Consequently, for design purposes, only Positions 1 through 4, the quietest locations, will be considered in the analysis. As shown in Figure 2.5.2, sound levels at these positions (only) were tightly grouped almost all of the time throughout the survey period and the average of these four locations is considered a reasonable and conservative representation of the L90 sound level anywhere within the site area. There no reason to believe, for instance, that the sound level would be significantly lower or different in any meaningful way at some point between the measurement locations. The average design L90 level is shown in Figure 2.5.3.

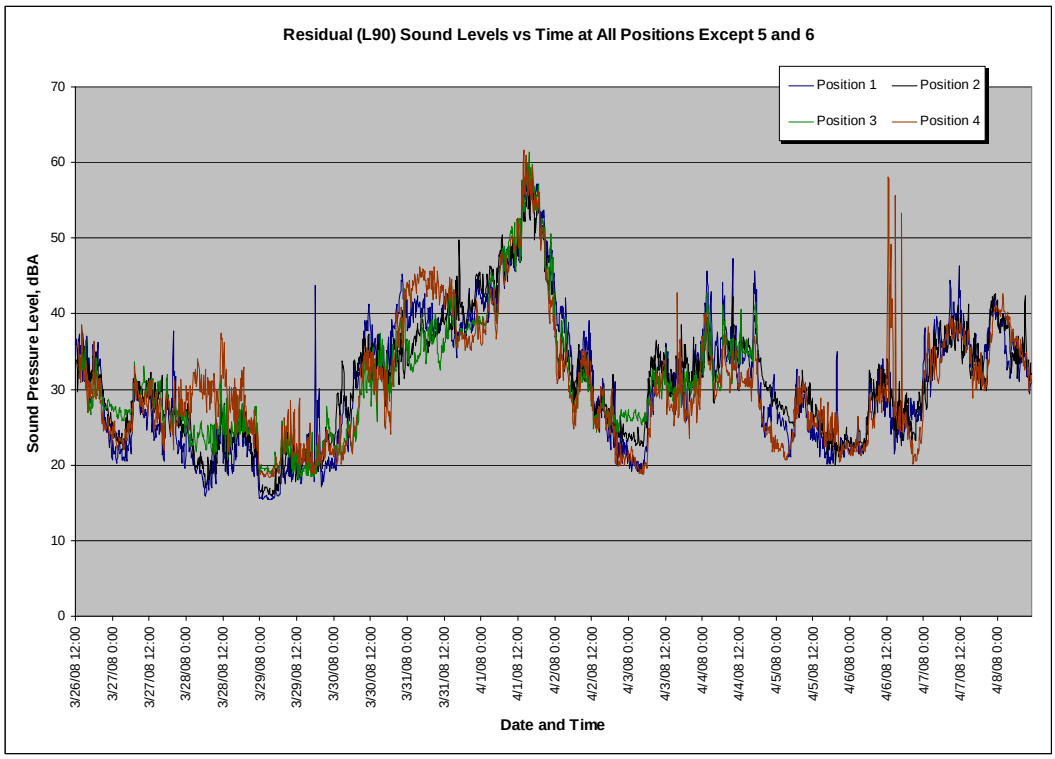


Figure 2.5.2 *10 minute L90 Sound Levels at All Monitoring Positions Except 5 and 6*

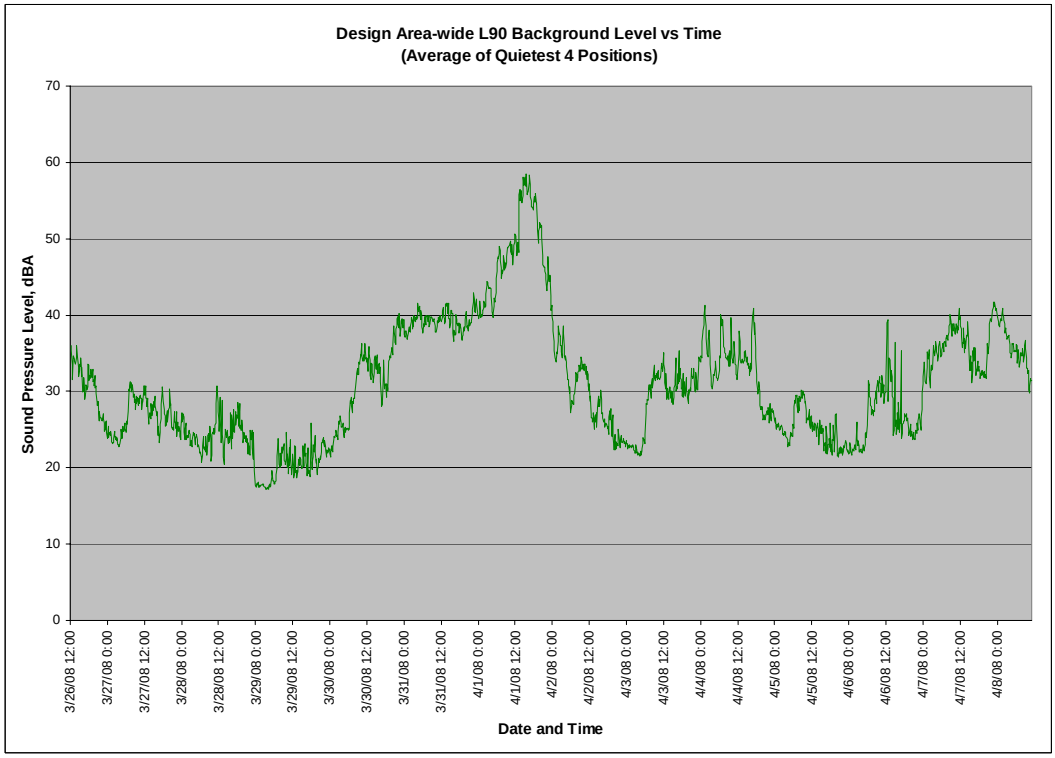


Figure 2.5.3 *Site-wide Design L90 Sound Level (Average of Positions 1 – 4)*

Experimental wind tunnel testing evidence [Ref. 14] shows that for a weather-treated 180 mm windscreen the amount of A-weighted wind-induced self-noise can be determined from the following empirical formula:

$$LpA_{due\ to\ wind} = 27.4 \ln (V_{mic}) - 10.7,\ \text{dBA}$$

Where V_{mic} is the wind speed (in m/s) at the microphone, or 1 m above the surface. This wind speed can be estimated from the 10 m wind speed shown in Figure 2.5.3 per the IEC wind gradient relation (Ref. 1, Eqn. 7). This contaminating sound level has been calculated for each 10 minute period during the survey and subtracted from the as-measured level to correct for possible microphone distortion. The as-measured and corrected L90 levels for the survey are shown below.

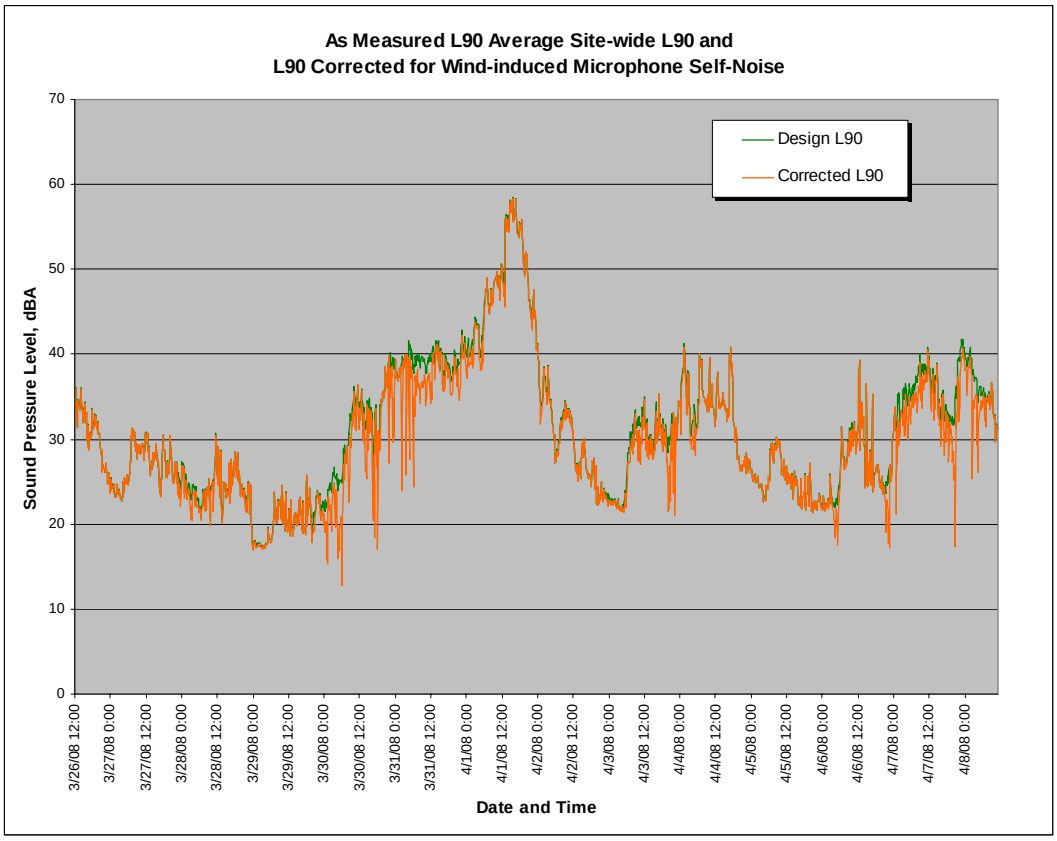


Figure 2.5.4 *Nominal Correction for Microphone Self-Noise*

This analysis shows that the two levels largely overlay each other and that there is no meaningful difference between the direct results obtained from the instruments and the corrected data. Moreover, the same wind tunnel study [Ref. 14] found that the 180 mm windscreen significantly attenuated higher frequency sound effectively reducing the measured A-weighted sound level slightly (by about 0.9 dBA) below the actual level. This countervailing effect is *not* accounted for in Figure 2.5.4. Because these two influences are small and tend to counteract each other, the as-measured data (design L90 level) is considered perfectly valid for use without the need for complicating adjustments.

The average L90 design sound level is plotted along with the average wind speed in Figure 2.5.5 below.

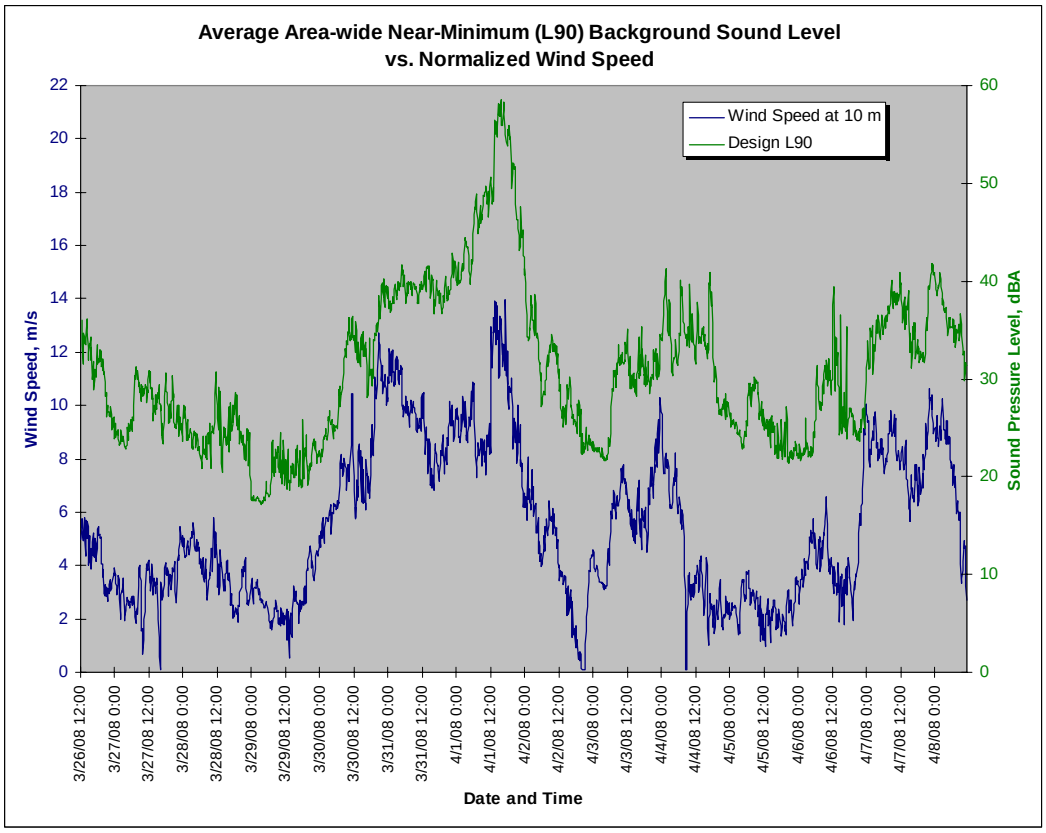


Figure 2.5.5 *Background L90 Sound Levels and Wind Speed*

This plot clearly shows that background sound levels over the site area have a definite but by no means perfect correlation to wind speed and wind-induced natural sounds.

Figure 2.5.6 below shows a similar plot of the site wide average, or Leq, sound level and wind speed. Again, there is a correlation between sound and wind - although it is less pronounced in this case because the Leq sound level tends to capture short-term noise events, which are usually man-made in origin and unrelated to the wind. In general, though, it would be fair to say the Leq level is the "typical" sound level that might be heard at any given moment and that the L90 sound level is quietest level that might be briefly observed over a 10 minute period. As such the L90 represents the "worst-case" sound level from a noise impact perspective, since it represents moments when background masking noise is temporarily at a minimum. By definition the L90 level occurs only a small fraction of the time (10% of the time) and is not a long-term or continuous phenomenon.

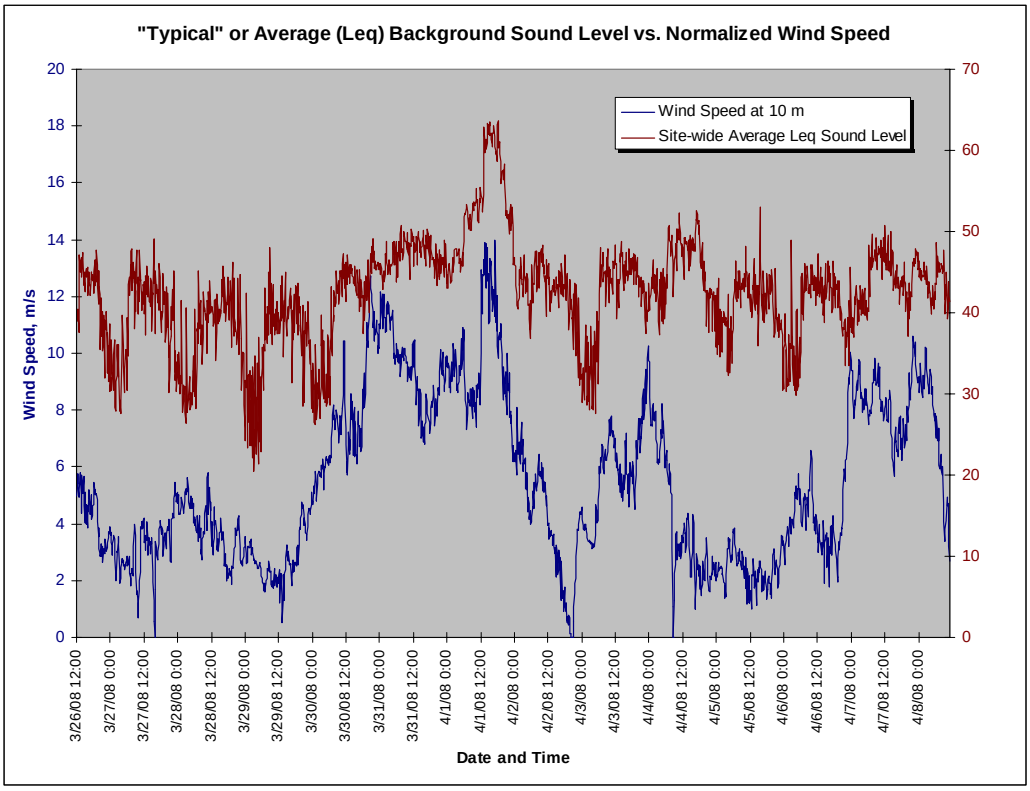


Figure 2.5.6 *Regression Plot of Background L90 Sound Levels and Wind Speed*

2.6 WIND SPEED AS A FUNCTION OF ELEVATION

Below about 100 m, wind speed varies with elevation above the ground due to friction with the ground surface and obstacles such as trees. Because this roughness varies from place to place measurements of wind turbine sound power levels and concurrent wind speeds carried out in accordance with IEC Standard 61400-11 [Ref. 1] are normalized to and reported at a reference height of 10 m. This enables the nominal sound level of different makes and models of wind turbines to be compared on the uniform basis.

The conversion of wind speed at one elevation to the related speed at another elevation is calculated from a formula in the standard (Equation (7), Section 8), which describes a logarithmic profile. For the specific parameters relevant to this project the wind profile resulting from the Eqn.(7) is shown graphically below for an example case where the wind is normalized to a speed of 6 m/s at 10 m.

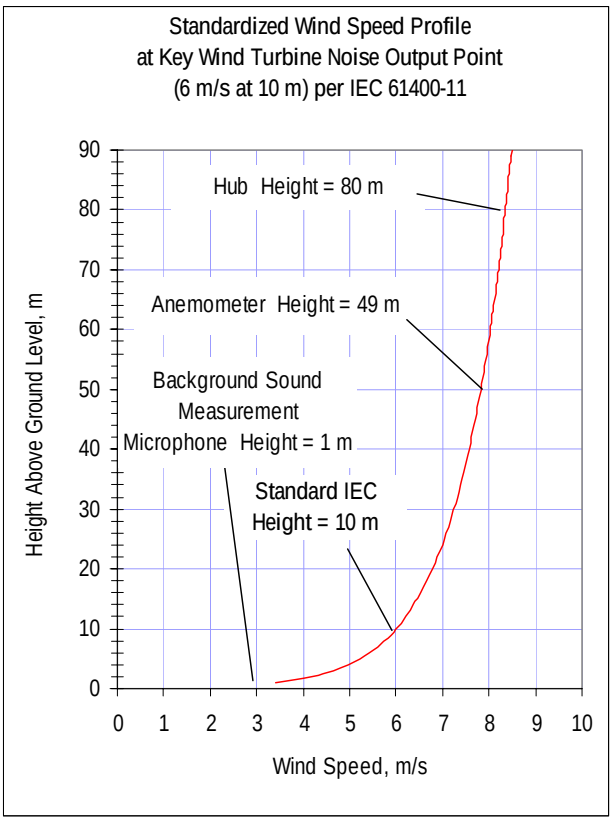


Figure 2.6.1

In this example, a standardized wind speed of 6 m/s at the reference height of 10 m would correspond to wind speed of just under 8 m/s at an anemometer height of 49 m and a speed of about 8.3 m/s at the expected turbine hub height of 80 m.

This plot illustrates that near the surface the wind speed typically drops off rapidly - so measuring background levels with the microphones at a height of about 1 m exposes them to relatively low wind speeds and prevents any significant contamination from self-generated noise (wind blowing over the microphone).

2.7 SOUND LEVELS AS A FUNCTION OF WIND SPEED

From the data collected over the survey period it is possible to determine the A-weighted sound level that is likely to occur over all wind speeds up to about 14 m/s. The wind speed range of interest with respect to wind turbine noise is from the cut-in speed of roughly 3 or 4 m/s at 10 m, when the turbines just begin to operate up to about 7 m/s at 10 m when the noise level essentially levels off at a constant, maximum value after increasing from zero.

The first regression plot below, Figures 2.7.1, quantifies the relationship between wind speed and the L90, or "worst-case" sound level during the leaf-off, cold weather conditions. The second plot, Figure 2.7.2, shows the correlation between the Leq, or "typical" sound level and wind speed.

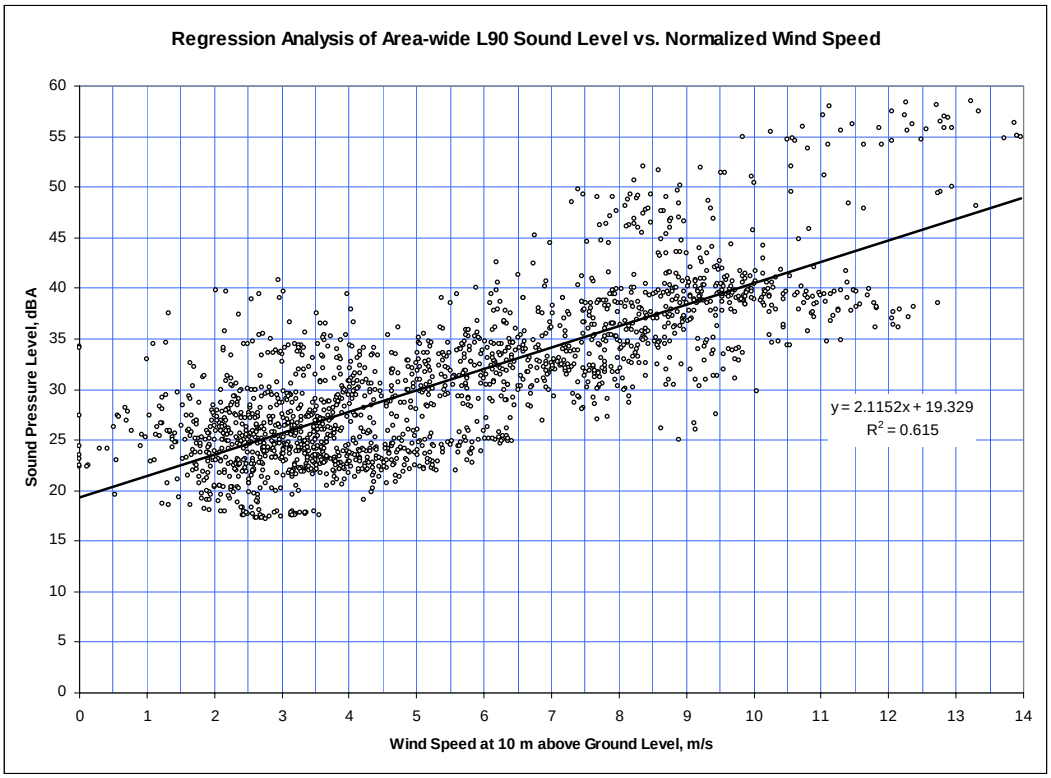


Figure 2.7.1

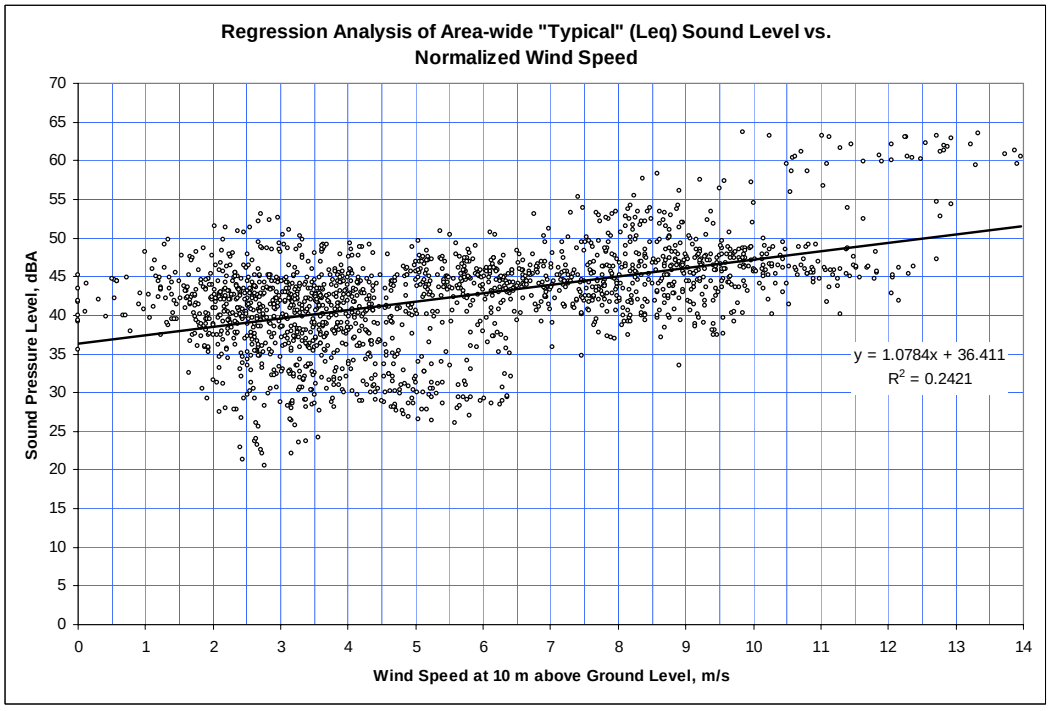


Figure 2.7.2

From the regression charts above the following typical and worst-case background sound levels can be expected at integer wind speeds ranging from 4 to 9 m/s during cold season/leaf-off conditions. The turbine sound power level as a function of wind speed is also noted in the chart along with the differential between this value and the background level. Where this differential is a maximum is where turbine noise is highest relative to the amount of masking background noise available – or where the *maximum potential for audibility* would exist. Consequently, a critical wind speed of **6 m/s** where this maximum occurs will be taken as the design basis value for most of the subsequent analyses. Any impacts would be less pronounced during all other wind conditions.

Table 2.7.1 *Measured L90 and Leq Background Sound Levels as a Function of Wind Speed Compared with Turbine Sound Power Level*

Integer Wind Speed at Standardized Hgt. of 10 m, m/s	4	5	**6**	7	8	9
GE 1.5sle Sound Power Level, dBA re 1 pW	<96	99	**103**	104	104	104
Worst-Case L90 Sound Level Cold Weather, dBA	27.8	29.9	**32.0**	34.1	36.3	38.4
Turbine Power Level – Background Sound Level Differential	68.2	69.2	**71.0**	69.9	67.7	65.6
Typical Leq Sound Level Cold Weather, dBA	40.7	41.8	**42.9**	44.0	45.0	46.1
Turbine Power Level – Background Sound Level Differential	55.3	57.3	**60.1**	60.0	59.0	57.9

3.0 PROJECT NOISE MODELING AND IMPACT ASSESSMENT

3.1 ASSESSMENT CRITERIA

There are several metrics against which to compare the predicted noise from the project and thereby determine if any adverse environmental impacts might result from it. The first of these measures are local regulatory noise limits; the second is a set of noise assessment guidelines published by the New York State Department of Environmental Conservation (NYSDEC); and a third approach looks at the predicted sound levels for this project in light of studies available in the professional literature on reactions to operating wind farms and on wind turbine noise in general.

3.1.1 REGULATORY NOISE LIMIT

The Town of Hanover is considering adopting an updated local ordinance specifically relating to wind energy facilities that limits noise from any wind energy conversion system (WECS) to **50 dBA** measured in terms of the L10 statistical level:

> at any residence existing at the time of completing of the SEQRA review of the application. If the ambient sound level exceeds 48 dBA, the standard shall be

> ambient dBA plus 5 dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement.
>
> In the event audible noise due to WECS operation contains a steady pure tone, such as a whine, screech or hum, the standards for audible noise set forth in subparagraph A [sic] of this subsection shall be reduced by five dBA. A pure tone is defined to exist if the 1/3 octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous bands by:
>
> 5 dB for center frequencies of 500 Hz or above
> 8 dB for center frequencies between 160 and 500 Hz
> 15 dB for center frequencies less than or equal to 125 Hz
>
> In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level.

It is not clear why the 50 dBA noise limit is expressed as an L10 statistical level. The L10 is the sound level during any given measurement interval that is exceeded 10% of the time; i.e. 90% of the time the actual sound level is quieter than this value and 10% of the time it is louder. As such, the L10 captures the near-maximum level occurring during the measurement, which, from a practical standpoint, usually consists of contaminating events like cars passing by or dogs barking. In almost all cases an L10 level is significantly higher than the average, or Leq, level and much higher than the L90, which captures the near minimum level during the measurement and excludes contaminating events.

A minimum setback of 1000 ft. from all residences is also required in the law.

The Town of Villenova already has in place an essentially identical law (Local Law No. 1 of 2007) that also limits wind turbine sound levels to 50 dBA (L10) at any residence and contains the same restriction on tonal noise.

There are no other overarching state or federal noise regulations that would apply to the project.

3.1.2 NYSDEC GUIDELINES

In the Program Policy *Assessing and Mitigating Noise Impacts* published by the New York State Department of Environmental Conservation (2001) a methodology is described for evaluating potential community impacts from any new noise source. The method is fundamentally based on the perceptibility of the new source above the existing background sound level.

It is a well-established fact for a new broadband, atonal noise source (and also with a frequency spectrum similar to that of the background) that a cumulative increase in the total sound level of about 5 or 6 dBA at a given point of interest is required before the new sound begins to be clearly perceptible or noticeable to most people. Cumulative increases of between 3 and 5 dBA for a source of this kind are generally regarded as negligible or hardly audible. Lower sound levels from the new source are "buried" in the existing background sound level and become progressively less perceptible. The specific language relating to these perceptibility thresholds in the NYSDEC program policy (Section V B(7)c) is a follows:

> Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive receptors are present. Sound pressure increases of more than 6 dB may require

> closer analysis of impact potential depending on existing SPL's [sound pressure levels] and the character of surrounding land use and receptors.

What this essentially says is that cumulative increases in the total ambient sound level of 6 dBA or less are unlikely to constitute an adverse community impact. From a practical standpoint, because decibels add logarithmically, this threshold means that noise from the project could exceed the existing background level by up to 5 dBA. For example, a background level of 40 dBA plus a project-only sound level of 45 dBA would equal a total cumulative level of 46 dBA – or 6 dBA above the original level.

From the results of the field study this would mean that the nominal thresholds for a potentially adverse impact would occur at the following project sound levels.

Table 3.1.2.1 *Nominal NYSDEC Noise Impact Thresholds*

Type of Level	Average Measured Background Level during Critical Wind Speed of 6 m/s, dBA	Nominal Impact Threshold (Project-only Sound Level Resulting in a 6 dBA Cumulative Increase in the Overall Sound Level)
Cold Weather Leq - Typical	43	**48**
Cold Weather L90 – Worst-Case	32	**37**

Somewhat higher threshold levels would be expected during the warmer months of the year when the trees are leafed out and background levels tend to be higher. For design purposes the more conservative wintertime results will be assumed to exist year-round.

3.2 TURBINE SOUND LEVELS

The noise emissions of the GE 1.5sle wind turbine as a function of wind speed are known from field tests carried out by independent acoustical engineers for General Electric in accordance with IEC 61400-11 [Ref. 1]. The values are reported in a document entitled "Technical Documentation, Wind Turbine Generator System GE 1.5sl/sle 50 & 60 Hz", *Noise Emission Characteristics* [Ref. 7]. For an 80 m hub height, as is planned for this Project, the following sound power levels are published as a function of wind speed at the standardized measurement height of 10 m.

Table 3.2.1 *GE 1.5sle Sound Power Levels vs. Wind Speed*

Wind Speed at 10 m Height, m/s	**Sound Power Level, dBA re 1 pW**
3 (Cut In)	< 96
4	<96
5	99.1
6	103.0
7 to Cut Out	≤ 104.0

At maximum rotor speed (during a wind speed of 7 m/s or greater) the octave band frequency spectrum is given as follows.

Table 3.2.2 *GE 1.5sle Sound Power Level Spectrum during a 7 m/s Wind*

Octave Band Center Frequency, Hz	63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level, dB re 1 pW	**111.3**	**110.1**	**105.8**	**101.8**	**97.9**	**93.3**	**86.3**	**79.2**	**104.0**

It is important to note in this context that a sound *power* level is not the same thing as a sound *pressure* level, which is the familiar quantity measured by instruments and perceived by the ear. A power level is a specialized, calculated measure, expressed in terms of Watts, that is primarily used for acoustical modeling and in design analyses. It is a function of both the sound pressure level produced by a source at a particular distance and the effective radiating area or physical size of the source. The basic mathematical relationship between power and pressure is as follows:

$$Lw = Lp + 10 \log (A), \text{ dB re 1 pW}$$

Where,

Lw = Sound Power Level
Lp = Sound Pressure Level
A = The effective radiating surface area at the point of the pressure level measurement, m^2

In general, the ostensible magnitude of a sound power level is always considerably higher than the sound pressure level near a source because of the area term. For example, the sound pressure level at 100 m from a wind turbine might be about 53 dBA and the area term might be on the order of 51 dBA with a resulting total power level of 104 dBA re 1 pW (the units of power levels are always denoted as decibels with reference to 1 picoWatt, or 10^{-12} W).

The fundamental advantage of a power level is that the sound pressure level of the source can be calculated at any distance; hence its importance to noise modeling.

The limited frequency resolution of the octave band power level spectrum shown in Table 3.2.2 does not provide any significant information as to whether the noise is tonal or not. A finer 1/3 octave band, or better, spectrum is needed to see if any prominent discrete tones exist. Figure 3.2.1 below is a plot of the 1/3 octave sound power level spectrum published by GE for this model turbine during a 7 m/s wind. This chart shows that, apart from a small blip at 160 Hz, the noise is distinctly broadband in nature; i.e. evenly distributed over the audible frequency spectrum. The sound power level spectrum is shown because it represents the frequency spectrum of the turbine measured at a fairly close distance of about 120 m (hub height plus half the rotor diameter in accordance with IEC 61400). As discussed above, power levels are derived from the measured sound pressure level and a frequency *independent* term accounting for the radiating area. Thus the frequency content of a power level does not differ from its associated sound pressure level. At greater distances from the turbine than 120 m any tonal content would tend to become less and less distinct as the sound merges with that of background sources – so, in that sense, the evaluation of potential tonal content at the relatively close distance of about 120 m is conservative.

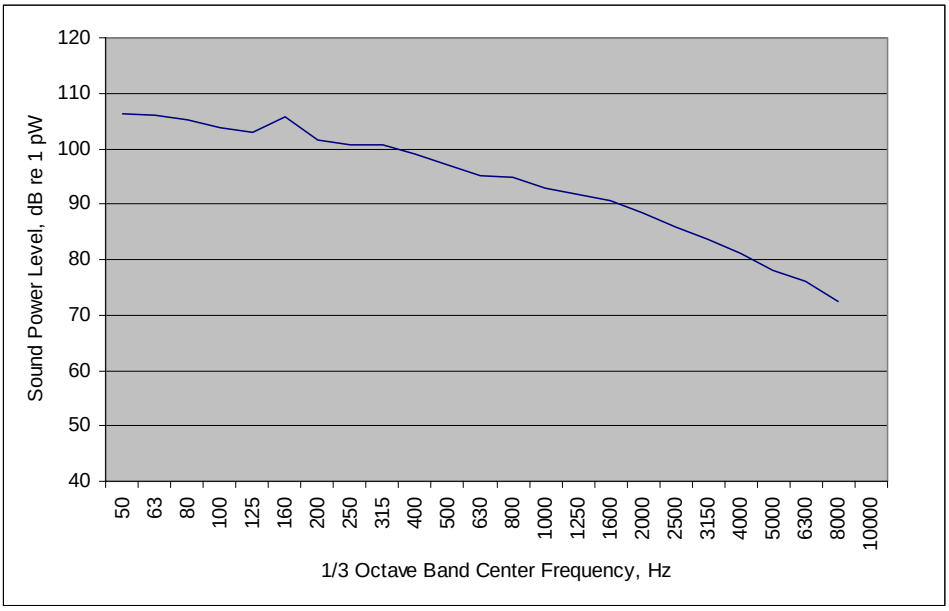


Figure 3.2.1 *1/3 Octave Band Sound Power Level Spectrum of GE 1.5sle Wind Turbine at Rated Power Output (1.5 MW during a 7 m/s Wind)*

A commonly used numerical definition for a discrete tone (used in the Hanover law and originally published by the U.S. Environmental Protection Agency as a part of a "Model Community Noise Control Ordinance" [Ref. 3]) is frequency dependent and defines a tone as existing when a single 1/3 octave band exceeds the average of the two adjacent bands by more than the following amounts:

Frequency Band Range	Exceedance
31.5 – 125 Hz	15 dB
160 – 400 Hz	8 dB
500 – 8000 Hz	5 dB

The exceedance amounts are frequency dependent because lower frequency tones are much harder to subjectively perceive than high frequency tones; i.e. the ear is much less sensitive to lower frequency sound in general.

Evaluated against this standard in the following table the small prominence at 160 Hz in the turbine power level spectrum falls well short of being a "tone".

Table 3.2.3 *Slightly Prominent Frequency Band in GE 1.5sle Sound Power Level Spectrum Compared to EPA Prominent Discrete Tone Definition*

Nominal Frequency, Hz	1/3 Octave Band Sound Power Level of Prominence and Two Adjacent Bands, dB re 1 pW	Exceedance above Average of Adjacent Bands, dB	Threshold for Tones Between 160 and 400 Hz, dB
160	102.8	3.6	8
	105.8		
	101.6		

3.3 CRITICAL DESIGN LEVELS

From the field survey it was determined that the background sound level varies with wind speed. From Table 3.2.1 above it can be seen that the turbine sound level also varies with wind speed. In order to carry out the ambient-based NYSDEC assessment procedure some specific background level must be established against which to compare Project noise and calculate cumulative increases.

In terms of potential noise impacts the worst-case combination of background and turbine sound levels would occur at the wind speed where the background level was lowest relative to the turbine sound level – or, in other words, where the differential between the background level and turbine sound power level is greatest. The following chart shows that this worst-case situation does not occur at the highest wind speeds when the turbines produce the highest sound level but rather at an intermediate wind speed of 6 m/s where the differential between the L90 and Leq background levels are 71 and 60 dB, respectively.

Table 3.3.1 *Comparison of Background and Turbine Sound Levels to Determine Critical Design Level (at Maximum Differential)*

Integer Wind Speed at Standardized Hgt. of 10 m, m/s	4	5	**6**	7	8	9
GE 1.5sle Sound Power Level, dBA re 1 pW	<96	99	**103**	104	104	104
Worst-Case L90 Sound Level Cold Weather, dBA	27.8	29.9	**32.0**	34.1	36.3	38.4
Turbine Power Level – Background Sound Level Differential	68.2	69.2	**71.0**	69.9	67.7	65.6
Typical Leq Sound Level Cold Weather, dBA	40.7	41.8	**42.9**	44.0	45.0	46.1
Turbine Power Level – Background Sound Level Differential	55.3	57.3	**60.1**	60.0	59.0	57.9

Consequently, background levels of **32 and 43 dBA** and a turbine sound power level of **103 dBA re 1 pW** will be used as the critical design values in the noise modeling assessment.

This approach is conservative in that turbine noise will be significantly less audible at all other wind speeds.

Because the frequency content of the turbine sound power level at 6 m/s is not given in the GE report, the octave bands have been estimated by subtracting 0.9 dB from the 7 m/s data. The resulting spectrum below will be used in the modeling study.

Table 3.3.2 *GE 1.5sle Sound Power Level Spectrum during a 7 m/s Wind and Estimated **Design Level** Spectrum at 6 m/s*

Octave Band Center Frequency, Hz	63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level at 7 m/s, dB re 1 pW	111.3	110.1	105.8	101.8	97.9	93.3	86.3	79.2	104.0
Adjustment Factor, dB	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	
Estimated Lw at 6 m/s, dB re 1 pW – **Design Level**	**110.4**	**109.2**	**104.9**	**100.9**	**97.0**	**92.4**	**85.4**	**78.3**	**103.0**

3.4 NOISE MODELING METHODOLOGY

Using the design sound power level spectrum in Table 3.3.2 above, a worst-case sound level contour plot for the site was calculated using the Cadna/A®, ver. 3.5 noise modeling program developed by DataKustik, GmbH (Munich). This software enables the Project and its surroundings, including terrain features, to be realistically modeled in three-dimensions. In this case, the topography has been incorporated into the model because it is fairly significant. Each turbine is represented as a point noise source at a height of 80 m above the local ground surface (design hub height).

The site plan used in the analysis is the latest layout as of 6/10/08. This layout is the result of several preliminary modeling studies designed to evaluate and mitigate potential noise impacts. As a result of these earlier studies 3 turbines with the most potential for an adverse impact on nearby residences were eliminated from the plan and 17 were moved to locations more distant from any homes in order to reduce potential sound impacts.

A somewhat conservative ground absorption coefficient of 0.5 has been assumed in the model since all of the intervening ground between the turbines and potentially sensitive receptors essentially consists of open farm fields, pasture land or wooded areas. Ground absorption ranges from 0 for water or hard concrete surfaces to 1 for absorptive surfaces such as farm fields, dirt or sand. Consequently, a higher ground absorption coefficient on the order of 0.8 or 0.9 could be justified here; however, for conservatism the value of 0.5 has been used. In addition, any additional attenuation that might result from wooded areas (foliage) has been completely neglected in all calculations.

Although wind direction effects can be modeled with this software, to be conservative the noise level from each turbine is assumed to be the downwind sound level in *all directions simultaneously*. In other words, although physically impossible, an omni-directional 6 m/s wind is

assumed. This approach yields a contour plot that essentially shows the maximum possible sound level at any given point and sometimes also shows levels that cannot possibly occur – such as between two or more adjacent turbines, since the wind would have to be blowing in two opposing directions at the same time. In a more realistic scenario with, for example, a wind out of the west the contour lines would occur closer to the turbines on the west side and would remain largely as shown on the east.

At the risk of significantly overestimating potential Project sound levels, the various conservative assumptions in the modeling analysis have been applied to ensure that Project noise does not exceed predicted levels under most normal conditions and also to allow some design margin for times when atmospheric conditions may favor noise propagation relative to average conditions, such as at night and during temperature inversions. Sound levels that are lower than those predicted in the modeling plots are expected to occur almost all of the time. The model represents a theoretical worst-case condition at any given receptor point that would require a convergence of the following conditions:

- **Wind Direction** – from *all* the turbines towards the receptor point
- **Wind Speed** - only a 6 m/s wind nominally produces the plotted contours; under all other wind conditions the contour lines would contract closer to the turbines by several decibels, or more
- **Low Ground Porosity** – normally farm fields are more absorptive than assumed in the model
- **No Leaves on the Trees** – the background sound level was measured under relatively quiet wintertime conditions when the wind causes less noise from tree rustle; during the summer a higher background level is likely to exist during a 6 m/s wind (due to both wind and insects) making turbine noise less perceptible
- **Observer Outside** – the plotted sound levels occur outside; sound levels inside of any dwelling will be 10 to 20 dBA lower
- **Environmental Noise Temporarily at a Minimum** – the L90 design background level of 32 dBA occurs only during intermittent lulls in environmental noise; higher background levels, such was would be represented by the average, or Leq, background level, would make Project noise less perceptible

3.5 MODEL RESULTS AND IMPACT ASSESSMENT

Preliminary noise modeling indicated that the potential for community noise impacts exists with this Project. This early modeling work essentially performed the function of the First Level Noise Impact Assessment in the NYSDEC assessment procedure and indicated that a Second Level assessment was necessary. A Second Level noise model considers the actual circumstances of the site including any attenuation that might be afforded by such factors as terrain, vegetation or man-made barriers.

The overall results of the Second Level model, based on the latest site plan where a number of turbines have been eliminated for noise mitigation purposes, is shown in Plots 1 through 3 - where the outermost sound level contour is associated with a particular limit or threshold. These plots illustrate the Project-only sound levels that might occur under the conservative assumptions described above in Section 3.4.

In **Plot 1** the sound emissions of the project are shown out to the Villenova and proposed Hanover noise limit of **50 dBA**. This figure clearly illustrates that all residences in both towns are well outside of this sound contour and that compliance is expected with the law. The predictions in this calculation (only) are based on the maximum turbine sound power level of 104 dBA re 1 pW, which occurs during a 7 m/s, or higher, wind. The maximum power level was used to assess

compliance with the local ordinance limit because it is absolute and is not dependent on the background level. In all subsequent cases it is the potential impact during a critical 6 m/s wind is represented, since that is the wind speed when turbine noise is highest relative to the amount of background masking noise available.

Plot 2 shows the project sound level out to a level of 48 dBA, which represents the 6 dBA cumulative increase threshold recommended by the NYSDEC based on the measured average, or Leq, sound level during a 6 m/s wind (43 dBA). This plot represents the impact most likely to be observed at any given moment relative to the "typical" background level. As with the previous example, all homes are well beyond the 48 dBA threshold line.

In **Plot 3** everything is the same except the threshold line has been moved out to 37 dBA, which is the NYSDEC 6 dBA increase threshold if the background level is taken to be the residual, or L90, value of 32 dBA. This is the background sound level that occurs only a small percentage of the time during lulls in the wind and when all sources of man-made noise are at a temporary minimum. Under these circumstances the perceptibility of project noise would increase making the turbines audible at greater distances. The turbine sound level doesn't change, just its prominence relative to the amount of natural masking noise in the environment. The region enclosed by the 37 dBA contour line essentially defines the area where an increase of 6 dBA or more might occur when background sound levels are momentarily at a near-minimum. As can be seen, this area is extensive and essentially includes the entire Project area – meaning that project noise will, at least some of the time, be clearly noticeable over a fairly wide area. Project audibility may be particularly pronounced at the houses along Dye Road at base of Ball Hill in the southeastern corner of the site near Turbines 38 – 40. This location is somewhat sheltered from the prevailing southwesterly wind, which may lead to relatively low levels of background noise during fairly windy conditions. A Project-only sound level of 39 dBA at these homes, although fairly low in absolute terms, may be quite noticeable if background levels are unusually low.

In general, the dividing line between an acceptable and adverse impact from wind turbine noise is much more gray and indistinct than it is for most other types of noise sources, such as a conventional power station. Much of it has to do with an individual's general attitude towards the project and aspects of it that have nothing to do with noise – so it is certainly not a foregone conclusion that everyone within the 37 dBA sound level contour shown in Plot 3 will be adversely affected by or even notice Project noise.

As an example, Figures 3.5.1 and 3.5.2 below are excerpted from a study by Pedersen and Persson-Waye [Ref. 8] where residents living in and around an operational wind farm in Sweden were interviewed about noise from the turbines. The results of this poll are interesting in that it is not really the magnitude of the sound level that leads to annoyance but rather individual attitudes towards any given project.

In Figure 3.5.1 the percentage of respondents annoyed by project noise at levels above 40 dBA varies from about 38% for those with a generally positive attitude towards to the project to almost 100% for those with a negative view of the project.

Even more pronounced is the annoyance due to noise reported by those with differing opinions on the visual aspects of the project. In Figure 3.5.2 it can be seen that about 70% of those that don't like the way the project looks think noise is problem at levels above 40 dBA while absolutely no one that doesn't have a problem with project appearance is annoyed by that sound level.

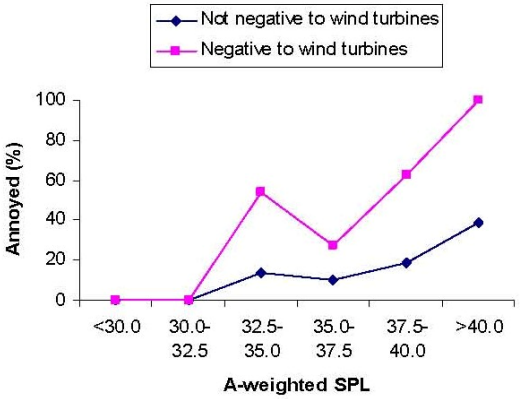


Figure 3.5.1 *General Attitude and Annoyance from Noise (from Pedersen)*

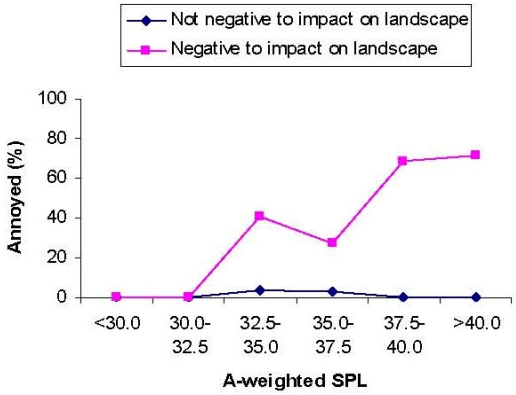


Figure 3.5.2 *Visual Attitude and Annoyance from Noise (from Pedersen)*

Consequently, it is somewhat difficult to predict what the reaction of the community will be to the Project based solely on the anticipated maximum sound levels. However, judging from the charts in Figures 3.5.1 and 3.5.2 it appears that some residents within the NYSDEC threshold of 37 dBA may well be dissatisfied with project noise with the degree of annoyance depending in large measure on individual attitudes towards the project.

Within this context it should be noted that the clear perceptibility of Project noise below about 40 dBA is likely to be intermittent in nature because these predictions are only valid for a worst-case 6 m/s wind. Recalling Table 3.3.1, potential impacts will nominally be lower under all other conditions.

In addition, the plots are intended to conservatively represent each situation, since for the predicted sound levels to actually occur the following conditions would be necessary:

- The wind would need to be blowing from all the nearest turbines towards the point of observation
- The wind would need to be blowing at a speed of 6 m/s
- The ground surface would need to be semi-reflective (as might happen when it is frozen or partially covered with ice or glazed snow)
- No leaves on the trees
- Observer outside
- Environmental noise temporarily at a minimum (L90 level)

These conservative assumptions and worst-case conditions have been consciously adopted for the analysis because the perceptibility of turbine noise does vary with atmospheric conditions and time of day, as reported by van den Berg [Ref. 9], for example. Consequently, there may be times, when the conditions are right, when the actual impact may approach or exceed the conservatively predicted levels in the plots. Of course, there will also be times, probably the majority of the time, when the perceptibility of Project noise will be less than indicated in the graphics.

In summary, the model predictions indicate that Project noise is likely to be audible, at least intermittently, at most of the houses in the immediate Project Area and that a certain percentage of residents may find Project noise annoying – particularly during certain atmospheric and seasonal conditions that favor sound propagation. In effect, adverse reactions cannot be ruled out.

3.6 COMPLIANCE WITH LOCAL WIND ENERGY FACILITY LAWS

It is evident from Plot 1 that a Project-only sound level of 50 dBA or more will not occur at any homes or other sensitive receptors within the Project Area as required by the Town of Villenova and as proposed by Hanover. In addition, no significant tonal noise is anticipated.

3.7 SEASONAL INFLUENCES ON POTENTIAL NOISE IMPACTS

Experience in conducting ambient sound level surveys at all times of the year indicates that background levels are lowest in winter when the leaves are off the trees. The sound of the wind rustling through leaves or over fields of crops or grass is most prominent in the mid to high frequencies, which is the region of the audible frequency spectrum that the human ear is most sensitive to. Since the purpose of "A-weighting" is to make a measured sound level agree with normal subjective perception, a summertime A-weighted background sound level, rich in mid to high frequency sound, is usually noticeably louder than the typical wintertime background level – such as that measured during this survey.

Note from the photographs in Section 2.2 that all the trees were bare during the background survey and that a considerable amount of snow was still on the ground.

The relevance of this to potential noise impacts from a wind farm is that relatively high levels of wind-induced background masking noise are normally available in summer whereas lower levels exist in winter. Consequently, the perceptibility of turbine noise, which itself is unaffected by the seasons, is lower in summer and higher in winter for an outdoor observer.

However, because people are generally indoors with the windows closed in the wintertime the greater perceptibility of turbine noise in winter does not automatically mean that the likelihood of disturbance or annoyance will also increase. Inside a typical house at a typical setback distance of more than 1000 feet turbine sound levels are likely to be very low so, in general, the potential for any significant noise impact from turbine operation is more likely during the warmer months of the year when outdoor activities occur and windows might be open. Coincidentally, this is also the time of year when background levels during windy conditions are relatively high making it more difficult to hear any turbine noise.

3.8 LOW FREQUENCY NOISE

Modern wind turbines of the type proposed for this project do not generate low frequency or infrasonic noise to any significant extent and no impact of any kind is expected from this. Early wind turbines with the blades downwind of the support tower were prone to producing a periodic thumping noise each time a blade passed the tower wake - but this effect no longer exists with the upwind blade arrangement used today.

Concerns about excessive low frequency noise from proposed wind farms are commonly voiced but they have apparently grown out of misinformation or anecdote (possibly stemming from early downwind turbine designs) without any basis in fact. A likely explanation for this widely-held belief is that the extreme low end of the frequency spectrum (only) is easily excited by wind blowing over a microphone, even with a windscreen in place, and, almost by definition, wind turbines are measured during windy conditions. Taken a face value any casual measurement of a wind turbine is likely to falsely indicate high levels of low frequency noise. The fact of the matter is that if the measurement were repeated *without* the turbine in operation essentially identical levels of low frequency noise would be measured.

A study has been recently completed by Sondergaard [Ref. 12] with the specific objective of determining whether large wind turbines produce significant low frequency noise. Extremely careful measurements were made based on the IEC 61400 measurement procedure using multiple elaborate wind screens over a microphone placed on a reflective ground plate (where the wind velocity is theoretically zero) to minimize self-noise contamination. The results of this testing show that for a typical 1.5 MW turbine its sound levels taper down steadily in magnitude towards the low end of the frequency spectrum and that the sound energy below about 40 Hz is actually comparable to the sound energy in the natural rural environment where the measurements were made (as shown in Figure 3.8.1).

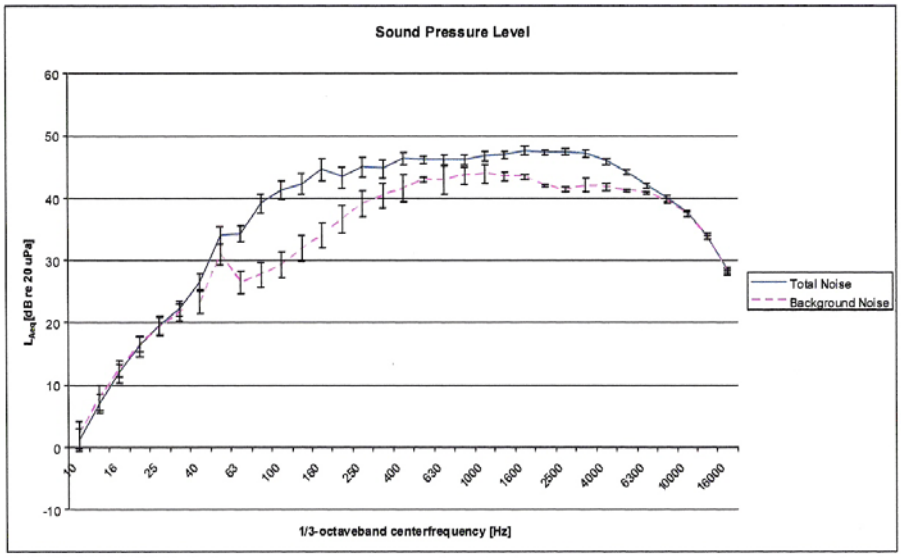


Figure 21 Spectra of total noise and background noise for a 1.5 MW wind turbine. A 50 Hz frequency from a nearby power line influences the measurements.

Figure 3.8.1 *Measured Turbine Sound Level down to 10 Hz Relative to Background Sound Level (Sondergaard)*

Another measure of low frequency noise is the "C-weighted sound level", which does not substantially suppress the lower frequencies to the extent A-weighting does. Because of this characteristic, C-weighted sound levels are most commonly used to measure and evaluate noise sources that produce significant amounts of low frequency noise - like combustion turbines. In ANSI Standard B133.8 *Gas Turbine Installation Sound Emissions* [Ref. 5] a threshold level of 75 to 80 dBC is given as the approximate on-set point for complaints and the perception of vibrations due to airborne sound.

The maximum predicted C-weighted sound level for any residence near the site area is 62 dBC. Obviously, this level is well below the threshold of perception therefore no adverse impact is expected at any receptors from low frequency noise.

3.9 CONSTRUCTION NOISE

Noise from construction activities associated with the Project is likely to temporarily constitute a moderate unavoidable impact at some, if not most, of the homes in the Project Area. Assessing and quantifying these impacts is difficult because construction activities will constantly be moving from place to place around the site leading to highly variable impacts with time at any given point.

In general, the maximum potential noise impact at any single residence might be analogous to a few days to a few weeks of repair or repaving work occurring on a nearby road or to the sound of machinery operating on a nearby farm. More commonly (at houses that are some distance away), the sounds from Project construction are likely to be faintly perceived as the far off noise of diesel-powered earthmoving equipment characterized by such things as irregular engine revs, back up alarms, gravel dumping and the clanking of metal tracks.

Construction of the Project is anticipated to consist of several principal activities:

- Access road construction and electrical tie-in line trenching
- Site preparation and foundation installation at each turbine site
- Material and subassembly delivery
- Erection

The individual pieces of equipment likely to be used for each of these phases and their typical noise levels as reported in the *Power Plant Construction Noise Guide* (Empire State Electric Energy Research Corp., [Ref. 6]) are shown below in Table 3.9.1. It should be noted that the reference used for equipment sound levels is quite old, dating back to 1977, and that the levels in it are roughly 5 dBA higher than the values that can be found in more recent references, such as from the FHWA [Ref. 15] for modern construction equipment. These older, higher values have been deliberately used just to be conservative.

Also shown in the table below are the maximum total sound levels that might temporarily occur at the closest non-participating residences (at least 1000 ft. away) and the distance from a specific construction site at which its sound would drop to 40 dBA. A bland, steady sound of level of 40 dBA is generally considered so quiet (about the sound level in a library) that it is not usually viewed as objectionable even when the background, or masking, sound level is negligible. Unlike for the operational Project, wind speed is irrelevant to the background level during the construction phase because there will be times when construction is occurring during calm and quiet periods.

Table 3.9.1 *Construction Equipment Sound Levels by Phase*

Equipment Description	Typ. Sound Level at 50 ft., dBA [Ref. 6]	Est. Maximum Total Level at 50 ft. per Phase, dBA*	Max. Sound Level at a Setback Distance of 1000 ft., dBA	Distance until Sound Level Decreases to 40 dBA, ft.
Road Construction and Electrical Line Trenching				
Dozer, 250-700 hp	88	92	63	5500
Front End Loader, 300-750 hp	88			
Grader, 13-16 ft. blade	85			
Excavator	86			
Foundation Work, Concrete Pouring				
Piling Auger	88	88	59	4200
Concrete Pump, 150 cu yd/hr	84			
Material and Subassembly Delivery				
Off Hwy Hauler, 115 ton	90	90	61	4800
Flatbed Truck	87			
Erection				
Mobile Crane, 75 ton	85	85	56	3400

* Not all vehicles are likely to be in simultaneous operation. Maximum level represents the highest level realistically likely at any given time.

What the values in this table generally indicate is that, depending on the particular activity, sounds from construction equipment are likely to be significant at distances of up to 5500 feet – which means that construction will occur close enough to many homes within the Project that its noise will be clearly audible.

At the very worst, however, sound levels ranging from 56 to 63 dBA might temporarily occur over several weeks at homes 1000 ft. from turbine construction sites. Such levels would not generally be considered acceptable on a permanent basis or outside of normal daytime working hours (when all Project construction is planned), but as a temporary, daytime occurrence construction noise of this magnitude may go unnoticed by many in the Project Area. For others, Project construction noise may be an unavoidable temporary impact.

The estimated sound levels at 50 ft. in Table 3.9.1 also demonstrate that a maximum allowable sound level of 80 dBA recommended in the NYSDOT construction noise guidelines is only likely to occur at, or within 200 ft. of any specific construction site (a 12 dB reduction from the maximum level of 92 dBA at 50 ft. down to 80 dBA would occur at a distance of about 200 feet). Consequently, construction activities at the site of each turbine will result in sound levels that are substantially below 80 dBA at any homes due to the setback distance of at least 1000 feet. There may be some cases; however, where road construction or trenching operations occur closer to homes. A short-term sound level of 80 dBA or more is theoretically possible where this distance is less than about 200 feet, but such instances are considered unlikely because there aren't many instances where construction activities are required that close to homes and also because conservative values from a somewhat antiquated 1977 reference [Ref. 6] have been deliberately used for the equipment.

Noise from the very small amount of daily vehicular traffic to and from the current site of construction should be negligible in magnitude relative to normal traffic levels (even given the rural nature of the roads in the Project area) and temporary in duration at any given location.

4.0 CONCLUSIONS

A field survey of existing sound levels within the Noble Ball Hill Windpark project area indicates that background sound levels during wintertime conditions are variable and moderately dependent on wind speed. Noises from roadways and other man-made sources are relatively insignificant and sporadic at best over most of the site and existing sound levels are dominated by natural sources.

A regression analysis of sound levels vs. wind speed shows that the average, or "typical" background sound level increases with wind speed and ranges from about 40 to 44 dBA over the range of wind speeds where turbine noise is variable; i.e. from about 4 m/s (measured at a standard elevation of 10 m) to 7 m/s when the turbine rotor reaches maximum rotational speed and sound output becomes constant. The residual (L90) sound level increases from 28 to 34 dBA over the same wind speed range. A uniform, relatively quiet sound level was found to exist at 4 of the 6 monitoring stations, while higher levels were recorded at the remaining two positions. Consequently, the design L90 background level for the entire site was taken to be the average level from the 4 quieter locations. These four monitoring locations were fairly evenly distributed over the Villenova portion of the Project area and followed the same temporal, mostly wind driven, trends, even though they were miles apart.

A comparison, as a function of wind speed, between the background sound levels and the variable sound power level of GE 1.5sle turbine proposed for the Project indicates that the maximum potential for an adverse impact from noise occurs at a wind speed of 6 m/s. At this wind speed the greatest differential exists between the turbine sound level and the amount of masking background noise available to obscure Project noise. This analysis showed that the "typical" (Leq) background sound level likely to exist under these conditions was **43 dBA** and the "worst-case", near minimum (L90) sound level was **32 dBA**.

In the New York State Department of Environmental Conservation's Program Policy *Assessing and Mitigating Noise Impacts* a cumulative increase in total sound level up to 6 dBA is characterized as having "potential for adverse noise impact only in cases where the most sensitive of receptors are present" and is suggested as a threshold for determining what areas might be adversely impacted by a new noise source and what areas should see "no appreciable effect". For this site a 6 dBA cumulative increase is associated with a Project-only sound level of **48 dBA** (43 + 48 = 49 dBA, or 6 dBA above the background level) for typical conditions and **37 dBA** when the background sound level is at a momentary minimum.

A "Second Level" modeling study carried out per the NYSDEC guidelines showed that the region where noise impacts might occur (i.e. where an increase of 6 dBA or more might occur) is confined to the immediate area of the turbines and does not encompass any houses basing the analysis on the average sound level of 43 dBA at the critical wind speed of 6 m/s. However, the potentially affected area grows significantly in size when the L90 sound level (32 dBA) is used as the design datum. In this latter scenario essentially the entire site area is encompassed by the 6 dBA increase threshold.

In theory, the model suggests that Project noise will be clearly audible above the minimum background sound level over the entire site but it should be pointed out that the modeling is conservative in a number important respects:

- The background design sound level of 32 dBA for this case is the residual, L90 level, which represents the quietest lulls between wind gusts, cars passing by, dogs barking, etc. As such, this level quantifies a very low value for masking environmental noise. Most of the time a higher background sound level of about 43 dBA, the Leq level, will exist during a 6 m/s wind condition.

- The noise model assumes that a 6 m/s wind is blowing simultaneously from all directions and that the turbine sound level experienced at any given point is the sound level that would occur downwind from all turbines in the project. Such a sound level is a physical impossibility in many situations. For example, a receptor between two turbines cannot possibly be downwind from both units at the same time.

- The ground surface is assumed to have a fairly low absorptivity – normally farm fields are highly absorptive.

- The design background level was measured under relatively quiet wintertime conditions when there were no leaves on the trees or insect noise. During this part of the year the wind causes less noise from tree rustle, while during the summer a higher background level (usually on the order of about 5 dBA) is likely to exist during a 6 m/s wind making turbine noise less perceptible.

- The predicted sound levels occur outside. Sound levels inside of any dwelling will be 10 to 20 dBA lower. This reduction puts Project noise levels inside any structure at about 30 dBA or less – or below the sleep disturbance threshold of 30 dBA published by the World Health Organization [Ref. 10].

These conservative assumptions are intended to over-estimate Project sound levels under most normal conditions so that some allowance or safety factor exists to cover the intermittent occurrence of certain atmospheric conditions that allow turbine noise to be more readily perceived, such as during stable atmospheric conditions that sometime develop in the evening or at night.

Additionally, the modeling has been carried out in a deliberately conservative manner to take into account the character of wind turbine noise, which usually contains a swishing sound, or amplitude modulation. This characteristic can at times make turbine noise discernable when its overall sound level is at parity with or generally comparable to the background level - rather than when it is 6 dBA above the background level. What this means is that adverse reactions to project noise are possible anywhere the Project sound level is approximately 32 dBA or higher, which is to say at all points in and around the immediate the Project area.

All things considered, the field measurements and modeling suggest that a moderately adverse reaction may be expected from some residents in the Project area and that the possibility of stronger reactions cannot be ruled out. The density of turbines despite the units already deleted for noise mitigation purposes, their proximity to residences and the relatively low background sound levels found during the field survey mean that some level of dissatisfaction is likely.

In any event, the modeling analysis shows that full compliance with the local laws in Villenova and Hanover relating to wind energy facilities is expected. The maximum allowable sound level of 50 dBA is predicted to occur well short of any residence or potentially sensitive receptor. In addition, no significant tonal content is anticipated from Project noise.

Although concerns are often raised with respect to low frequency noise emissions from wind turbines, no adverse impact of any kind related to low frequency noise is expected from this Project. The results of a carefully controlled field study are shown demonstrating that a typical 1.5

MW wind turbine produces no significant noise below about 40 Hz. In addition, the maximum (conservatively) predicted C-weighted sound level at any receptor is at least 13 dBC below the 75 dBC minimum threshold of perception per ANSI B133.8.

Unavoidable but mild noise impacts may occur during the construction phase of the Project. Construction noise, sounding similar to that of distant farming equipment is anticipated to be sporadically audible at most homes within the immediate Project vicinity on a temporary basis. The maximum magnitude of construction noise at the nearest homes to individual turbine locations is not expected to exceed 56 to 63 dBA depending on the particular activity.

END OF REPORT TEXT

REFERENCES

1. International Electromechanical Commission (IEC) 61400-11:2002(E) *Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques*, Second Edition 2002-12.

2. American National Standards Institute (ANSI) S12.36-1990, *Survey Methods for the Determination of Sound Power Levels of Noise Sources*, 1990.

3. U. S. Environmental Protection Agency, Report EPA 550/9-76-003 *Model Community Noise Control Ordinance*, Washington, DC, 1975.

4. American National Standards Institute (ANSI) S1.13-1995, *Measurement of Sound Pressure Levels in Air*, 1995.

5. American National Standards Institute (ANSI) B133.8-1977 *Gas Turbine Installation Sound Emissions*, Appendix B, 1989.

6. Empire State Electric Energy Research Corporation, *Power Plant Construction Noise Guide*, Bolt Beranek and Newman Report 3321, May 1977.

7. GE Wind Energy GmbH, "Technical Documentation, Wind Turbine Generator System GE 1.5sl/sle 50 & 60 Hz", *Noise Emission Characteristics – Normal Operation According to IEC*, 2005.

8. Pedersen, E. and Persson Waye, K., *Human Response to Wind Turbine Noise – Annoyance and Moderating Factors*, Proceedings from Wind Turbine Noise: Perspectives for Control, Berlin, October 2005.

9. van den Berg, G.P., *Mitigation Measures for Nighttime Wind Turbine Noise*, Proceedings from Wind Turbine Noise: Perspectives for Control, Berlin, October 2005.

10. Berglund, B., Linvall, T., Schwela, D., *Guidelines for Community Noise*, World Health Organization, 1999.

11. Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, Vol. 1, 2nd Edition, 1984.

12. Sondergaard, B., Hoffmeyer, D, *Low Frequency Noise from Wind Turbines*, Proceedings from Wind Turbine Noise 2007, Lyon, France, Sept. 21, 2007.

13. Nelson, D, *Perceived Loudness of Wind Turbine Noise in the Presence of Ambient Sound*, Proceedings from Wind Turbine Noise 2007, Lyon, France, Sept. 21, 2007.

14. Hessler, G. F., Hessler, D.M., Brandstaett, P., Bay, K, "Experimental study to determine wind-induced noise and windscreen attenuation effects on microphone response for environmental wind turbine and other applications", *Noise Control Engineering Journal*, J.56, July-August 2008.

15. U. S. Dept. of Transportation, Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, Table 1, Jan. 2006.

Description:

Graphic A
Sound Monitoring Positions

Project:

Noble Ball Hill Windpark

Drawing Number:

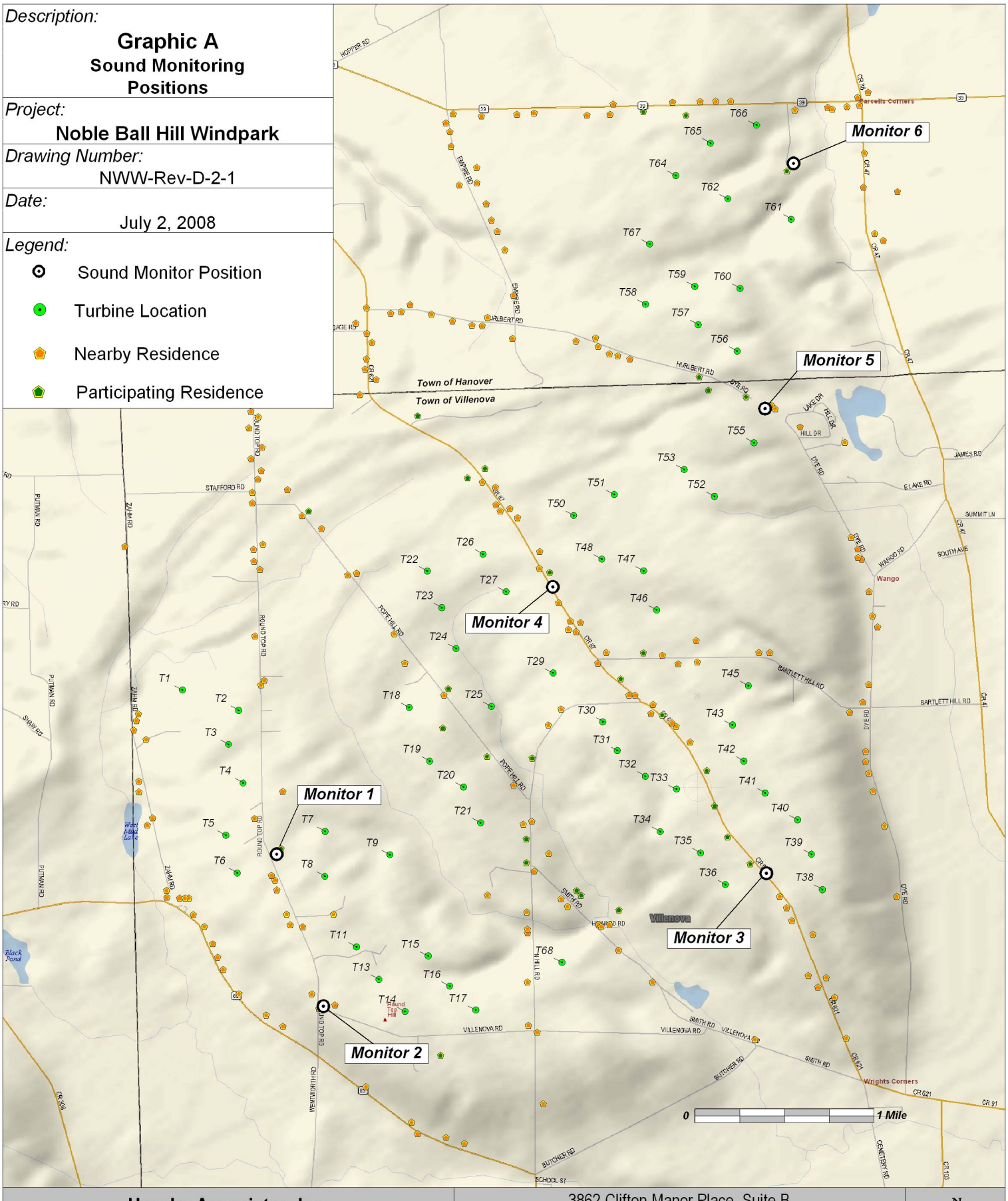
NWW-Rev-D-2-1

Date:

July 2, 2008

Legend:

- Sound Monitor Position
- Turbine Location
- Nearby Residence
- Participating Residence



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Consultants in Engineering Acoustics

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3862 Clifton Manor Place, Suite B
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Description:

Plot 1

Predicted Sound Contours (dBA) of GE 1.5sle Turbines with an Omnidirectional 7 m/s Wind

Project:

Noble Ball Hill Windpark

Drawing Number:

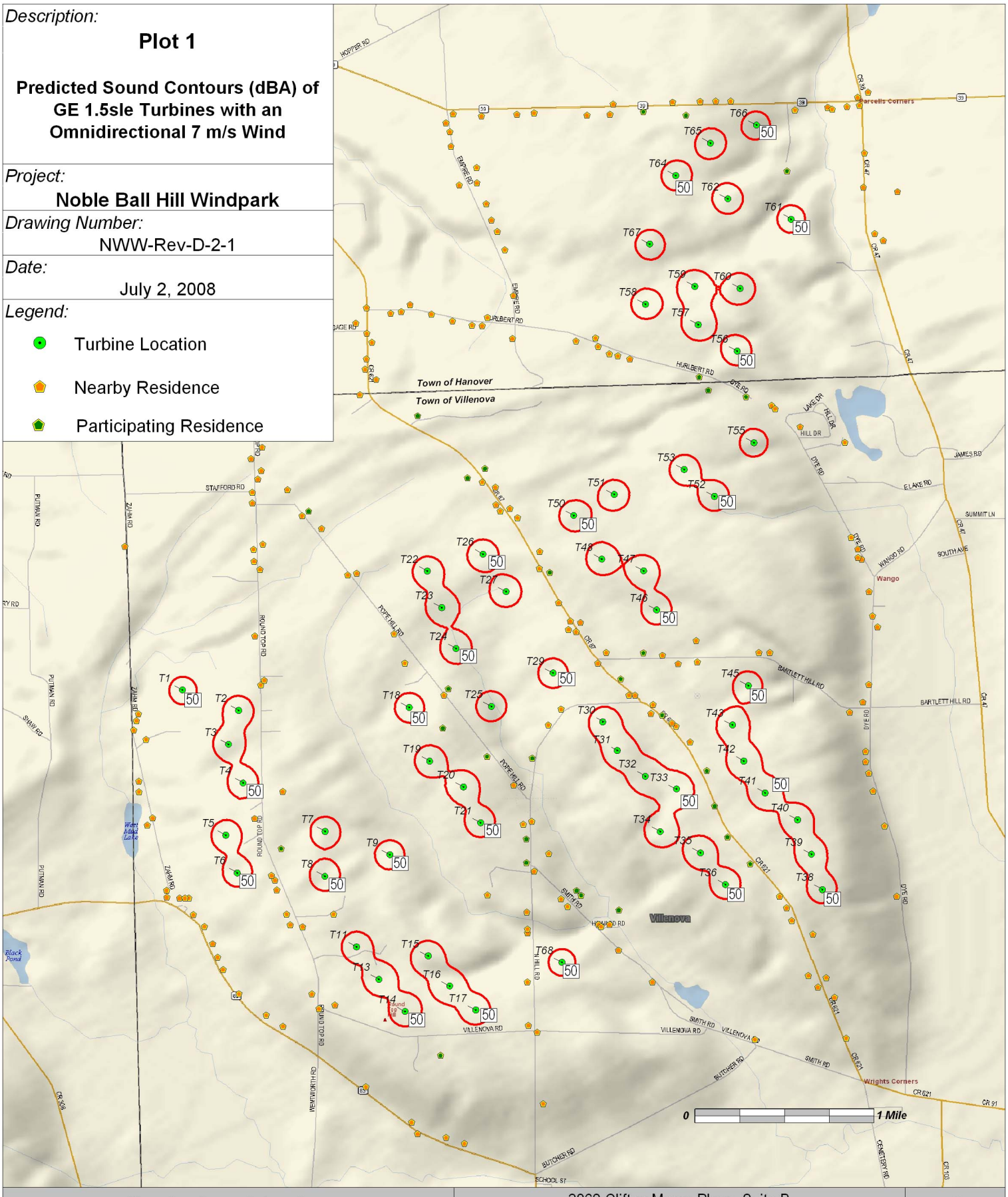
NWW-Rev-D-2-1

Date:

July 2, 2008

Legend:

- Turbine Location
- Nearby Residence
- Participating Residence



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N W E S

Description:

Plot 2

Predicted Sound Contours (dBA) of GE 1.5sle Turbines with an Omnidirectional 6 m/s Wind Based on Typical Leq Background Level

Project:

Noble Ball Hill Windpark

Drawing Number:

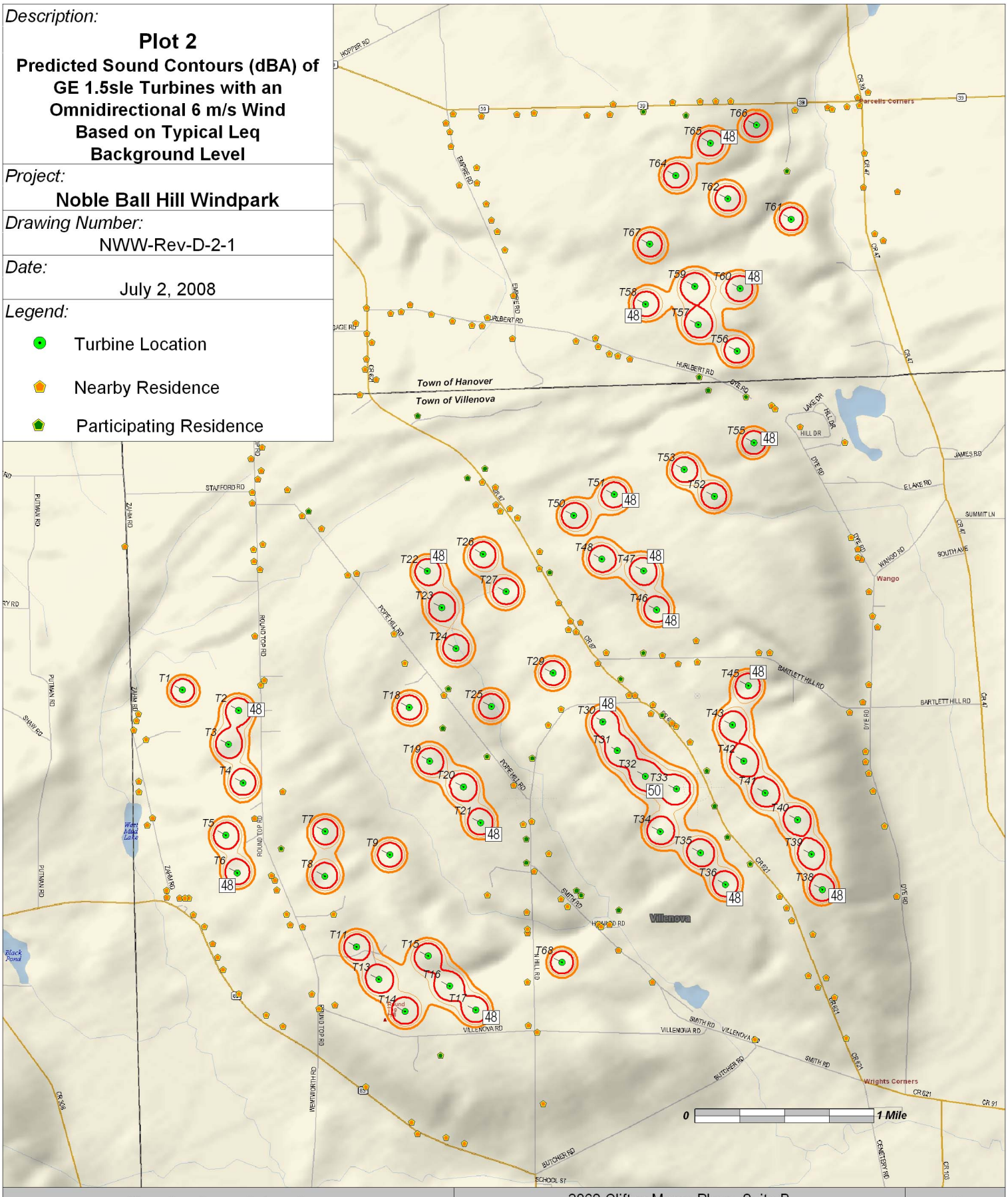
NWW-Rev-D-2-1

Date:

July 2, 2008

Legend:

- Turbine Location
- Nearby Residence
- Participating Residence



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Description:

Plot 3

Predicted Sound Contours (dBA) of GE 1.5sle Turbines with an Omnidirectional 6 m/s Wind Based on Worst-Case L90 Background Level

Project:

Noble Ball Hill Windpark

Drawing Number:

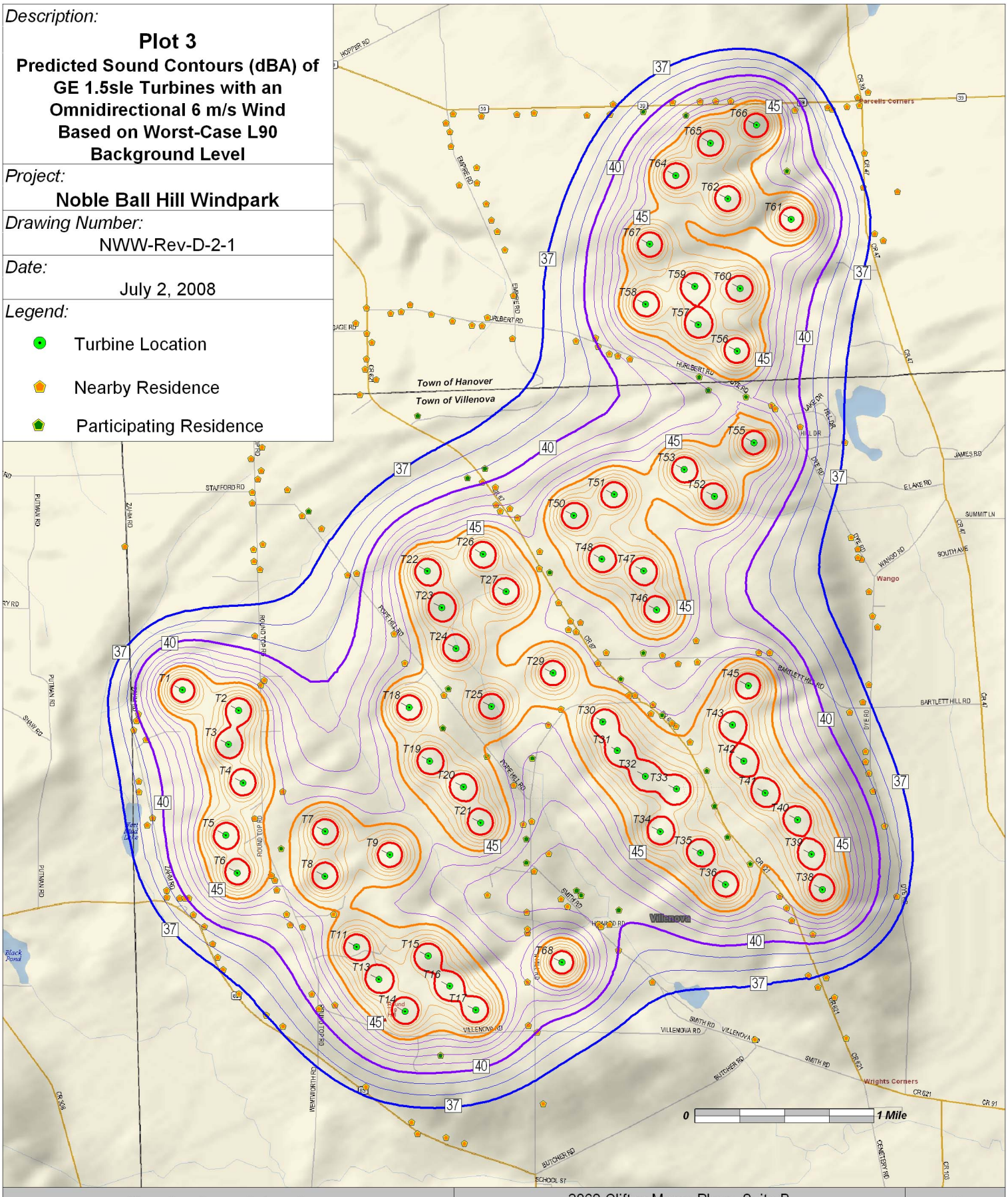
NWW-Rev-D-2-1

Date:

July 2, 2008

Legend:

- Turbine Location
- Nearby Residence
- Participating Residence



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M Communication Signal Study

Executive Summary – Wind Power GeoPlanner™
Licensed Microwave Search & Worst Case Fresnel Zone

Comsearch

Executive Summary – Wind Power GeoPlanner™

Licensed Microwave Search & Worst Case Fresnel Zone

Comsearch performed an analysis to evaluate the potential effects of the planned Ball Hill project in Chautauqua County, New York on existing non-Federal Government microwave telecom systems.

Microwave Search Results: Comsearch's Wind Power GeoPlanner™ provides a graphical representation of affected microwave paths and provides supporting technical parameters. The microwave path data is overlaid on topographic basemaps. Comsearch identified 13 microwave paths that intersect the project area (see Figure 1 and Table 1 below).

Comsearch then calculated a Worst Case Fresnel Zone (WCFZ) for each microwave path in the project area. The mid-point of a full microwave path is the location where the widest (or worst case) Fresnel zone occurs. Fresnel zones are calculated for each path using the following formula.

$$Rn \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d1d2}{d1+d2}\right)}$$

Where,
R_n = First Fresnel Zone Radius, meters
n = The Number 1
F_{GHz} = Frequency of Microwave Link, GHz
d1 = Distance to Wind Turbine from Microwave Station 1, km
d2 = Distance to Wind Turbine from Microwave Station 2, km

note: For WCFZ calculation d1 = d2

The calculated WCFZ radius, giving the linear path an area or swath, buffers each microwave path in the project area. The distance unit is in meters and can be found in the column attribute "WCFZ." In general, this is the XY area where the planned wind turbines should be avoided, if possible. These areas are shown in Figure 2.

Please note that because the turbine locations were not provided, we could not determine if any potential obstruction cases exist between the planned wind turbines and the microwave systems. If the latitude and longitude values for turbine locations are provided, Comsearch can identify specific microwave telecom paths and turbines where a potential XY conflict exists. Additionally, when wind turbines need to be located inside a WCFZ, Comsearch can provide a detailed clearance study, which considers the vertical Z-height clearance objectives.

Map Projection: The ESRI® Shapefiles contained in the enclosed GeoPlanner CD are in NAD 83 UTM Zone 17 projected coordinate system.

Comsearch Contact:
Denise Finney, Account Manager
Phone: (703) 726-5650 Fax: (703) 726-5595
Email: dfinney@comsearch.com

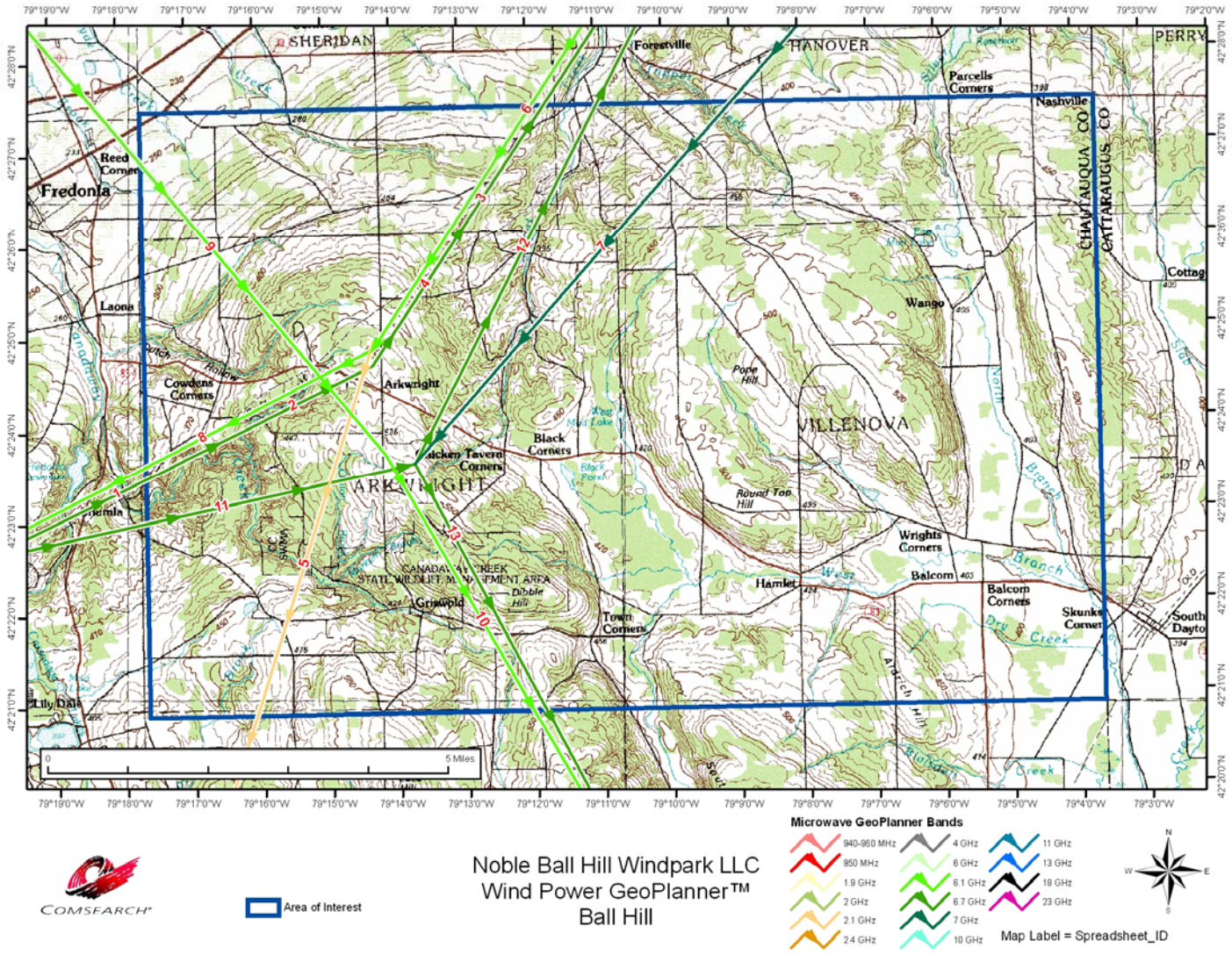

Figure 1 – Wind Power GeoPlanner™

M-7

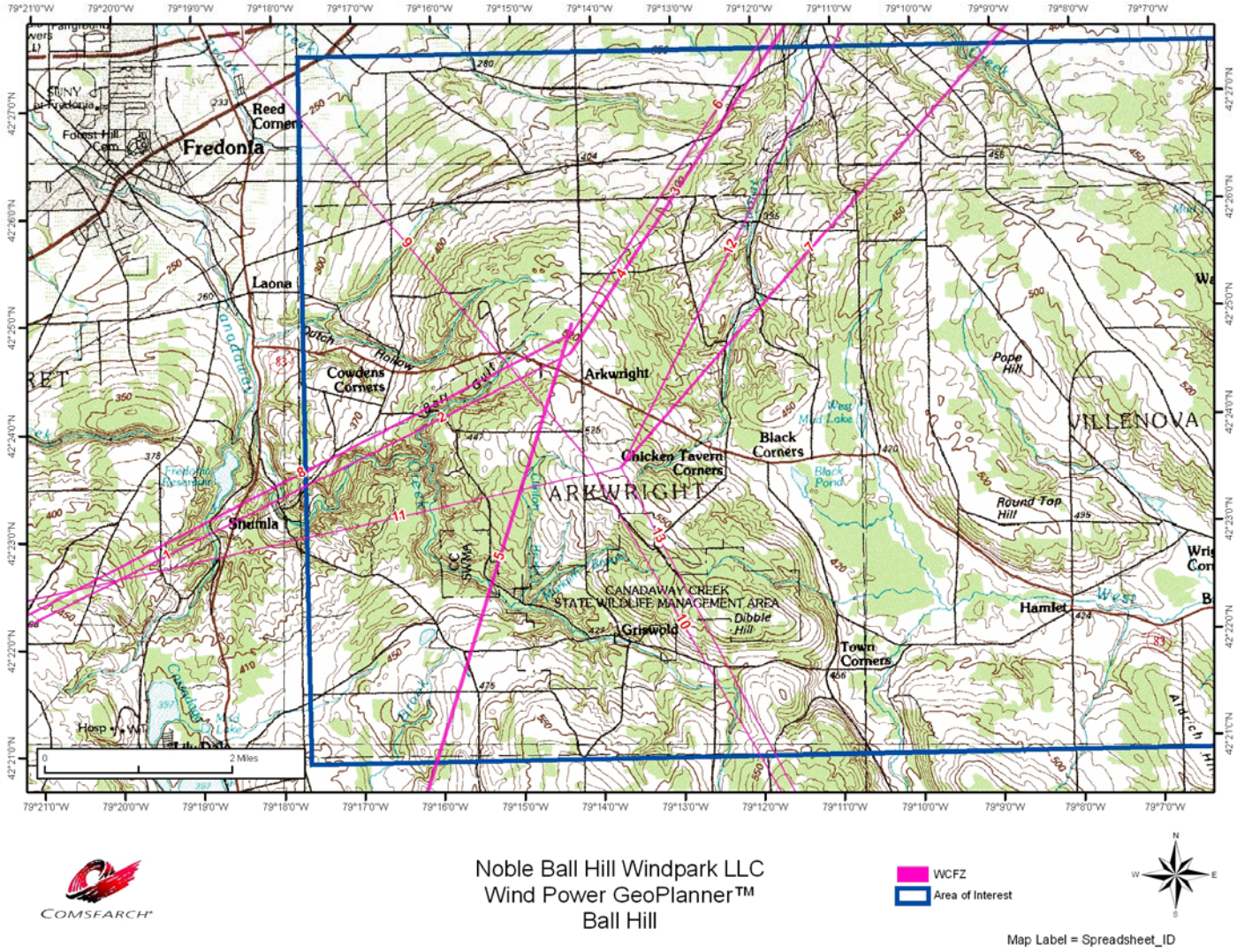

Figure 2 – Wind Power GeoPlanner™ & WCFZ

M-8

	Site Name	Call Sign	Latitude	Longitude	Band Name	Licensee	WCFZ (m)
1-2	WESTFIELD	WBB741	42.27372222	-79.62394444	Upper 6 GHz	Norfolk Southern Railway	19.84
	ARKWRIGHT	WBB742	42.41116667	-79.23866667			
3-4	ARKWRIGHT	WBB742	42.41116667	-79.23866667	Upper 6 GHz	Norfolk Southern Railway	26.81
	BUFFALO	WBH542	42.88894444	-78.79447222			
5	ARKWRIGHT	WMK453	42.41561111	-79.23836111	2.1 GHz	Dobson Cellular Systems, Inc.	31.05
	ELLERY CNTR	WMK454	42.17916667	-79.34305556			
6	ANGOLA	WMP200	42.62750000	-79.04380556	Lower 6 GHz	Upstate Cellular Network	18.61
	ARKWRIGHT	WPOS280	42.41422222	-79.23838889			
7	BIG TREE RD	WPNF351	42.76338889	-78.77197222	7 GHz	FAITH BROADCASTING NETWORK, INC.	24.39
	ARKWRIGHT	RXONLY	42.39338889	-79.22866667			
8	ARKWRIGHT	WPOS280	42.41422222	-79.23838889	Lower 6 GHz	Upstate Cellular Network	19.93
	WESTFIELD	WPOR599	42.28311111	-79.59477778			
9	DUNKIRK	WPRR465	42.48444444	-79.33361111	Lower 6 GHz	CHAUTAUQUA COUNTY	12.44
	ARKWRIGHT	WPRR472	42.39505556	-79.23588889			
10	ARKWRIGHT	WPRR472	42.39505556	-79.23588889	Lower 6 GHz	CHAUTAUQUA COUNTY	12.25
	CHERRY CREEK	WPRR461	42.29750000	-79.16305556			
11	PRB1004A	WQFB456	42.36916667	-79.38750000	Upper 6 GHz	New York State Office for Technology SWN	12.21
	PRB1010A	WQFB461	42.39333333	-79.22861111			
12	PRB1010A	WQFB461	42.39333333	-79.22861111	Upper 6 GHz	New York State Office for Technology SWN	15.02
	PRB1013C	WQFB462	42.55422222	-79.11383333			
13	PRB1010A	WQFB461	42.39333333	-79.22861111	Upper 6 GHz	New York State Office for Technology SWN	11.55
	WESTFIELD	WBB741	42.27372222	-79.62394444			

Table 1 – Microwave GeoPlanner Links Considered in Analysis (See enclosed mw_geopl.xls for more detailed information and GP_dict_matrix_description.xls for field description)

M-9

Letter to Edward Davison,
United States Department of Commerce
from Noble Environmental Power

Re: Notification of Ball Hill Wind Energy Development
in Chautauqua County, New York
May 2, 2008

Noble
ENVIRONMENTAL POWER

May 2, 2008

Mr. Edward Davison
U. S. Department of Commerce
1401 Constitution Avenue N.W.
Washington DC 20230
Via: Email

RE: Notification of Ball Hill Wind Energy Development in Chautauqua County, NY

Dear Mr. Davison:

This letter and its attachments will serve as notification to the government that Noble Environmental Power, LLC of Essex, Connecticut plans to install a Wind Energy facility in the vicinity of Chautauqua County, New York. The installation, comprised of 67 wind turbines, will be called the Noble Ball Hill Windpark.

Enclosed are maps and a table that describe the location of the Noble Ball Hill Windpark in Chautauqua County, New York.

Figure 1 is a map of the general area showing the locale of the wind energy project.
Figure 2 is a local map of the wind energy facility boundary.
Table I contains the coordinates of the boundary of the planned development area which is depicted in Figure 2.

Locations for the individual turbines are not yet identified. The dimensions of the wind turbines to be installed at this facility are:

Turbine tower height: 80 meters (262.5 feet) at hub,
Turbine blade diameter: 77 meters (252.6 feet).

Noble commissioned Comsearch of Ashburn, Virginia to search the FCC database for licensed microwave signals whose paths cross the project boundaries. Comsearch found one such signal. It would be most appreciated if the agencies represented in IRAC would also review the site plan for the wind facility and comment on the expected impact, if any, to government radar and telecommunication operations in the project vicinity within the next 45 days.

If you have any questions with regard to this notification, please call Rick Opalanko at (860) 581-5068.

Sincerely,

R. S. Opalanko

Richard S. Opalanko, P.E.
Noble Environmental Power
Applications Engineer

Attachments

Table I
Coordinates for Noble Ball Hill Windpark
Degrees, NAD83

Facility Point	Latitude	Longitude
Northwest	42.459412 N	79.177947 W
Northeast	42.459100 N	79.061100 W
Southeast	42.369633 N	79.060992 W
Southwest	42.369633 N	79.177947 W

Figure 1
General Area of Noble Environmental Power
Ball Hill Windpark

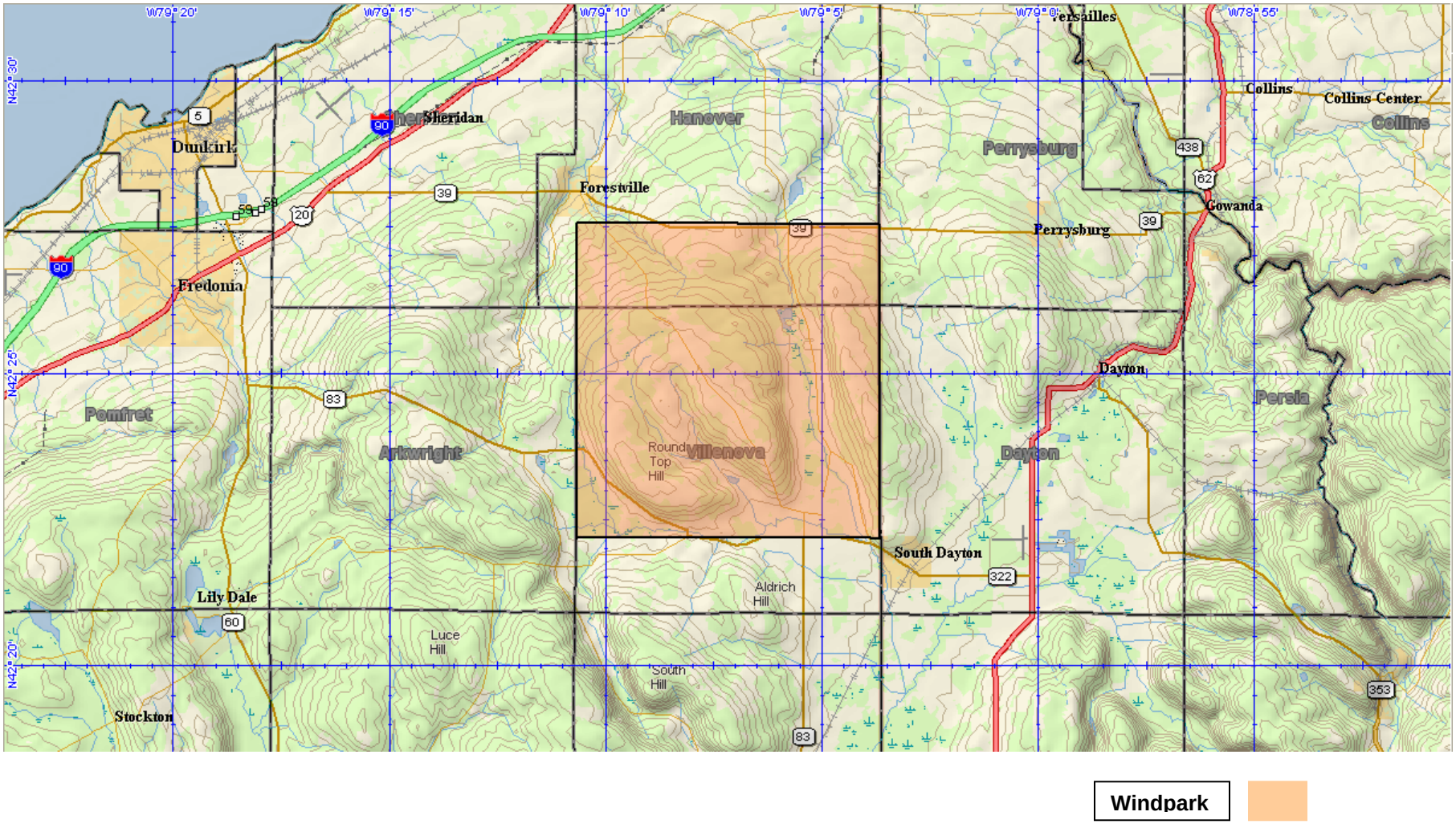

Figure 2
Local Area of Noble Environmental Power
Ball Hill Windpark

Analysis of AM and FM Broadcast Station Operations
in the Vicinity of the Ball Hill Wind Energy Project
in Chautauqua County, New York

Comsearch

19700 Janelia Farms Blvd
Ashburn, VA 20147
703-726-5500

Analysis of AM and FM Broadcast Station Operations in the Vicinity of the Ball Hill Wind Energy Project in Chautauqua County, New York

Comsearch was contracted by the Noble Ball Hill Windpark LLC of Essex, Connecticut to determine if there would be any degradation to the operational coverage of AM and FM Radio Broadcast Stations located in the vicinity of their proposed Ball Hill Wind Energy Project in Chautauqua County, New York.

Comsearch determined that there were two license entries for AM stations within a search radius (10 miles) of the center of the Project site. Both entries were for the same station (WDOE) that operates at two different transmit powers. The high power (1 kW) is for day-time operations and the low-power (500Watts) is for night-time operations.

Table 1 AM Radio Stations in the Vicinity of the Ball Hill Wind Energy Project

Location		Call Sign	Tx-ERP	Frequency	Distance
DUNKIRK	NY	WDOE	1.0 kW	1410 kHz	9.96 mi
DUNKIRK	NY	WDOE	0.5 kW	1410 kHz	9.96 mi

NY = New York
kHz = kilohertz
kW = kilowatt
mi = mile
Tx-ERP= transmit effective radiated power

Figure 1 is a map that shows the location of the AM transmit antenna with respect to the Project site. No degradation of AM broadcast coverage will occur due to the presence of the wind turbines as long as the separation distance to the nearest wind turbine is greater than 2 miles. Potential problems with broadcast coverage are only anticipated when AM broadcast stations with directive antennas are within 2 miles of turbine towers and AM broadcast stations with non-directive antennas are within 0.5 mile.

Comsearch determined that there were fifteen FM stations within a 10 mile search radius of the center of the Project site. The stations are listed in Table 2 of this report. One of the FM stations is a full-power station , i.e. stations with transmit powers > 10kW. Three of the FM stations are medium-power FM stations, i.e. stations with transmit powers between 1 and 10 kW. Two of the FM Stations are low-power FM stations, i.e. stations with transmit powers between 100 W and 1 kW. Eight of the FM stations are very low-power FM stations, i.e. stations with transmit power of < 100 Watts. One of the stations, WBKX, did not have it's transmit power defined but based on its common ownership by Chadwick Bay Broadcasting Corporation, its same call sign and the location within 0.5 mile of the same frequency medium power station it is believed to be a very-low power FM Station.

Figure 2 is a map that shows the location of the FM transmit antennas with respect to the Project

site.

Table 2 FM Radio Stations in the Vicinity of the Ball Hill Wind Energy Project

Location		Call Sign	Tx-ERP	Frequency	Distance
FREDONIA	NY	W203AW	0.01 kW	88.5 MHz	3.66 mi
FORESTVILLE	NY	W203AW	0.01 kW	88.5 MHz	2.68 mi
FREDONIA	NY	WCVF-FM	0.13 kW	88.9 MHz	8.79 mi
IRVING	NY	NEW	6. kW	89.3 MHz	12.76 mi
SILVER CREEK	NY	NEW	17. kW	89.3 MHz	8.52 mi
GOWANDA	NY	NEW	6. kW	89.3 MHz	11.21 mi
DUNKIRK	NY	W236BJ	0. kW	95.1 MHz	7.13 mi
FREDONIA	NY	WBKX	#NAME?	96.5 MHz	10.49 mi
FREDONIA	NY	WBKX	1.4 kW	96.5 MHz	10.95 mi
DUNKIRK	NY	NEW	0.1 kW	98.7 MHz	7.67 mi
SILVER CREEK	NY	W255BP	0. kW	98.9 MHz	9.97 mi
DUNKIRK	NY	NEW	0.055 kW	100.3 MHz	9.04 mi
DUNKIRK	NY	NEW	0.027 kW	100.5 MHz	7.13 mi
DUNKIRK	NY	NEW	0.013 kW	104.9 MHz	7.13 mi
DUNKIRK	NY	NEW	0.013 kW	105.9 MHz	7.13 mi

NY = New York
MHz = kilohertz
kW = kilowatt
mi = mile
Tx-ERP= transmit effective radiated power

All of the FM station antennas are located at distances greater than 2.68 miles from the center of the Ball Hill Wind Energy Project. Only the stations at 2.68 and 3.66 mile distances are within the Project area-of-interest. Both of these stations are very low-power stations and as long as separated from the wind turbines by 0.5 miles will not have their operation affected. At distances of 3 miles or more from the wind turbines, the effects to the FM coverage for all of the other stations will be very minimal to non-existent.

The FM station (W203AW, Forestville, NY) listed at a separation distance of 2.68 miles was found to be within 0.5 miles of two of the planned wind turbines. Because of this a further examination of the station license was made. The station does not have an operational license. It only has a construction permit. Field investigations in July 2008 showed that there was no station transmitter located at the coordinates listed in the station's construction permit application. Also, the construction permit stated that the antenna height of the station antenna would be 27 meters above ground level. The wind turbine blades are centered at a height of 80 meters with a radius of 38.5 meters, which means that the blade tip lowest height will be 41.5 meters. This shows that the wind turbine blades will be above the FM station antenna by 14.5 meters. Therefore, if the station becomes operational in conformance with its construction permit its operation will not be obstructed by the blades on the wind turbines in the area.

The thirteen other FM stations are outside of the Ball Hill area-of-interest. For the low-power and very low-power FM stations, since their coverage does not extend as far as their separation from the wind energy facility no degradation of their coverage will occur. The very low-power

FM stations are designed for very limited coverage. Their coverage is normally no greater than 0.5 mile. Normally this is a church parking lot or a very small community. The low-power FM station will cover a college campus or a small-town church community with special broadcasting for a limited audience. Normal coverage for these stations is usually less than 1.5 mile.

No problems are expected for the coverage of the full-power and the three medium-power FM stations because they are outside the area-of-interest and their separation distance from any of the wind turbines should be greater than 3 miles.

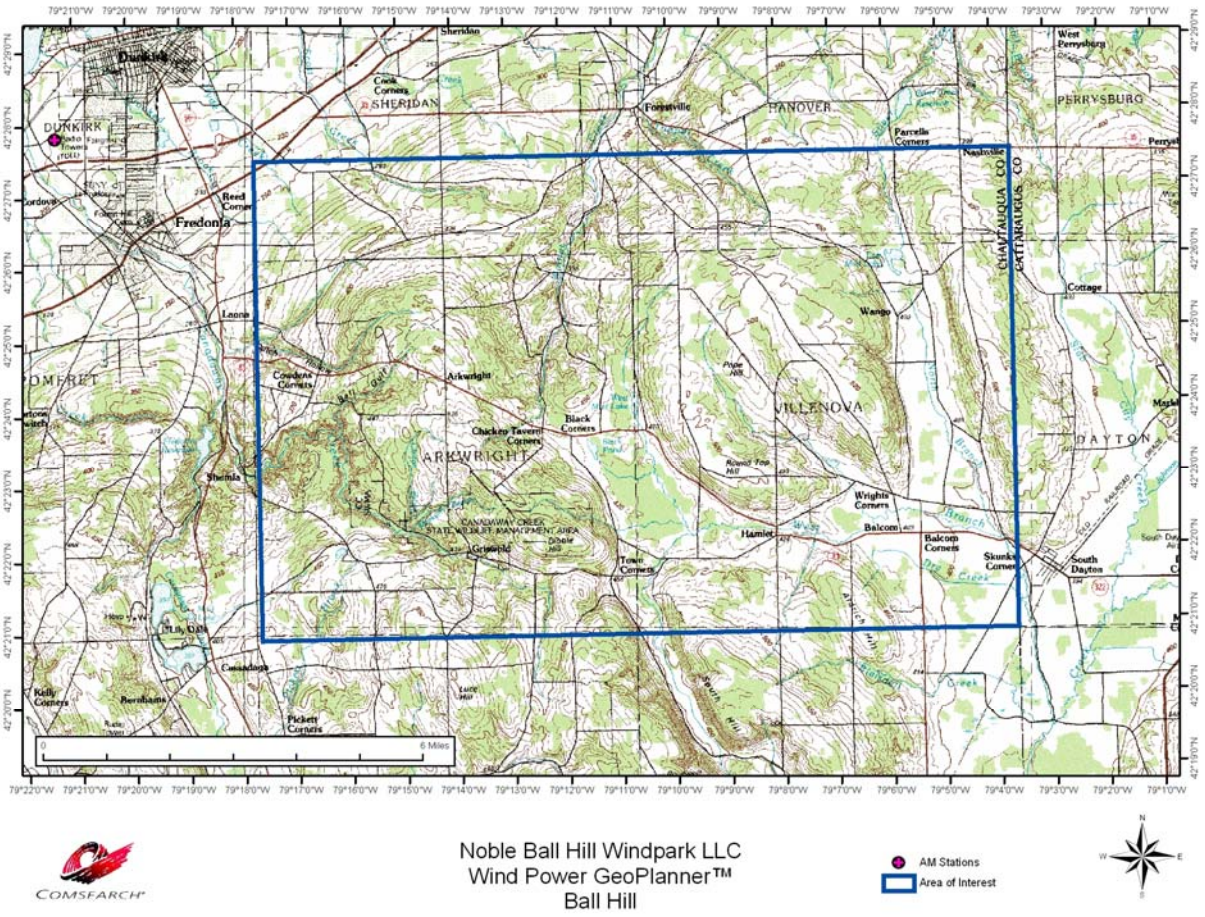

Figure 1 AM Station in the Vicinity of the Ball Hill Wind Energy Project

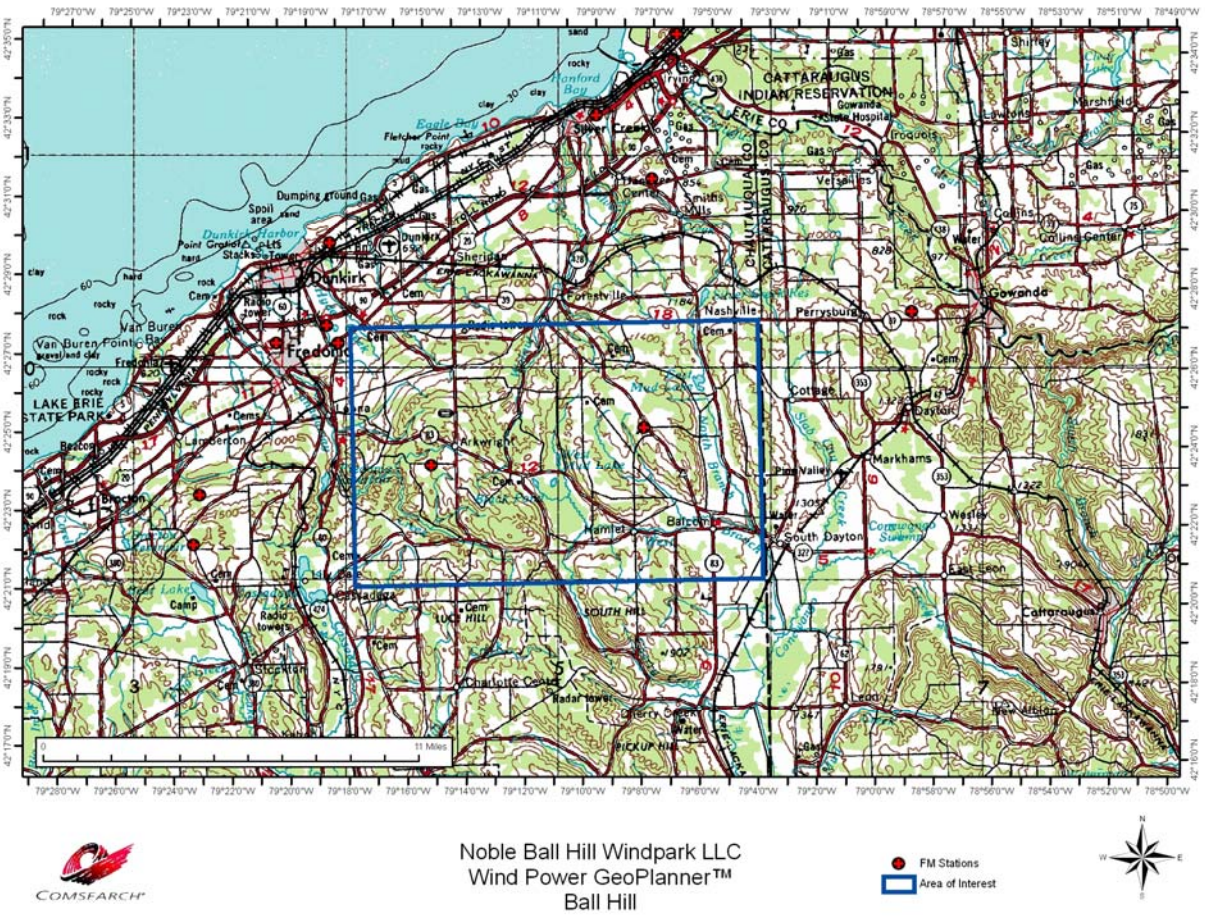

Figure 2 FM Stations in the Vicinity of the Ball Hill Wind Energy Project

Cellular/PCS Telephone and Land Mobile Radio (LMR) Analysis
in the Vicinity of the Proposed Ball Hill Wind Energy Project
in Chautauqua County, New York

Comsearch

COMSEARCH

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Ashburn, VA 20147
703-726-5500

Cellular/PCS Telephone and Land Mobile Radio (LMR) Analysis in the Vicinity of the Proposed Ball Hill Wind Energy Project in Chautauqua County, New York

Comsearch was contracted by Noble Ball Hill Windpark LLC of Essex, Connecticut to analyze the impact that the installation of the proposed Ball Hill Wind Energy Project (the Project) in Chautauqua County New York would have on the operation of cellular and Personal Communication Systems (PCS) telephone communications and LMR communications in and around the Project site. Table 1 lists the licensed cellular operators in Chautauqua County, New York. Table 2 lists the PCS operators in Chautauqua County. Cellular and PCS telephone coverage in the Project vicinity is based on the underlying county for the facility, which is Chautauqua. Chautauqua County is in Cellular Market Area (CMA) 563, New York 3- Chautauqua for cellular and Basic Trading Area (BTA) 215 and MTA (Market Trading Area) 035 for PCS. The LMR systems within the Chautauqua County area are listed in Table 3 and shown in Figure 1.

Table 1 Cellular Telephone Operators in Chautauqua County, New York

Operator	Band of Operation	Call Sign
AT&T	A	KNKN865
Verizon	B	KNKQ273
Sprint Nextel	A	KNLF269
AT&T	B	KNLF270

Table 2 PCS Telephone Operators in Chautauqua County, New York

Operator	Band of Operation	Call Sign
Verizon	C3	WQCS426
Verizon	C4	WPTB346
AT&T	C5	WPTI736
AT&T	D	KNLG454
T-Mobile	E	KNLF957
Blue Wireless	F	KNLG731

The telephone communications in the cellular and PCS frequency bands should be unaffected by the presence of the wind turbines. This applies to operations both within and outside of the Project site boundaries. Signal blockage caused by the wind turbines

would not degrade the telephone network because of the way these systems are designed to operate; that is, if the signal cannot reach one cell the network design allows it to be able to reach one or more other cells in the system. Therefore, local obstacles are not normally a problem for these telephone systems whether they are installed in urban areas near large structures and buildings or in a rural area such as the Chautauqua County area near the proposed Project. If a cellular or PCS company could show that their coverage has been compromised by the Project, an unlikely condition, the way to restore the coverage would be to add an additional cell or an additional sector antenna to an existing cell.

Table 3 LMR Licenses in the vicinity of the Ball Hill Wind Energy Facility

Location		Call Sign	Latitude	Longitude	Frequency-MHz	Owner-Operator
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	462.97500000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.00000000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.02500000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.05000000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.07500000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.10000000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.12500000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.15000000	Chautauqua County EMS
ARKWRIGHT	NY	KAN682	42.39477777780	-79.23588888890	463.17500000	Chautauqua County EMS
RANDOLPH	NY	KDP395	42.16088888890	-78.97336111110	33.68000000	Cattaraugus County
RANDOLPH	NY	KDP395	42.16088888890	-78.97336111110	33.70000000	Cattaraugus County
RANDOLPH	NY	KDP395	42.16088888890	-78.97336111110	33.74000000	Cattaraugus County
RANDOLPH	NY	KDP395	42.16227777780	-78.97447222220	33.68000000	Cattaraugus County
RANDOLPH	NY	KDP395	42.16227777780	-78.97447222220	33.70000000	Cattaraugus County
RANDOLPH	NY	KDP395	42.16227777780	-78.97447222220	33.74000000	Cattaraugus County
EAST RANDOLPH	NY	KDP395	42.17172222220	-78.94947222220	33.68000000	Cattaraugus County
EAST RANDOLPH	NY	KDP395	42.17172222220	-78.94947222220	33.70000000	Cattaraugus County
EAST RANDOLPH	NY	KDP395	42.17172222220	-78.94947222220	33.74000000	Cattaraugus County
CONEWANGO	NY	KDP395	42.23894444440	-79.03086111110	33.68000000	Cattaraugus County
CONEWANGO	NY	KDP395	42.23894444440	-79.03086111110	33.70000000	Cattaraugus County
CONEWANGO	NY	KDP395	42.23894444440	-79.03086111110	33.74000000	Cattaraugus County
LEON	NY	KDP395	42.29394444440	-79.01669444440	33.68000000	Cattaraugus County
LEON	NY	KDP395	42.29394444440	-79.01669444440	33.70000000	Cattaraugus County
LEON	NY	KDP395	42.29394444440	-79.01669444440	33.74000000	Cattaraugus County
CATTARAUGUS	NY	KDP395	42.32061111110	-78.86919444440	33.68000000	Cattaraugus County
CATTARAUGUS	NY	KDP395	42.32061111110	-78.86919444440	33.70000000	Cattaraugus County
CATTARAUGUS	NY	KDP395	42.32061111110	-78.86919444440	33.74000000	Cattaraugus County
OTTO	NY	KDP395	42.35561111110	-78.83197222220	33.68000000	Cattaraugus County
OTTO	NY	KDP395	42.35561111110	-78.83197222220	33.70000000	Cattaraugus County
OTTO	NY	KDP395	42.35561111110	-78.83197222220	33.74000000	Cattaraugus County
SOUTH DAYTON	NY	KDP395	42.36116666670	-79.04975000000	33.68000000	Cattaraugus County
SOUTH DAYTON	NY	KDP395	42.36116666670	-79.04975000000	33.70000000	Cattaraugus County
SOUTH DAYTON	NY	KDP395	42.36116666670	-79.04975000000	33.74000000	Cattaraugus County
DAYTON	NY	KDP395	42.41783333330	-78.97475000000	33.68000000	Cattaraugus County
DAYTON	NY	KDP395	42.41783333330	-78.97475000000	33.70000000	Cattaraugus County

DAYTON	NY	KDP395	42.41783333330	-78.97475000000	33.74000000	Cattaraugus County
PERRYSBURG	NY	KDP395	42.45644444440	-79.00308333330	33.68000000	Cattaraugus County
PERRYSBURG	NY	KDP395	42.45644444440	-79.00308333330	33.70000000	Cattaraugus County
PERRYSBURG	NY	KDP395	42.45644444440	-79.00308333330	33.74000000	Cattaraugus County
GOWANDA	NY	KDP395	42.46366666670	-78.93363888890	33.68000000	Cattaraugus County
GOWANDA	NY	KDP395	42.46366666670	-78.93363888890	33.70000000	Cattaraugus County
GOWANDA	NY	KDP395	42.46366666670	-78.93363888890	33.74000000	Cattaraugus County
VERSAILLES	NY	KDP395	42.51866666670	-78.98808333330	33.68000000	Cattaraugus County
VERSAILLES	NY	KDP395	42.51866666670	-78.98808333330	33.70000000	Cattaraugus County
VERSAILLES	NY	KDP395	42.51866666670	-78.98808333330	33.74000000	Cattaraugus County
ELLERY CENTER	NY	KEB392	42.17977777780	-79.34450000000	154.78500000	Chautauqua County
ELLERY CENTER	NY	KEB392	42.17977777780	-79.34450000000	154.81500000	Chautauqua County
ELLERY CENTER	NY	KEB392	42.17977777780	-79.34450000000	155.65500000	Chautauqua County
ELLERY CENTER	NY	KEB392	42.17977777780	-79.34450000000	156.21000000	Chautauqua County
MAYVILLE	NY	KEB392	42.25477777780	-79.50477777780	156.21000000	Chautauqua County
MAYVILLE	NY	KEB392	42.25477777780	-79.50477777780	39.46000000	Chautauqua County
MAYVILLE	NY	KEB392	42.25561111110	-79.50505555560	154.78500000	Chautauqua County
MAYVILLE	NY	KEB392	42.25561111110	-79.50505555560	154.81500000	Chautauqua County
MAYVILLE	NY	KEB392	42.25561111110	-79.50505555560	155.37000000	Chautauqua County
MAYVILLE	NY	KEB392	42.25561111110	-79.50505555560	155.65500000	Chautauqua County
ARKWRIGHT	NY	KEB392	42.39477777780	-79.23588888890	154.78500000	Chautauqua County
ARKWRIGHT	NY	KEB392	42.39477777780	-79.23588888890	154.81500000	Chautauqua County
ARKWRIGHT	NY	KEB392	42.39477777780	-79.23588888890	155.65500000	Chautauqua County
ARKWRIGHT	NY	KEB392	42.39477777780	-79.23588888890	156.21000000	Chautauqua County
MAYVILLE	NY	KEB909	42.25477777780	-79.50450000000	45.88000000	Chautauqua County
MAYVILLE	NY	KEB909	42.25477777780	-79.50450000000	46.10000000	Chautauqua County
MAYVILLE	NY	KEB909	42.25477777780	-79.50450000000	46.14000000	Chautauqua County
ARKWRIGHT	NY	KEB909	42.39477777780	-79.23588888890	46.10000000	Chautauqua County
ARKWRIGHT	NY	KEB909	42.39477777780	-79.23588888890	46.14000000	Chautauqua County
CHERRY CREEK	NY	KED908	42.30422222220	-79.17866666670	154.69500000	New York state
CHERRY CREEK	NY	KED908	42.30422222220	-79.17866666670	155.47500000	New York state
CHERRY CREEK	NY	KED908	42.30422222220	-79.17866666670	155.50500000	New York state
CHERRY CREEK	NY	KED908	42.30422222220	-79.17866666670	155.56500000	New York state
CHERRY CREEK	NY	KED908	42.30422222220	-79.17866666670	42.14000000	New York state
FREDONIA	NY	KIQ637	42.41366666670	-79.21894444440	461.70000000	GOYA FOODS
SILVER CREEK	NY	KIT533	42.41366666670	-79.21894444440	461.70000000	George Ortolando
FORESTVILLE	NY	KMB262	42.47172222220	-79.18002777780	46.10000000	Forestvile Village
FORESTVILLE	NY	KMB262	42.47172222220	-79.18002777780	46.14000000	Forestvile Village
FORESTVILLE	NY	KNAR424	42.46422222220	-79.20475000000	155.22000000	Forestvile Village
SHERIDAN	NY	KNBL897	42.48755555560	-79.23697222220	46.10000000	Sheridan Fire Dist
SHERIDAN	NY	KNBL897	42.48755555560	-79.23697222220	46.14000000	Sheridan Fire Dist
FREDONIA	NY	KNEK542	42.41366666670	-79.21894444440	461.70000000	Falcone farms Inc
FREDONIA	NY	KNGB649	42.41366666670	-79.21894444440	461.70000000	Crowell Robert
ARKWRIGHT	NY	KNGQ592	42.41366666670	-79.21894444440	461.70000000	Time Warner Ent
ARKWRIGHT	NY	KNGQ592	42.41366666670	-79.21894444440	466.70000000	Time Warner Ent
SOUTH DAYTON	NY	KNHF422	42.34030555560	-79.09194444440	464.07500000	Pine Valley Cent Sch
DAYTON	NY	KNHF422	42.43338888890	-78.99975000000	464.07500000	Pine Valley Cent Sch
FORESTVILLE	NY	KNIA771	42.48644444440	-79.20947222220	151.74500000	Tri;le M. Farms

FORESTVILLE	NY	KNRS991	42.44061111110	-79.13169444440	864.06250000	NEXTEL WIP
FORESTVILLE	NY	KNRT703	42.44061111110	-79.13169444440	864.68750000	NEXTEL WIP
ARKWRIGHT	NY	KQD357	42.41116666670	-79.23866666670	161.25000000	Norfolk Southern RR
ARKWRIGHT	NY	KQD357	42.41116666670	-79.23866666670	161.49000000	Norfolk Southern RR
SHERIDAN	NY	KXM941	42.46505555560	-79.23586111110	150.99500000	Town of Sheridan
FREDONIA	NY	WNAD644	42.41366666670	-79.21894444440	461.70000000	A Sam & Son Prod
DUNKIRK	NY	WNBK721	42.41561111110	-79.23588888890	463.55000000	Robert D. Harvey
ELLINGTON	NY	WNCU997	42.23727777780	-79.14005555560	464.40000000	Don Frame Trucking
FREDONIA	NY	WNCU997	42.41366666670	-79.21894444440	464.40000000	Don Frame Trucking
DUNKIRK	NY	WNLX689	42.41561111110	-79.23588888890	463.55000000	D Blakeley Construct
DUNKIRK	NY	WNMI645	42.41561111110	-79.23588888890	463.55000000	ERIE 2
DUNKIRK	NY	WNMM500	42.41561111110	-79.23588888890	463.55000000	Patton elect co.
JAMESTOWN	NY	WNXQ602	42.13616666670	-79.22338888890	458.48750000	W C A Services Corp
FREDONIA	NY	WNXQ602	42.41366666670	-79.21894444440	155.20500000	W C A Services Corp
FREDONIA	NY	WNXQ602	42.41366666670	-79.21894444440	453.48750000	W C A Services Corp
DUNKIRK	NY	WPCP419	42.41561111110	-79.23588888890	463.55000000	Carrier Coach Inc.
MAYVILLE	NY	WPDD694	42.26477777780	-79.49227777780	153.27500000	Great Lakes Energy
FREDONIA	NY	WPDD694	42.41366666670	-79.21894444440	158.41500000	Great Lakes Energy
FREDONIA	NY	WPDF572	42.40811111110	-79.21894444440	461.70000000	BFI Waste Systems
FREDONIA	NY	WPGH563	42.41366666670	-79.21894444440	461.45000000	S ST George Enterp.
ARKWRIGHT	NY	WPJY947	42.41477777780	-79.23825000000	929.96250000	Arch Wireless Co
ARKWRIGHT	NY	WPLR869	42.39338888890	-79.22866666670	455.02000000	Faith Broadcast Net
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.12500000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.20000000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.27500000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.33750000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.40000000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.45000000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.58750000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.71250000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.77500000	Chautauqua County
ELLERY CENTER	NY	WPLY454	42.17977777780	-79.34450000000	868.81250000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.12500000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.20000000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.27500000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.33750000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.40000000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.45000000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.58750000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.71250000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.77500000	Chautauqua County
MAYVILLE	NY	WPLY454	42.25561111110	-79.50505555560	868.81250000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	866.01250000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	867.01250000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	867.51250000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.12500000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.20000000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.27500000	Chautauqua County

ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.33750000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.40000000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.45000000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.58750000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.71250000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.77500000	Chautauqua County
ARKWRIGHT	NY	WPLY454	42.39477777780	-79.23588888890	868.81250000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	866.01250000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	867.01250000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	867.51250000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.12500000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.20000000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.27500000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.33750000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.40000000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.45000000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.58750000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.71250000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.77500000	Chautauqua County
DUNKIRK	NY	WPLY454	42.48338888890	-79.34422222220	868.81250000	Chautauqua County
CHERRY CREEK	NY	WPMW661	42.30422222220	-79.17866666670	220.82750000	Chautauqua County
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	935.88750000	Ass. Of Amer RR
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	935.93750000	Ass. Of Amer RR
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	935.98750000	Ass. Of Amer RR
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	936.88750000	Ass. Of Amer RR
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	936.93750000	Ass. Of Amer RR
ARKWRIGHT	NY	WPOY644	42.41116666670	-79.24450000000	936.98750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	896.88750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	896.93750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	896.98750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	897.88750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	897.93750000	Ass. Of Amer RR
WESTFIELD	NY	WPRK814	42.36533333330	-79.17672222220	897.98750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	896.88750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	896.93750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	896.98750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	897.88750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	897.93750000	Ass. Of Amer RR
DUNKIRK	NY	WPRK814	42.47866666670	-79.28061111110	897.98750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	896.88750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	896.93750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	896.98750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	897.88750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	897.93750000	Ass. Of Amer RR
SILVER CREEK	NY	WPRK814	42.54450000000	-79.17752777780	897.98750000	Ass. Of Amer RR
BLACK CORNER	NY	WPVX231	42.39333333330	-79.22888888890	851.03750000	New York, State of
BLACK CORNER	NY	WPVX231	42.39333333330	-79.22888888890	851.56250000	New York, State of
BLACK CORNER	NY	WPVX231	42.39333333330	-79.22888888890	851.93750000	New York, State of

BLACK CORNER	NY	WPVX231	42.39333333330	-79.22888888890	852.98750000	New York, State of
ARKWRIGHT	NY	WPVX592	42.39505555560	-79.23588888890	158.83500000	Chautauqua County
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	851.01250000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	851.03750000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	851.46250000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	851.56250000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	851.93750000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	852.01250000	New York, State of
Sinclairville	NY	WPVX630	42.30416666670	-79.17888888890	852.81250000	New York, State of
DUNKIRK	NY	WQEK811	42.41561111110	-79.23588888890	463.55000000	State Electronics Co
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.01250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.03750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.11250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.13750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.16250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.18750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.23750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.46250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.51250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.56250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.58750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.61250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.91250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	851.93750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.01250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.03750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.11250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.13750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.43750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.48750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.56250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.81250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.83750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.88750000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.91250000	NY State OT wireless
Cherry Creek	NY	WQFG848	42.34838888890	-79.17977777780	852.98750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.03750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.11250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.13750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.16250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.18750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.23750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.51250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.56250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.58750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.61250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	851.93750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.01250000	NY State OT wireless

ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.03750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.11250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.13750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.43750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.48750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.56250000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.83750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.88750000	NY State OT wireless
ARKWRIGHT	NY	WQFJ929	42.39333333330	-79.22861111110	852.91250000	NY State OT wireless
FORESTVILLE	NY	WYP487	42.46838888890	-79.18613888890	461.05000000	Walnut Hill Vineyard

The frequencies of operation of the LMR repeaters are generally unaffected by the presence of wind turbines. Very little, if any, change in the coverage of the repeaters will occur when wind turbines at the Ball Hill wind energy facility are installed. However, if there is a reported change in coverage it can easily be corrected by repositioning the affected repeater, or by adding a repeater to the LMR system.

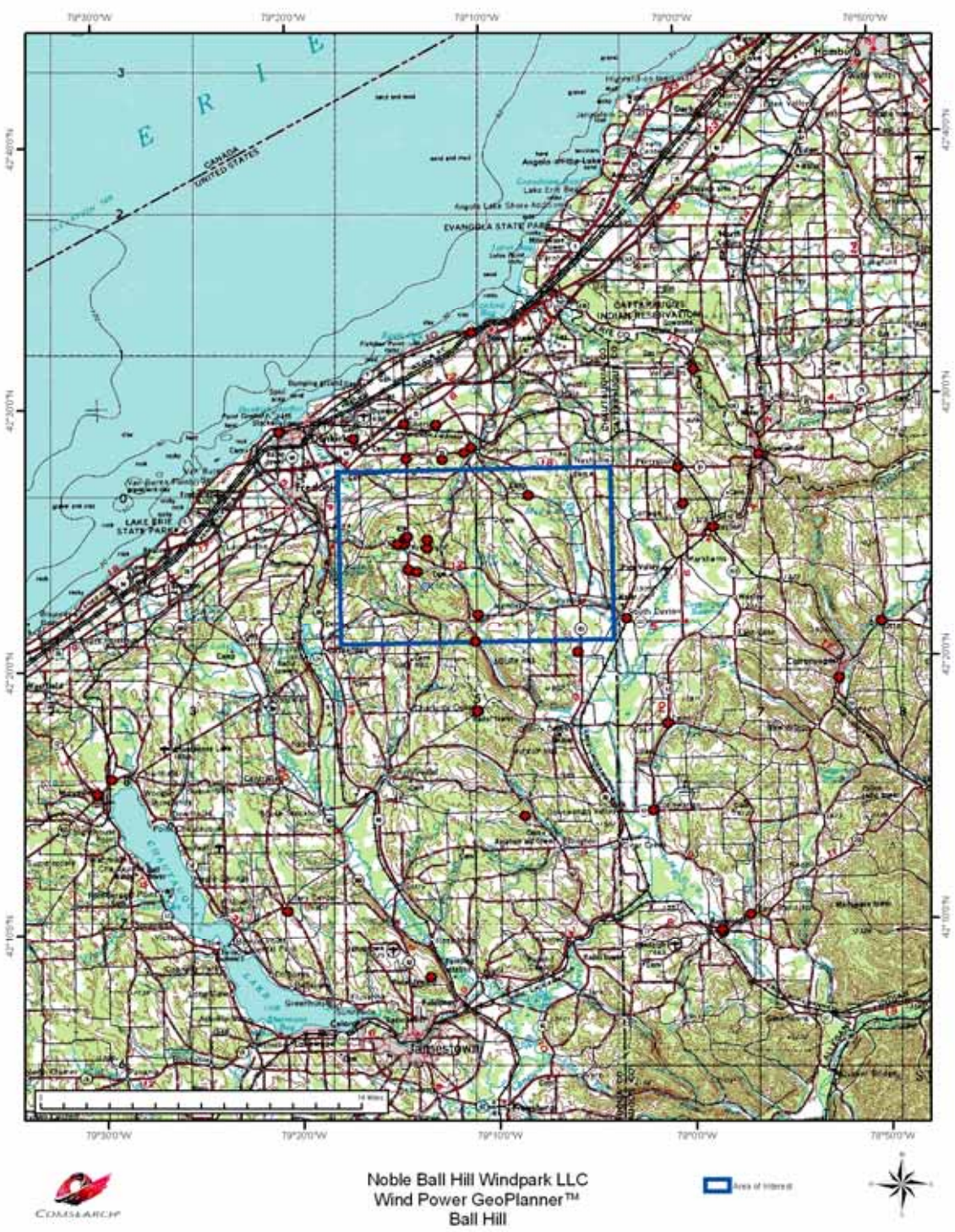

Figure 1 LMR Licenses in the Vicinity of the Ball Hill Wind Energy Project

Off-Air TV Reception Analysis
at the Ball Hill Wind Energy Project Area
in Chautauqua County, New York

Comsearch

COMSEARCH

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Off-Air TV Reception Analysis at the Ball Hill Wind Energy Project Area in Chautauqua County, New York

Comsearch was contracted by the Noble Ball Hill Windpark LLC of Essex, Connecticut to identify all of the off-air television stations within 100-mile radius of the proposed Ball Hill Wind Energy Project in Chautauqua County, NY. Off-air stations are television broadcasters that transmit signals that can be received directly on a television receiver from terrestrially located broadcast facilities. Comsearch examined the coverage of the off-air TV stations and the communities in the area that could potentially have degraded television reception because of the location of the wind turbines. The proposed wind energy facility boundaries and local communities are plotted in the map shown in Figure 1 of this memorandum. Table 1 lists the U. S. off-air television stations. Table 2 lists the Canadian off-air television stations. Figure 2 shows all of the television stations, U.S. and Canadian, within 100 mile radius of the proposed wind facility.

Table 1 List of U. S. Off-Air TV Channels within 100 Miles of the Ball Hill Wind Energy Project

Location		Call Sign	Channel	Service	Status	Distance
BUFFALO	NY	WGRZ-TV	2	TV	LIC	38.19 mi
CLEARFIELD	PA	WPSU-TV	3	TV	LIC	96.26 mi
BUFFALO	NY	WIVB-TV	4	TV	LIC	33.27 mi
HORNELL	NY	W06AR	6	TX	LIC	77.39 mi
GREECE/ROCHESTER	NY	WGCE-CA	6	CA	LIC	92.49 mi
GREECE/ROCHESTER	NY	NEW	6	LD	APP	92.49 mi
ERIE	PA	NEW	6	TX	APP	37.87 mi
BUFFALO	NY	WKBW-TV	7	TV	LIC	32.76 mi
BUFFALO	NY	WKBW-TV	7	TS	LIC	32.76 mi
SPRINGVILLE	NY	WNGS	7	DM	APP	32.76 mi
SPRINGVILLE	NY	WNGS	7	DT	APP	32.76 mi
ERIE	PA	W07DM	7	TX	CP	45.48 mi
ROCHESTER	NY	WROC-TV	8	TV	LIC	95.53 mi
BATAVIA	NY	TEST	8	DR	APP	68.27 mi
ROCHESTER	NY	WHSH-LD	9	LD	CP	95.47 mi
ERIE	PA	WLEP-LP	9	TX	LIC	47.58 mi
JAMESTOWN	NY	W10BH	10	TX	LIC	18.90 mi
ROCHESTER	NY	WHEC-TV	10	TV	LIC	95.53 mi
ROCHESTER	NY	WHEC-TV	10	DT	APP	95.53 mi
ERIE	PA	WICU-TV	12	TV	LIC	48.45 mi
ERIE	PA	WICU-TV	12	DT	APP	48.49 mi
ROCHESTER	NY	WHAM-TV	13	TV	LIC	95.52 mi
ROCHESTER	NY	WHAM-TV	13	DT	CP	95.52 mi
BATH	NY	WFBT	14	TA	-	96.67 mi

BUFFALO	NY	WUTV	14	DS	STA	44.78 mi
BUFFALO	NY	WUTV	14	DT	LIC	44.78 mi
BUFFALO	NY	WBNF-CA	15	CA	LIC	44.78 mi
ASHTABULA	OH	-	15	TA	-	90.37 mi
CLEARFIELD	PA	WPSU-TV	15	DT	CP	96.26 mi
CLEARFIELD	PA	WPSU-TV	15	DS	STA	96.27 mi
CLEARFIELD	PA	WPSU-TV	15	DT	APP	96.26 mi
HORNELL, ALFRED	NY	W16BE	16	TX	LIC	79.79 mi
ROCHESTER	NY	WXXI-TV	16	DT	LIC	95.52 mi
BUFFALO	NY	NEW	16	LD	APP	44.78 mi
ERIE	PA	WSEE-TV	16	DT	CP MOD	48.45 mi
BUFFALO	NY	WNED-TV	17	TV	LIC	45.19 mi
BATAVIA	NY	W52CB	18	TX	APP	68.27 mi
ERIE	PA	W18DH	18	TX	CP	45.69 mi
OLEAN	NY	W20AB	20	TX	LIC	44.35 mi
ROCHESTER	NY	WAWW-LP	20	TX	CP	95.48 mi
ROCHESTER	NY	WXXI-TV	21	TV	LIC	95.52 mi
ROCHESTER	NY	NEW	22	LD	APP	95.47 mi
ERIE	PA	WFXP	22	DS	STA	52.13 mi
ERIE	PA	WFXP	22	DT	CP	51.89 mi
ERIE	PA	WFXP	22	DT	APP	52.13 mi
BUFFALO	NY	WNLO	23	TV	LIC	45.19 mi
BATAVIA	NY	WPXJ-TV	23	DT	APP	68.27 mi
ERIE	PA	WJET-TV	24	TV	LIC	52.13 mi
OLEAN	NY	WONS-LP	25	CA	LIC	45.86 mi
JAMESTOWN	NY	WNYB	26	TV	LIC	2.69 mi
VICTOR	NY	W26BZ	26	TX	LIC	99.43 mi
JAMESTOWN	NY	WNYB	26	DT	CP	2.69 mi
JAMESTOWN	NY	WNYB	27	DS	STA	2.69 mi
JAMESTOWN	NY	WNYB	27	DT	LIC	2.69 mi
ROCHESTER	NY	WUHF	28	DS	STA	95.45 mi
ROCHESTER	NY	WUHF	28	DS	STA	95.45 mi
BUFFALO	NY	WDTB-LP	28	TX	CP	36.30 mi
ROCHESTER	NY	WUHF	28	DT	LIC	95.45 mi
BUFFALO	NY	WUTV	29	TV	LIC	44.78 mi
ERIE	PA	NEW	29	TX	APP	45.48 mi
ERIE	PA	NEW	29	TX	APP	45.48 mi
OLEAN	NY	W30BW	30	TX	LIC	45.88 mi
ERIE	PA	NEW	30	TX	APP	45.28 mi
ROCHESTER	NY	WUHF	31	TV	LIC	95.52 mi
JAMESTOWN	NY	NEW	31	LD	APP	22.71 mi
BUFFALO	NY	WNLO	32	DS	APP	45.19 mi
BUFFALO	NY	WNLO	32	DT	LIC	45.19 mi
BUFFALO	NY	WGRZ-TV	33	DS	STA	38.19 mi
BUFFALO	NY	WGRZ-TV	33	DT	LIC	38.19 mi
BUFFALO	NY	WNYO-TV	34	DS	STA	45.12 mi
BUFFALO	NY	WNYO-TV	34	DT	LIC	44.78 mi
ERIE	PA	WSEE-TV	35	TV	LIC	51.90 mi

ROCHESTER	NY	WHSH-CA	36	CA	LIC	95.47 mi
ROCHESTER	NY	WAWW-LP	38	TX	LIC	95.47 mi
BUFFALO	NY	WKBW-TV	38	DT	LIC	32.76 mi
ERIE	PA	W48CH	38	LD	CP	51.90 mi
HAMBURG	NY	WDTB-LP	39	TX	LIC	35.27 mi
BUFFALO	NY	WIVB-TV	39	DT	LIC	33.27 mi
ROCHESTER	NY	WBGT-CA	40	CA	LIC	93.06 mi
BUFFALO	NY	WDTB-LP	40	TX	STA	36.30 mi
GENESEO	NY	NEW	41	DN	ADD	71.48 mi
ROCHESTER	NY	NEW	41	DM	ADD	93.18 mi
ROCHESTER	NY	W42CO	42	TX	LIC	95.48 mi
ROCHESTER	MI	W42CO	42	LD	CP	95.47 mi
BUFFALO	NY	WNED-TV	43	DT	LIC	45.19 mi
ERIE	PA	WLEP-LD	43	LD	APP	47.58 mi
MEADVILLE	PA	W52BO	44	TX	APP	74.01 mi
ROCHESTER	NY	WROC-TV	45	DS	STA	95.53 mi
ROCHESTER	NY	WROC-TV	45	DT	LIC	95.53 mi
BROOKVILLE	PA	W45BT	45	TX	LIC	88.65 mi
ERIE	PA	NEW	45	TX	APP	44.81 mi
ERIE	PA	NEW	45	TX	APP	44.81 mi
JAMESTOWN	NY	900725KG	46	TV	APP	22.71 mi
JAMESTOWN	NY	DW46BA	46	TA	-	21.50 mi
SPRINGVILLE	NY	WNGS	46	DT	APP	32.76 mi
ROCHESTER	NY	WROH-LP	47	TX	LIC	95.47 mi
BUFFALO	NY	NEW	48	LD	APP	41.57 mi
ROCHESTER	NY	NEW	48	LD	APP	95.47 mi
BUFFALO	NY	NEW	48	LD	APP	36.30 mi
ERIE	PA	W48CH	48	TX	LIC	51.88 mi
BUFFALO	NY	WNYO-TV	49	TV	LIC	45.12 mi
BATAVIA	NY	TEST	49	DR	APP	68.27 mi
ERIE	PA	W49CS	49	TX	CP	45.48 mi
ERIE	PA	WQLN	50	DS	STA	51.89 mi
ERIE	PA	WQLN	50	DT	APP	51.89 mi
ERIE	PA	WQLN	50	DT	LIC	51.89 mi
BATAVIA	NY	WPXJ-TV	51	TV	LIC	68.27 mi
BATAVIA	NY	TEST	51	DR	APP	68.27 mi
ERIE	PA	W51EC	51	TX	CP	45.48 mi
MEADVILLE	PA	W52BO	52	TX	LIC	74.00 mi
ERIE	PA	WICU-TV	52	DT	CP	48.45 mi
ERIE	PA	WICU-TV	52	DS	STA	48.45 mi
BATAVIA	NY	WPXJ-TV	53	DT	APP	68.27 mi
ERIE	PA	WQLN	54	TV	LIC	51.89 mi
GREENWOOD	NY	DW55AD	55	TX	LIC	80.23 mi
WELLSVILLE & SCIO	NY	W56AU	56	TX	LIC	65.99 mi
HAMMONDSPORT	NY	DW56AI	56	TX	LIC	99.05 mi
KENNEDY	NY	W56AD	56	TX	LIC	18.14 mi
RUSHFORD & HOUGHTON	NY	DW56AV	56	TX	LIC	51.15 mi
BUFFALO	NY	WBXZ-LP	56	TX	LIC	36.29 mi

ARCADE	NY	NEW	56	DM	APP	49.49 mi
BROCKPORT	PA	DW57AH	57	TX	LIC	84.34 mi
BUFFALO	NY	WFHW-LP	58	TX	LIC	36.29 mi
ROCHESTER	NY	WHEC-TV	58	DS	STA	95.53 mi
ROCHESTER	NY	WHEC-TV	58	DS	STA	95.53 mi
ROCHESTER	NY	WHEC-TV	58	DT	LIC	95.53 mi
ERIE	PA	WJET-TV	58	DS	STA	52.13 mi
ERIE	PA	WJET-TV	58	DT	CP MOD	52.13 mi
ERIE	PA	WJET-TV	58	DT	APP	52.13 mi
ALLENTOWN, ETC.	NY	W59AH	59	TX	LIC	61.49 mi
ROCHESTER	NY	WHAM-TV	59	DS	STA	95.52 mi
ROCHESTER	NY	WHAM-TV	59	DT	LIC	95.52 mi
CUBA	NY	W60AJ	60	TX	LIC	48.96 mi
FINDLEY LAKE	NY	W60AC	60	TX	LIC	35.67 mi
ANDOVER	NY	W61AJ	61	TX	LIC	71.77 mi
ROCHESTER	NY	960228KF	61	TV	APP	95.52 mi
ROCHESTER	NY	960228KF	61	TA	-	95.55 mi
FRIENDSHIP & BELMONT	NY	W62AS	62	TX	LIC	58.69 mi
FILLMORE	NY	W62AQ	62	TX	LIC	58.62 mi
ARCADE	NY	960111KN	62	TV	APP	31.68 mi
ARCADE	NY	960404KL	62	TV	APP	49.12 mi
ARCADE	NY	960404LB	62	TV	APP	50.28 mi
ARCADE	NY	960404LH	62	TV	APP	49.80 mi
ARCADE	NY	960405L4	62	TV	APP	45.88 mi
ARCADE	NY	960405L7	62	TV	APP	34.73 mi
ARCADE	NY	960405LR	62	TV	APP	40.34 mi
ARCADE	NY	960405LY	62	TV	APP	44.71 mi
ARCADE	NY	960405XF	62	TV	APP	46.63 mi
ARCADE	NY	960405XN	62	TV	APP	31.68 mi
ARCADE	NY	960111KN	62	TA	-	47.53 mi
CHERRY CREEK, ETC.	NY	W62AE	62	TX	LIC	11.28 mi
CLYMER	NY	W62AD	62	TX	LIC	34.73 mi
SINCLAIRVILLE	NY	W62AG	62	TX	LIC	14.20 mi
ERIE	PA	W62DK	62	TX	CP	45.48 mi
WHITESVILLE	NY	W64AJ	64	TX	LIC	76.65 mi
SHERMAN	NY	W64AF	64	TX	LIC	26.60 mi
CONNEAUT	OH	W64AK	64	TX	LIC	85.74 mi
ANGELICA, ETC.	NY	W65AJ	65	TX	LIC	57.88 mi
ERIE	PA	WFXP	66	TV	LIC	51.93 mi
SPRINGVILLE	NY	WNGS	67	TV	LIC	26.24 mi
SPRINGVILLE	NY	WNGS	67	TV	APP	32.76 mi
BOLIVAR & RICHBURG	NY	W68AJ	68	TX	LIC	55.95 mi
ERIE	PA	W68DZ	68	TX	CP	45.48 mi
TROUPSBURG	NY	DW69AF	69	TX	LIC	84.77 mi

TV –Normal Broadcast Station
DS-Digital Service Television, Temporary Operation, STA Operation
DT-Digital Television Broadcast Station
DR- Indicates Station has Applied for FCC Rule Making

GRA-Indicates Rule Making was granted by FCC
LP-Low Power Television Broadcast Station
TX-Translator Television Broadcast Station
LIC – Licensed and operational station
CP – License approved construction permit granted
APP – License application, not yet operational
STA – Special transmit authorization, usually granted by FCC for temporary operation

Table 2 Canadian Off-Air TV Channels within 100 Miles of the Ball Hill Energy Project

Location		Call Sign	Channel	Class	Banner	Distance
Fort Erie	ON	CIII-TV-55	55	B	OP	36.38
Fort Erie	ON	CIII-DT-55	60	B	AL	36.38
St. Catharines	ON	CH5190	2614	R	AU	52.32
St Catharines	ON	ON-DT-161	22	C	TD	52.84
St Catharines	ON	ON-TV-461	48	A	AL	52.84
Welland	ON	ON-DT-189	42	A	AL	40.23
Welland	ON	ON-TV-489	50	A	AL	40.23
Toronto	ON	CJMT-DT	44	VU	AU	86.62
Toronto	ON	CJMT-TV	69	C	OP	86.62
Toronto	ON	CFMT-DT(1)	64	VL	AP	86.62
Toronto	ON	CFTO-DT	40	VU	OP	86.21
Toronto	ON	CBLFT-DT	24	C	OP	86.21
Toronto	ON	CBLT-DT	20	VL	OP	86.21
Toronto	ON	CITY-DT	53	C	OP	86.21
Toronto	ON	CKXT-DT	66	C	OP	86.21
Toronto	ON	CICA-DT	51	C	AL	86.21
Toronto	ON	CIII-DT-41	65	C	AU	86.21
Toronto	ON	CKXT-TV	52	C	OP	86.21
Toronto	ON	CBLFT	25	D	OP	86.21
Toronto	ON	CBLFT(1)	25	D	AU	86.21
Toronto	ON	CITY-TV	57	C	OP	86.21
Toronto	ON	CFMT-TV	47	D	OP	86.21
Toronto	ON	CIII-TV-41	41	D	OP	86.21
Toronto	ON	CICA-TV	19	D	OP	86.21
Toronto	ON	CFTO-TV	9	R	OP	86.21
Toronto	ON	CBLT	5	R	OP	86.21
Toronto	ON	CIII-DT-41	65	C	AL	86.21
Hamilton	ON	CHCH-DT	18	VU	AU	63.27
Hamilton	ON	CKXT-DT-1	15	C	OP	63.27
Hamilton	ON	CITS-DT	35	VU	AU	63.27
Hamilton	ON	CKXT-TV-1	45	B	OP	63.27
Hamilton	ON	CITS-TV	36	D	OP	63.27
Hamilton	ON	CHCH-TV	11	R	OP	63.27
Hamilton	ON	CHCH-DT	18	VU	AL	63.27
Guelph	ON	ON-DT-133	26	B	AL	96.01
Guelph	ON	ON-TV-433	58	B	AL	96.01
Brantford	ON	ON-DT-112	48	B	AL	74.87

Brantford	ON	ON-TV-412	34	B	AL	74.87
Normandale	ON	CBLN-TV-6	44	A	OP	61.07
Normandale	ON	CBLN-DT-6	60	A	AL	61.07
Kitchener	ON	CBLN-TV-1	56	D	OP	87.42
Kitchener	ON	CICO-TV-28	28	C	OP	87.42
Kitchener	ON	CBLN-DT-1	67	C	AL	87.42
Kitchener	ON	CICO-DT-28	55	C	AL	87.42
Paris	ON	CIII-TV	6	R	OP	87.42
Paris	ON	CIII-DT	30	VL	AL	87.42
Kitchener	ON	ON-DT-142	59	B	AL	98.00
Kitchener	ON	ON-TV-442	39	B	AL	98.00
Woodstock	ON	CITY-TV-2	31	C	OP	92.28
Woodstock	ON	CITY-DT-2	51	C	AL	92.28

The most likely TV stations that will produce off-air coverage to the Chautauqua County, NY area will be those stations at a distance of 40 miles or less. Of the stations listed in Table 1and 2 there are a total of 39 stations with license records within this range, and of these, 2 are Canadian and 37 are U. S. stations. Of the 37 U.S. Stations only 20 are presently broadcasting. Four of the stations are full power analog stations and four are full power digital stations. There are twelve low power translators broadcasting. Two of the translators are operating on a special transmit authority (STA). All of the translators operate with limited coverage. Of the 2 Canadian stations one is an operational analog station and the other is to be a digital station but not yet operational. The stations within 40 miles are listed in Table 3 below.

The number of off-air television available to the local communities is limited since there are only 4 full power analog and digital U. S. channels available and one Canadian full power analog channel. There also twelve translators available but they are low power stations with limited coverage and programming. Based on the low number of U. S. stations in the area it is not expected that the off-air television stations available in the area are the primary mode of television service for the local communities. Because of this, TV Cable service, where available, and/or direct satellite broadcast (DBS) are probably the dominant delivery mode of TV service to the proposed wind facility's surrounding communities. These services will be unaffected by the presence of the wind turbine facility.

Table 3 Off-Air TV Channels within 40 Miles of the Ball Hill Wind Energy Project

Location		Call Sign	Channel	Service	Status	Distance
JAMESTOWN	NY	WNYB	26	TV	LIC	2.69 mi
JAMESTOWN	NY	WNYB	26	DT	CP	2.69 mi
JAMESTOWN	NY	WNYB	27	DS	STA	2.69 mi
JAMESTOWN	NY	WNYB	27	DT	LIC	2.69 mi
CHERRY CREEK, ETC.	NY	W62AE	62	TX	LIC	11.28 mi
SINCLAIRVILLE	NY	W62AG	62	TX	LIC	14.20 mi
KENNEDY	NY	W56AD	56	TX	LIC	18.14 mi
JAMESTOWN	NY	W10BH	10	TX	LIC	18.90 mi
JAMESTOWN	NY	DW46BA	46	TA	-	21.50 mi
JAMESTOWN	NY	NEW	31	LD	APP	22.71 mi
JAMESTOWN	NY	900725KG	46	TV	APP	22.71 mi
SPRINGVILLE	NY	WNGS	67	TV	LIC	26.24 mi

SHERMAN	NY	W64AF	64	TX	LIC	26.60 mi
ARCADE	NY	960111KN	62	TV	APP	31.68 mi
ARCADE	NY	960405XN	62	TV	APP	31.68 mi
BUFFALO	NY	WKBW-TV	7	TV	LIC	32.76 mi
BUFFALO	NY	WKBW-TV	7	TS	LIC	32.76 mi
SPRINGVILLE	NY	WNGS	7	DM	APP	32.76 mi
SPRINGVILLE	NY	WNGS	7	DT	APP	32.76 mi
BUFFALO	NY	WKBW-TV	38	DT	LIC	32.76 mi
SPRINGVILLE	NY	WNGS	46	DT	APP	32.76 mi
SPRINGVILLE	NY	WNGS	67	TV	APP	32.76 mi
BUFFALO	NY	WIVB-TV	4	TV	LIC	33.27 mi
BUFFALO	NY	WIVB-TV	39	DT	LIC	33.27 mi
ARCADE	NY	960405L7	62	TV	APP	34.73 mi
CLYMER	NY	W62AD	62	TX	LIC	34.73 mi
HAMBURG	NY	WDTB-LP	39	TX	LIC	35.27 mi
FINDLEY LAKE	NY	W60AC	60	TX	LIC	35.67 mi
BUFFALO	NY	WBXZ-LP	56	TX	LIC	36.29 mi
BUFFALO	NY	WFHW-LP	58	TX	LIC	36.29 mi
BUFFALO	NY	WDTB-LP	28	TX	CP	36.30 mi
BUFFALO	NY	WDTB-LP	40	TX	STA	36.30 mi
BUFFALO	NY	NEW	48	LD	APP	36.30 mi
Fort Erie	ON	CIII-TV-55	55	B	OP	36.38
Fort Erie	ON	CIII-DT-55	60	B	AL	36.38
ERIE	PA	NEW	6	TX	APP	37.87 mi
BUFFALO	NY	WGRZ-TV	2	TV	LIC	38.19 mi
BUFFALO	NY	WGRZ-TV	33	DS	STA	38.19 mi
BUFFALO	NY	WGRZ-TV	33	DT	LIC	38.19 mi

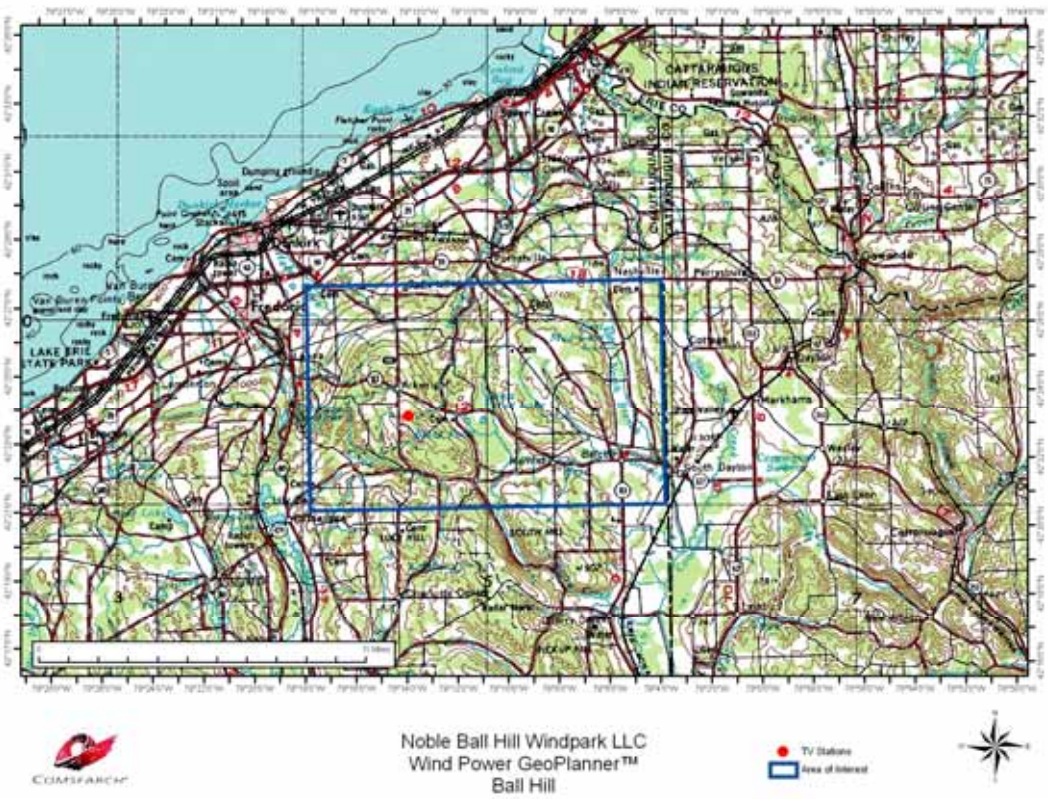


Figure 1 Ball Hill Wind Energy Facility Boundaries and Local Communities

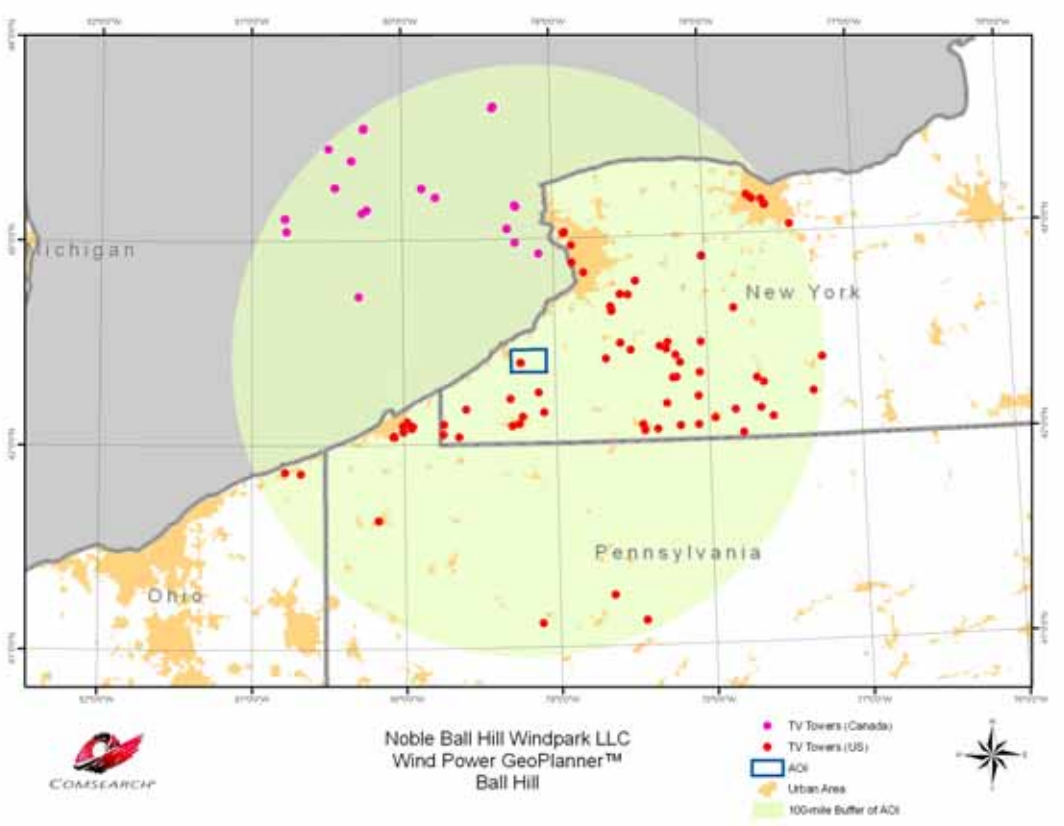
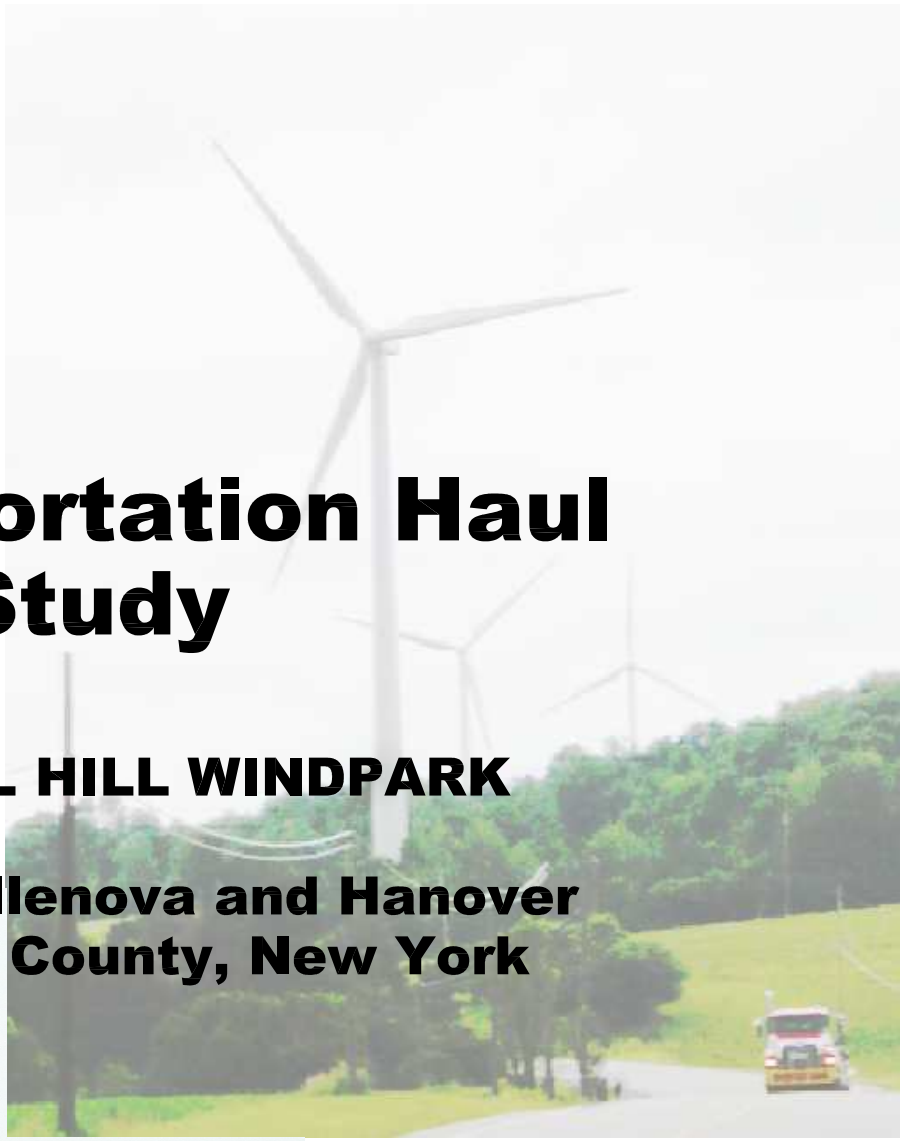


Figure 2 TV Stations within 100 Miles of Ball Hill Wind Energy Facility

N Transportation Plan

Transportation Haul Route Study



Transportation Haul Route Study

NOBLE BALL HILL WINDPARK

Towns of Villenova and Hanover
Chautauqua County, New York

PREPARED FOR

Noble Ball Hill Windpark, LLC
8 Railroad Ave., Suite 8
Essex, CT 06426

PREPARED BY

ESS Group, Inc.
888 Worcester Street, Suite 240
Wellesley, Massachusetts 02482

September 19, 2008

TRANSPORTATION HAUL ROUTE STUDY
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ESS Group, Inc.

EXECUTIVE SUMMARY

The Noble Ball Hill Windpark Transportation Haul Route Study evaluates potential routing for delivering wind turbine components to the project construction areas and identifies where temporary roadway widening will be required at intersections throughout the project area, where temporary or permanent drainage improvements may be required, and where existing bridge structures may need to be reinforced during construction mobilization and wind turbine transport to complete the project. Off-Site routes were evaluated to determine feasible route alternatives from the East, South, Southwest and Northwest to the project area. It was assumed that turbine components would be delivered to the project area from all directions over NYSDOT-approved routes using interstate, state and county highways.

The Haul Route Study indicates that the preferred Off-Site route to the project area is the Northwest Access Alternative 2 Route (see Map 1). This route is the safest, shortest, most direct haul route to the project area with only one minor bridge crossing in Forestville; however, it is not likely that all turbine components can be routed through Fredonia, NY along US Route 20 East.

Once inside the project area, nearly all the Off-Site routes use the same local intersections for access to the individual turbine construction sites. The direction of travel on the local roads was carefully considered so as to minimize the extent of temporary construction required at the intersections within the project area. After the project has been constructed, the intersections will be restored to their original condition including traffic sign replacement and roadway resurfacing if necessary.

1.0 INTRODUCTION

ESS Group, Inc. (ESS) has prepared a preliminary haul route study of the potential Over-Size/Over-Weight (OS/OW) truck routes for delivering wind turbine components (blades, tower sections, hubs, nacelles and transformers) to the Ball Hill Windpark Project (the Project). The Project includes 60 turbines with a capacity of up to 90 megawatts, a new substation and a new switchyard. All wind turbines will be General Electric (GE) 1.5-MW, "Model sle". The Project will be developed on leased private land, totaling approximately 13,566 acres, in the Towns of Villenova and Hanover (Chautauqua County) located in western New York State. This study describes and evaluates potential routing to the site, describes and evaluates local transportation routes within the project boundaries and identifies potential transportation route deficiencies such as deteriorating roadway conditions, drainage structures and bridges.

As part of this study, ESS contacted several public agencies and private contractors identified in Section 4.0 to incorporate their input, expectations and requirements for transporting OS/OW loads over public roads and bridges.

The study area identified for this evaluation included the Ball Hill project area and the area within a 13-mile radius from which it was assumed that wind turbine components would be delivered to from their point of origin to the project site via interstate highway to the points of beginning (P.O.B) as shown on Map 1. The Transportation Haul Route Study included both Off-Site and On-Site OS/OW route planning. The Off-Site haul routes included in the study are identified on Map 1 as:

- East Access Alternative 1
- East Access Alternative 2
- East Access Alternative 3 – Preferred Route
- South Access
- Southwest Access
- Northwest Access Alternative 1
- Northwest Access Alternative 2 – Preferred Route

On-Site OS/OW route planning included preparing an inventory of the local area road network; evaluating the condition and safety of smaller county and local low-volume roads and assessing the ability of the local road system to support the anticipated OS/OW cargo of wind turbine components carried by special heavy hauling transport trucks.

OS/OW tractor-trailers are used for transporting wind turbine components and include special heavy hauling vehicles of various lengths, widths and weights. The configurations of tractor and trailer are customized depending on the particular wind turbine part being transported. The following table is a sample of OS/OW truck descriptions for various wind turbine parts:

TABLE 1: OS/OW TRUCK CONFIGURATIONS

Wind Turbine Part	Gross Wt (lbs.)	Transport Vehicle (configurations may vary)	Length	Height	Width	Turning Radius
80m Tower Base	**212,000***	11-Axle Double Schnabel	158'-9"	15'-0"	14'-2"	80'-5"
80m Tower Mid-Section	132,000	7-Axle Double Schnabel	128'-2"	15'-0"	n/a	80'-5"
80m Tower Top	112,000	6-Axle Expandable Flatbed	123'-7"	14'-6"	n/a	74'-6"
Nacelle	197,000	11-Axle Lowboy	112'-10"	14'-8"	n/a	111'-2"
37m Blade	<7,000	5-Axle Expandable Flatbed	143'-11"	13'-6"	n/a	120'-0"
Substation Transformer	165,960	19-Axle with jeep assembly	**192'-2"***	18'-5.5"**	12'-3"	80'-0"
Hub Assembly	75,000	5-Axle Double Drop	78'-0"	13'-8"	10'-5"	48'-4"

* SUPERLOAD (PERM12S) required by NYSDOT for any vehicle or combination of vehicles which exceed 16 feet in width; or 16 feet in height or greater; or greater than 160 feet in length; or 200,000 lbs. or greater in GVW; or a combination of any of the above.

** Requires special adjustments to overhead utility lines.

The planning parameters used to evaluate potential OS/OW routes included:

a) Traffic Safety (i.e. accident data);

b) Traffic Capacity (i.e. traffic volume as a function of roadway capacity);

c) Structural Capacity (e.g. roadway width, roadway condition, drainage structures, bridges, intersection geometry and roadway alignment); and

d) Overhead Electrical Wire (vertical clearance).

Based on the above parameters, potential mitigation measures were identified to address specific roadway deficiencies resulting from OS/OW wheel loads, OS/OW vertical clearance and OS/OW vehicle paths as the large trucks negotiate tight-radius turns over the trucking route. Table 2 presents the mitigation measures that may be applied to particular roadway deficiencies.

1.1 Video-documentation of Roadway Conditions

As part this study, a visual inspection of the physical characteristics of the local roads will also be performed in Spring 2009 after the frost has left the ground. This inspection will primarily consist of videotaping the local roadway network to photo-document the physical condition of the road surface as a way of identifying specific areas where potholes may have formed, where pavement cracking or heaving may have occurred or where other pavement or drainage structure may have become damaged over the winter months. The videotape will help establish a "baseline" for the general condition of the roadway and drainage infrastructure when the applicant enters into a Road Use Agreement with the adjoining towns.

TABLE 2: POTENTIAL MITIGATION MEASURES

Observed Roadway Deficiency	Potential Mitigation Measure
Insufficient Roadway Width	Widen roadway for OS/OW transport trucks
Poor Roadway Condition	Roadway resurfacing and/or regrading
Insufficient Cover Over Drainage Structure	Add cover or steel plates over structure. Review each structure with the County/Town Highway Dept.
Poor Drainage Structure Condition	Replace structure
Inadequate Bridge Capacity	1. Use bridge plates or jumpers 2. Provide temporary structural reinforcement 3. Find alternative route
Low Overhead Wires	Coordinate raising wires with utility company
Insufficient Roadway Geometry	1. Construct large radius intersection geometry 2. Reset traffic control signs on removable posts 3. Add or extend drain culverts to drainage ditches. 4. Find alternate route

Preliminary estimates indicate that up to 500 OS/OW truck trips may be required to transport the turbines components to the project area and another 14,100 gravel and cement trucks to build the infrastructure for the project. There would also be an equal number of returning empty vehicles. In addition, there are five (5) bridges in the study area that will require a more complete structural review and approximately 16 intersections with insufficient roadway width for OS/OW truck turning requirements. One concrete box culvert on East Lake Rd. may require structural improvements or replacement. The objective of this study is to select OS/OW truck routes that minimize the number of bridge crossings and intersections with insufficient roadway widths.

2.0 TRANSPORTATION FLEET REQUIREMENTS

Transporting the wind turbine components from their point of origin to their individual construction sites requires a large number of Over-Size/Over-Weight (OS/OW) transport vehicles specially designed for the wind energy industry. Each OS/OW load requires a special hauling permit from the NYSDOT as well as other county and local permits.

Aside from the OS/OW vehicle fleet requirements for a wind energy project of this size, a large number of gravel dumps and cement trucks are required to construct the infrastructure for the project. Miles of gravel access roads must first be constructed to access the actual turbine sites and then the turbine foundations can be constructed. As a result, thousands of gravel and cement trucks are required before any vertical construction can begin. These gravel and cement loads must meet New York State legal weight limit restrictions (22,000 – 24,000 lbs/axle) to use public roads for access. Over-the-road gravel loads may reach up to 65,000 lbs. depending on the number of axles and axle configurations.

2.1 OS/OW Transportation Requirements

The table below summarizes the special hauling permit vehicle trip requirements for a wind energy project consisting of 60 GE 1.5-MW turbines. It is estimated that between 410 and 500 OS/OW inbound loads will be required for the Ball Hill Windpark Project. Many of the trailer configurations can reduced in length after they have made their deliveries. As they leave the project area, their length and weight are greatly reduced making it easier and quicker to exit the project area.

TABLE 3: ESTIMATED SPECIAL HAULING PERMIT VEHICLE TRUCK TRIPS

Wind Turbine Component	No. each Turbine/Crane	Ball Hill Project	No. Vehicles Required	No. Single Trips	No. Round Trips*
80m Tower Base	1	60	60	60	120
80m Tower Mid-Section	1	60	60	60	120
80m Tower Top	1	60	60	60	120
Nacelle	1	60	60	60	120
37m Blade	3	180	90	90	180
Hub Assembly	1	60	60	60	120
Substation Transformer	2	2	2	2	4
500-ton Crane	1	1	19	19	38
TOTAL:	**11**	**483**	**411 (min.)**	**411 (min.)**	**822**

* All trucks are empty on the return trip except the crane trucks. Some trailer lengths can be shortened upon leaving the project area.

2.2 Gravel and Cement Truck Requirements

The table below summarizes the gravel and cement truck vehicle trip requirements for a wind energy project consisting of 60 GE 1.5-MW turbines. It is estimated that between 10,056 and 12,382 gravel and cement loads will be required for the Ball Hill Windpark Project. For purposes of this study, it is assumed that all gravel and cement truck loads will be leaving the project area empty. The total number of round-trip truck trips could be reduced if gravel trucks left with loads of unsuitable soil after delivering gravel loads to the site instead of leaving empty.

TABLE 4: ESTIMATED GRAVEL & CEMENT TRUCK TRIPS

Proposed Construction Activity	Quantity	Total Volume (CY)	No. Vehicles Required (range) *	No. Single Trips **	No. Round Trips **
Gravel for temporary Turbine Access Roads (35' wide x 8" depth)	16.0 miles	76,700	5,478 – 6,391	6,391	12,782
Gravel Removal for permanent Turbine Access Roads (16' wide x 8" depth)	16.0 miles	37,650	2,700 – 3,750	3,750	7,500
Unsuitable Soil Removal – Roads & Foundations (approx.)	varies	5,000	358 - 417	417	834
Cement for Turbine Foundations (304 CY each)	60 foundations	18,240	1,520 - 1,824	1,824	3,648
	TOTAL:	**137,590**	**10,056 – 12,382**	**12,382**	**24,764**

* Range is 14 CY – 12 CY for each gravel load and 12 CY – 10 CY for each cement load.
** Trip estimates based on higher range (i.e., smaller truck loads).

3.0 OFF-SITE HAUL ROUTE ALTERNATIVES

Several Off-Site haul routes were studied and reviewed in the field to determine how best to access the project area from the North, East, South and West. Because the points of origin of the turbine components will not be determined until about six months prior to construction it became necessary to study multiple off-site haul routes. For purposes of this study, limits for the Off-Site haul routes are described in the table below:

TABLE 5: OFF-SITE HAUL ROUTE ALTERNATIVES

Access Route	Limit of Study *	No. Routes Alternatives Studied	Distance from Project Area (mi.)**
East Access (E)	Springville, NY (Route 39W at Route 219S)	3	23.7
South Access (S)	Ellington, NY (Route 62N at end Route 50)	1	13.1
Southwest Access (SW)	Cassadaga, NY (Route 60N at end Route 58E)	1	8.7
Northwest Access (NW)	Fredonia, NY (Route 60S)	2	8.7

* For purposes of this study it was assumed that the applicant's special hauling contractor will be able to use an approved route that will connect to these intersections.

** Distance of preferred alternative route.

3.1 Off-Site Routes: East Access (3 alternatives)

Three (3) alternatives were evaluated for turbine loads originating east of the project area. For example, turbine loads originating at the Port of Oswego may use Route 104 West to Rochester, then follow I-390 South to Route 20A West to Route 39 West to Gowanda. For the purpose of this study, the eastern route study limit is Route 39 West at US Route 219 in Springville (Cattaraugus County).

All the East Access route alternatives begin in Springville at Route 39 West. It isn't until the routes reach Taylor Hollow Rd (Collins, NY) that they become different as they cross three (3) different bridges over the Cattaraugus Creek in the area of Gowanda Village. Refer to Off-Site Route Map 1 for details.

The criteria for selecting the preferred East Access alternative are based on the following:

a) Distance to the project area. The objective is to determine the shortest off-site haul route to the project area if possible.

b) Length and width of bridge crossed. The objective is to determine the shortest and widest bridge span that will safely support OS/OW turbine loads.

c) Extent of construction required to reinforce bridge structure. The objective is to determine which bridge will require the least amount of temporary improvements in the shortest period of time.

Based on these criteria, Alternative 3 (Gowanda Center) appears to be the preferred off-site haul route to the project area from the East. The following table describes the bridges along each route.

TABLE 6: OFF-SITE EAST ACCESS – BRIDGE CROSSINGS

East Access Alternative	Bridge Crossing	Bridge Dimensions (W x L)	BIN
1	Versailles Plank Rd Bridge (Erie / Cattaraugus Counties)	25′ x 400′	n/a
2	Aldrich St Bridge (Erie / Cattaraugus Counties)	30′ x 230′	n/a
3	Gowanda Center (Erie / Cattaraugus Counties)	49′ x 135′	n/a

EAST ACCESS ALTERNATIVE 1: VERSAILLES PLANK RD. BRIDGE. Alternative 1 is the longest route to the project area, but it by-passes Gowanda Village. The challenge for this alternative route comes at the approach to the Versailles Plank Rd. bridge over Cattaraugus Creek. Refer to Photo Sheet 3, Image 3a, in Appendix C. The horizontal distance between the near bridge abutment and the 3-way intersection is too short to allow the oversize turbine loads to completely straighten before going over the bridge. The width of the bridge is 25 feet with a raised sidewalk 5 feet wide on one side. There are metal beam highway guardrails on both sides for safety reasons. Behind the guardrails the ground slopes toward the Creek.

Major intersection improvements on private property would be required to mitigate the turning requirements of oversize loads at this location. One possible solution to improve this intersection would be to construct a "jug handle" as a way of lengthening the approach to the bridge. This solution would most likely require the removal of several large trees and require permission from the landowner to construct major improvements.

EAST ACCESS ALTERNATIVE 2: ALDRICH ST. BRIDGE. Alternative 2 is the shortest route to the project area and it also by-passes Gowanda Village, but it requires traveling through the Aldrich St. residential neighborhood located just south of the Aldrich St. bridge. Refer to Photo Sheet 3, Image 3d, in Appendix C. This route also includes an elementary school zone whereas the other alternative routes do not. The length, width and general condition of the Aldrich St. bridge appear to meet the criteria for crossing with overweight loads, but as the route continues southerly there is a problematic T-intersection at Route 39. At this location there is a very difficult right turn onto Route 39 West where major intersection widening would have to be constructed on the corner of a residential property in order to accommodate oversize truck turning requirements. The corner widening would involve tree removal, curb removal, sidewalk reconstruction and re-grading of the lawn area on the adjoining residential property.

EAST ACCESS ALTERNATIVE 3: GOWANDA BRIDGE. Alternative 3 has the most potential as the preferred East Access haul route to the project area. The bridge structure over Cattaraugus Creek in Gowanda Village has sufficient width to allow two-way traffic when OS/OW loads are using the bridge. If temporary structural improvements to the bridge are necessary, they could be constructed within the limits of the dedicated westbound right-turn lane. This would leave enough room for two-way traffic over the bridge. Since the bridge has pedestrian sidewalks on both sides, pedestrians could still use one sidewalk while the other sidewalk is closed temporarily. Refer to Figure IB-E8 in Appendix A and Photo Sheets 4 and 5 in Appendix C.

Though this route does pass through the Gowanda business district, it is still the most feasible route to the project area of all the East Access alternatives studied. Compared to the other two alternatives this route best satisfies the criteria for selecting the preferred haul route based on route length, bridge characteristics and extent of construction required to reinforce the bridge structure.

3.2 Off-Site Routes: South Access

The only Off-Site haul route from the South that was studied begins in Ellington Center (Chautauqua County). Refer to Map 1 for details. This route was chosen based on the assumption that turbine loads could reach this point by using I-86 and exiting in Jamestown to connect to state and county highways that lead to Ellington Center. The South Access route follows State Route 62 North (Ellington Center) to Cowango Valley where it merges with State Route 83 North and continues north to the project area at Balcom Cross Road. From this point the route continues north for 0.3 miles over an old county bridge (BIN 3325880) on Balcom Cross Road. A more detailed structural review of this bridge will be necessary to determine what structural improvements may be required to insure its safety. Along the South Access route only two intersections were reviewed for potential improvements and temporary widening. The results can be seen on Figures IB-S1 and IB-S2 in Appendix A.

3.3 Off-Site Routes: Southwest Access

The only Off-Site haul route from the Southwest that was studied begins in Cassadaga. Refer to Map1 for details. This route was chosen based on the assumption that turbine loads passing through Erie, PA could reach this point by using US Route 20 East; then to State Route 394 South to Mayville; then to County Route 58 North to Cassadaga. From Cassadaga, the Southwest route follows State Route 60 North for one-quarter mile and then merges with County Route 72 East (CR 72). CR 72 has a posted weight limit of 6 tons (between March 1 and May 31). CR 72 continues easterly for 8.4 miles where it enters the project area at Wentworth Road. The length of this route is 8.7 miles. Only two intersections along this route were reviewed for potential improvements and temporary widening. The results can be seen on Figures IB-SW1 and IB-SW2 in Appendix A.

3.4 Off-Site Routes: Northwest Access (2 alternatives)

Two Off-Site haul routes from the Northwest were evaluated for this study. Both routes begin at State Route 60 (SR 60) in Pomfret, but at different locations. Northwest Access Alternative 1 begins at the intersection of SR 60 and SR 83 South on the Pomfret / Arkwright town line. Northwest Access Alternative 2 begins at the intersection of SR 60 and US Route 20 East in Fredonia. SR 60 in Fredonia was chosen based on the assumption that turbine loads could reach this point by using routes along Lake Erie such as US Route 20 and SR 5. Turbine loads capable of using I-90 (NYS Thruway) could exit at Exit 59 (Dunkirk) and follow SR 60 to either of the two Northwest Access routes. Refer to Map 1 for details.

NORTHWEST ACCESS ALTERNATIVE 1: ROUTE 83 SOUTH. This route begins with a difficult 90-degree left turn uphill onto SR 83 South from SR 60 South and follows SR 83 South for 3.5 miles, then proceeds south (2.8 miles) on Center Road (CR 79) in Arkwright to the end of CR 79 at the intersection of CR 72. From this point the route joins the Southwest Access route to the project area at Wentworth Road (3.7 miles). The length of this Off-Site route alternative is 10.0 miles.

This is the same haul route proposed by the New Grange Windpark in Arkwright as indicated in the Transportation Assessment Section of the New Grange Windpark DEIS. The construction of this project is expected to begin around the same time as the Ball Hill Windpark project in 2009.

This alternative can be characterized as having a challenging horizontal and vertical alignment over the first 6.3 miles with many high speed curves (speed limit, 55 MPH) and long downhill slopes and sag curves. For example, the 3.5 mile section along Center Road (CR 79) has a steep downhill grade of -9.5% just past the intersection of Meadow Road, and then another downhill grade of -7.2% just before the intersection with CR 72. These steep downhill grades could potentially result in longer than usual stopping distances for turbine loads and construction vehicles. On the basis of traffic safety relative to stopping sight distances, NW Access Alternative 1 should be avoided considering the benefits of NW Access Alternative 2 described below.

NORTHWEST ACCESS ALTERNATIVE 2: US ROUTE 20 EAST. This route begins at the intersection of SR 60 and US Route 20 in Fredonia. This is a multi-lane signalized intersection with more than 50 feet clear distance in all directions from curb to curb. Turning left onto US Route 20 East from SR 60 South could be performed easily and with much less disruption to traffic than trying to turn left onto

SR 83 South as described above. The route continues east on US Route 20, then merges right onto SR 39 East. The intersection of US Route 20 and SR 39 favors a right turn for oversize turbine loads and no stopping is required because of the "forked" alignment. Horizontal sight distance is very good and this condition should not result in unexpected traffic delays. There is sufficient pavement width at this location for oversize loads and no widening will be required. From this point the route continues east through the village of Forestville (Sheridan) where SR 39 becomes divided for a short distance. Here there is on-street parking on the left side of the road, but there is still adequate pavement width for through truck traffic. No temporary improvements to SR 39 would be required in Forestville. Refer to Photo Sheets 9 and 10 in Appendix C for more details. The route continues East on SR 39 until Empire Road where it enters the project area in Hanover. The length of this route is 8.7 miles.

NW Access Alternative 2 is preferred over NW Access Alternative 1 because it is the safer and shorter route to the project area and requires no improvements. The first 6.1 miles between SR 60 and Forestville is relatively flat with no high speed horizontal curves. There are two downhill sections along this route, but neither is as steep as the ones found on NW Access Alternative 1 described above. Alternative 2 also has the least impact to daily traffic resulting in fewer delays to the public compared to Alternative 1.

3.5 Traffic Safety

Accident Data was requested from the NYSDOT (Region 5) Public Information Office for state highways included in this report. The data comes directly from the NYSDOT Safety Information Management System (SIMS) for a 3-year period from January 1, 2005 to December 31, 2007. The results are shown in the tables below.

TABLE 7a: STATE HIGHWAY ACCIDENT DATA – Northwest Access & East Access

Route No.	County	Length (miles)	No. Accidents Reported	Collision With Deer	Fatal	Persons Injured
US Route 20	Chautauqua	2.0	61	5	0	28
Route 39	Chautauqua	11.2	60	25	0	32
Route 39	Cattaraugus	6.7	56	14	0	31
Route 39	Erie	12.8	53	17	1	25
TOTAL:		**32.7**	**230**	**61**	**1**	**116**

Refer to Appendix D, Map 1 for state highway limits.

TABLE 7b: STATE HIGHWAY ACCIDENT DATA – South Access

Route No.	County	Length (miles)	No. Accidents Reported	Collision With Deer	Fatal	Persons Injured
Route 60	Chautauqua	3.8	5	0	0	1
Route 83	Chautauqua	12.3	57	25	1	17
TOTAL:		**16.1**	**62**	**25**	**1**	**18**

Refer to Appendix D, Map 1 for state highway limits.

The SIMS data includes accidents that occurred early in the morning, late at night, in the rain, snow and ice with poor visibility. The NYSDOT Special Hauling permit specifically prohibits operating in these conditions. The one exception is a waiver for peak-hour restriction which may allow OS/OW transports between 7-9AM and 4-6PM which NYSDOT considers as "curfew hours". The NYSDOT Special Hauling permits require that transportation escorts and police escorts be present at all times during transport. Also, speed limits are restricted and hours of operation are limited to daytime-only for transportation safety reasons. Summer months are also preferred to take advantage of lower traffic volumes and longer days.

3.6 Traffic Capacity

Highway Sufficiency Ratings data was requested from the NYSDOT (Region 5) Public Information Office for state highways included in this report. The most recent data on state highway capacity and traffic volumes received from NYSDOT includes 2007. The results are shown in the tables below.

TABLE 7b: 2007 HIGHWAY SUFFICIENCY – U.S. Route 20 Eastbound (SR 60 to SR 39)

Begin Mileage	End Mileage	Total Lanes	Paved Width (feet)	Shoulder Width (feet)	AADT
27.48	27.72	4	40	10	1,124-1,388
27.72	29.66	2	24	8	1124

AADT=Annual Average Daily Trips – Two Way

TABLE 7c: 2007 HIGHWAY SUFFICIENCY – State Route 39 Eastbound (U.S. 20 to U.S. 219)

Begin Mileage	End Mileage	Total Lanes	Paved Width (feet)	Shoulder Width (feet)	AADT
0.00	11.13 COUNTY LINE	2	20-26	0-8	223-292
0.00 COUNTY LINE	6.66	2	20-30	0-8	223-512
6.66	6.76 GOWANDA	3	37	0	512
6.76	6.78 COUNTY LINE	4	50	0	1,134
0.00 COUNTY LINE	0.01	4	50	0	1,219
0.01	1.09	2	24-28	0-6	430-1,219
1.09	1.32	4	46	10	430
1.32	13.57	2	22-24	5-8	392-481
13.57	15.18	3	36	8	481
15.18	15.26	4	48	7	481

TABLE 7d: 2007 HIGHWAY SUFFICIENCY – State Route 60 Northbound (CR 58 to U.S. 20)

Begin Mileage	End Mileage	Total Lanes	Paved Width (feet)	Shoulder Width (feet)	AADT
22.12	25.62	2	24	0-10	734-936
25.62	26.49	3	36	9	936
26.49	30.31	2	23-24	9	936-1,493

TABLE 7e: 2007 HIGHWAY SUFFICIENCY–State Routes 62 & 83 Northbound (CR 50 to SR 60)

Begin Mileage	End Mileage	Total Lanes	Paved Width (feet)	Shoulder Width (feet)	AADT
21.55 ELLINGTON	25.44 AT SR 83	2	22	8	125
0.00 SR 83 AT SR 62	21.82 SR 83 AT SR 60	2	20-24	0-9	149-223

Refer To Appendix D, Map 1 for state highway limits.

Each state highway route described in the above tables has more than adequate available capacity for the transportation fleet of OS/OW vehicles to delivery turbine components to the local On-Site roadway network of county highways and town roads. Available highway capacity is not a limiting factor in the selection of potential Off-Site haul routes for this project.

3.7 Structural Capacity

HIGHWAY WIDTH. In general, the state highways are all two-lane roads with sufficient travel lane width and paved shoulder width to sustain oversize turbine loads without encroachment into the opposing traffic lane.

HIGHWAY CONDITION. In general, the state highway pavement surfaces are in very good condition. No excessive cracking or pot holes were observed in the field. Pavement markings, regulatory and directional signage were clear and in good condition.

DRAINAGE STRUCTURES. Drainage structures such as pipe culverts and concrete box culverts were not evaluated as part of the off-site haul route alternatives study. An experienced New York State route surveyor will have to verify the condition and depth of cover over existing drainage structures along the off-site routes during the Special Hauling permit application process.

RAILROAD CROSSINGS. One railroad crossings was observed on SR 39 West in the Town of Collins during the off-site haul route alternatives study. The railroad crossing was an at-grade crossing in very good condition and does not require any modifications to accommodate lowboy trailers.

BRIDGES.

UNDERPASSES. No overhead bridges were observed along the routes included in the off-site haul route alternatives study.

OVERPASSES. Several small "culvert bridges" over small streams were observed in the field as well as several major bridges over waterbodies along the off-site routes. Bridges and box culverts are shown on Map 1 in Appendix D. Physical characteristics such as allowable weight loads, bridge type and condition will be determined by the NYSDOT Structures Division during the actual Special Hauling Permit application process. The route surveyor will submit a route plan to NYSDOT for review and NYSDOT will query the NYSDOT GIS database for a bridge report to identify potential bridge related problems along the route.

DEFICIENT INTERSECTION GEOMETRY AND ROADWAY ALIGNMENT.

Seven (7) intersections within the off-site haul route study area are in need of some temporary widening in order to accommodate oversize turbine loads as they make their way to the individual turbine construction sites within the project area. The intersection improvements for these seven locations are shown in Appendix A on Figures IB-E2, IB-E4, IB-E5, IB-E9, IB-S1, IB-S2 and IB-SW1. Typically, the proposed intersection improvements include traffic sign removal, compacted gravel widening, drainage ditch filling and/or drain pipe culvert extensions. Once the gravel widening has been constructed, traffic signs are reset in their original location on portable or removable posts so they can be easily moved when oversize loads pass through the intersection.

When the project is completed, the intersections will be restored to their original condition and the disturbed areas will be reseeded as required depending on location and circumstances.

3.8 Overhead Electrical Wires

Overhead wires such as telephone, electric, internet cables and fiber optic cables were not evaluated as part of the off-site haul route alternatives study. An experienced New York State route surveyor will have to verify the vertical clearance of overhead wires along the off-site routes during the Special Hauling permit application process.

3.9 Summary and Follow-up for Off-Site OS/OW Haul Route Alternatives

Since the point of origin of wind turbine components may not be determined until approximately six months prior to construction it became necessary to look at multiple inbound routes from the East, South, Southwest and Northwest. The objective of this Off-Site alternative routes study was to evaluate "likely routes" that potentially could be used for OS/OW special hauling for this project and do not include any "fatal flaws" such as low overhead railroad bridges or bridges under repair. All the off-site route alternatives considered for this project are potential routes to the project area. Some are better than others with varying degrees of temporary construction required to meet OS/OW transportation requirements.

Access from the East requires crossing the Cattaraugus Creek. Access from the South and Southwest requires crossing the West Branch Creek at Balcom Cross Road (CR 87). When the NYSDOT Structure Division reviews these bridge structures and makes its determination of what improvements may be required to make these structures safe, access to the project area from the East and South may change dramatically. Access from the Northwest crosses one bridge just west of Forestville on SR 39. This bridge crossing appears to be minor compared to the other alternatives. Of all the alternative routes studied, the Northwest Access Alternative 2 (US Route 20 East to SR 39 East from Fredonia) is the preferred off-site haul route, but it may not be possible or realistic that all turbine components can use this route.

3.10 Recommendation

The results of this OS/OW transportation route study are preliminary, but identify where to direct efforts in planning the final route for this project. The following action plan is recommended as this project moves forward.

1. Work closely with NYSDOT Special Hauling Permits Division (Albany) and get them involved early in the process. Allow a minimum of 6 to 9 months for NYSDOT permitting.
2. Contact an experienced Route Surveyor who will submit a final route as part of the permit process required by NYSDOT.
3. Provide accurate highway survey information for problem intersections in order to determine engineering solutions to construction vehicle turning movements.
4. Understand where vertical clearance problems occur along the route especially as they relate to low overhead electric wires. The Route Surveyor should provide this.
5. Contact the appropriate utility companies 6 to 9 months in advance of the first OS/OW truck trip to notify them that they need to raise wires above the roads as necessary.

6. Conduct on-site meetings with the project's construction manager, environmental scientist and transportation contractor to review the haul routes to identify specific issues early in the process and establish an action plan to address them as the project moves forward.

4.0 ON-SITE HAUL ROUTES (STATE, COUNTY & TOWN ROADS)

This section of the Transportation Haul Route Study addresses the physical capacity of the local area road network to support the OS/OW turbine loads that will serve the project area. The wind turbine components will travel over these smaller, local roads to reach their final destinations. Four (4) On-Site Haul Route Maps were developed for planning local haul routes by cardinal direction (East, South, Southwest and Northwest). Refer to Appendix D: Haul Route Maps for more details. For purposes of this study, each drainage structure was located to the nearest 0.1 mile as each road was field inspected to complete the local road network inventory. The results of the roadway inventory are included in Appendix B. The roadway width and condition was also recorded in a mileage logbook and photographs were also taken. Photographs of state, county and town roads and intersections can be found in Appendix C. The following tables identify the roads included in this study that form the basis for On-Site Haul Routes: Maps 2, 3, 4, and 5.

TABLE 8: ON-SITE HAUL ROUTES - LOCAL AREA ROAD NETWORK

Road Name	Town	Jurisdiction	Description	Condition/ Comments
Route 39	Hanover	State	Paved 30'-36' wide 4'-6' gravel shoulders	Very good
Route 83	Villenova	State	Paved 30' wide 4'-6' gravel shoulders	Very good
County Route 72	Villenova	County	Paved 22' wide 4'-8' gravel shoulders	Good. Weight Limit 6 Tons
County Route 93	Hanover Villenova	County	Paved 24' wide 4'-8' gravel shoulders	Good
Buttermilk Rd (CR 91)	Villenova	County	Paved 22' wide 4'-8' gravel shoulders	Good
Balcom Cross Rd (CR 87)	Villenova	County	Paved 22' wide 4'-8' gravel shoulders	Good
Ball Hill Rd (CR 87)	Villenova	County	Paved 22' wide 4' gravel shoulders	Good
Empire Rd	Hanover	Town	Paved 20' wide 5' gravel shoulders	Fair-good
Hurlbert Rd	Hanover	Town	Paved 20' wide 3'-6' gravel shoulders	Fair-good
Dye Rd	Villenova	Town	Paved 20' wide 5' gravel shoulders	Fair
East Lake Rd	Villenova	Town	Gravel 24' wide 4'-6' grass shoulder	Good
Smith Rd	Villenova	Town	Paved 20' wide 5' gravel shoulders	Fair-good
North Hill Rd	Villenova	Town	Paved 20' wide 5' gravel shoulders	Fair-good
Pope Hill Rd	Villenova	Town	Paved 20' wide 5' gravel shoulders	Fair-good
Round Top Rd	Villenova	Town	Paved 20' wide 5' gravel shoulders	Poor-fair
Villenova Rd	Villenva	Town	Gravel 22' wide 4' grass shoulders	Good-very good
Bartlett Hill Rd	Villenova	Town	Gravel 22' wide 4' grass shoulders	Good. Dead End
Prospect Rd	Hanover	Town	Paved 20' wide 5' gravel shoulders	Fair-good. Gravel & cement trucks only

Within the project area 19 intersections were measured, photographed and analyzed for potential modifications to accommodate OS/OW turbine transport vehicles such as gravel widening, light pole and utility pole relocation, traffic sign removal and relocation and drain pipe culvert extensions. Out of 19 intersections, 16 require some form of temporary construction to meet oversize transport vehicle turning requirements. The intersection improvements for these on-site locations are shown in Appendix A.

The oversize truck turning simulation shown on the Intersection Improvement Plans is based on a rear fixed-axle blade trailer with a wheel base span of 88'. The overall length of tractor/trailer and blade is 143'-11". The blade length is 123' and overhangs the back of the trailer 26'. The minimum inside turning

radius for this vehicle is 120'-0". The overall clear width of the blade trailer is 12'-0". Other trailer configurations may be heavier, longer and wider, but have the advantage of being "rear steerable" and can turn more sharply at intersections than the fixed-axle trailers. These dimensions were used as part of the truck turning simulation because they generate the most conservative vehicle path to establish the limits of gravel widening at intersections.

4.1 Local Haul Routes: East Access

For planning purposes, the direction of travel from the East was a key factor in evaluating truck turning characteristics at intersections inside the project area. This the basis of Map 2 in Appendix D. East site access begins at the northern boundary of the project area and proceeds south along CR 93. This direction of travel requires simple right and left turns at intersections within the project because of the way the existing roads intersect at a skewed angle. The "vehicle path footprint" that is generated by turning in the "direction of the skew" results in smaller areas of gravel widening at intersections within the project. The affect on intersection widening can be seen on the Intersection Improvement Plans in Appendix A. East site access also avoids crossing bridges over the West Branch Creek that traverses the southern boundary of the project area.

4.2 Local Haul Routes: Northwest Access

For planning purposes, the direction of travel from the Northwest was a key factor in evaluating truck turning characteristics at intersections inside the project area. This the basis of Map 5 in Appendix D. Northwest site access begins at the northern boundary of the project area at Empire Road and proceeds south on Empire Road to Hurlbert Road. This direction of travel requires simple right and left turns at intersections within the project because of the way the existing roads intersect at a skewed angle. The "vehicle path footprint" that is generated by turning in the "direction of the skew" results in smaller areas of gravel widening at intersections within the project. The affect on intersection widening can be seen on the Intersection Improvement Plans in Appendix A. Northwest site access also avoids crossing bridges over the West Branch Creek that traverses the southern boundary of the project area.

4.3 Local Haul Routes: South Access

For planning purposes, the direction of travel from the South was a key factor in evaluating truck turning characteristics at intersections inside the project area. This the basis of Map 3 in Appendix D. South site access begins at the southern boundary of the project area at SR 83 North and proceeds north on Balcom Cross Road (CR 87) over an old county bridge over the West Branch Creek. From the end of Balcom Cross Road, South site access joins East site access and the direction of travel westbound through the project area is the same.

4.4 Local Haul Routes: Southwest Access

For planning purposes, the direction of travel from the Southwest was a key factor in evaluating truck turning characteristics at intersections inside the project area. This the basis of Map 4 in Appendix D. Southwest site access begins at the southern boundary of the project area on CR 72 East at Wentworth Road and continues easterly on CR 72, then becomes SR 83 South (but still heading east)

to Balcom Cross Road. From this point, Southwest site access proceeds north on Balcom Cross Road where it joins the South site access route described above.

4.5 Traffic Safety

Accident data was obtained from the Chautauqua County Department of Public Facilities (Falconer, NY). Data was collected for county highways for a 4-year period from 2004 through 2007. The results are shown in the table below.

TABLE 9: COUNTY HIGHWAY ACCIDENT DATA (2004-2007)

County Route No.	County	Length (miles)	No. Accidents Reported *	Collision With Deer	Fatal	Persons Injured
CR 72	Chautauqua	9.9	6	n/a	0	n/a
CR 79	Chautauqua	6.9	5	n/a	0	n/a
CR 87	Chautauqua	5.7	4	n/a	0	n/a
CR 91	Chautauqua	2.0	2	n/a	0	n/a
CR 93	Chautauqua	4.2	3	n/a	0	n/a
TOTAL:		**28.7**	**20**		**0**	

Refer to Appendix D, Map 1 for county highway limits. * Includes collisions with deer.

During visits to the project area, driving speeds were observed on the county and town roads. Observed driving speeds on Hurlbert Road, Dye Road, East Lake Road, Bartlett Hill Road and Villenova Road were generally 25 mph or less. Observed driving speeds on North Hill Road, Empire Road, Pope Hill Road and Round Top Road were generally 25-35 mph. Observed driving speeds on Ball Hill Road (CR 87) and Smith Road were generally 35-45 mph. Speeds on SR 83 and Buttermilk Road (CR 91) were generally around 35-45 mph. Speeds on CR 93 were generally 50-60 mph. In general, county highways have a posted speed limit of 55 MPH in rural areas and 35 MPH approaching local villages.

During turbine transport, care shall be taken to locate transportation escorts and police details strategically in areas where speeds are high and sight distance is limited so that oncoming traffic can be adequately warned and/or stopped while turbine transports are turning ahead. This condition would apply to CR 93 along the eastern boundary of the project.

4.6 Traffic Capacity (County Highways)

Highway sufficiency data was obtained from the Chautauqua County Department of Public Facilities (Falconer, NY) for county highways in the project area. The data is shown in the table below.

TABLE 10: 2007 CHAUTAUQUA COUNTY HIGHWAY SUFFICIENCY DATA

County Highway *	Begin	End	Total Lanes	Paved Width (feet)	Soft Shoulder Width (feet)	AADT
CR 72	SR 60	SR 83	2	21-23	6-8	560-1300
CR 79	CR 72	SR 39	2	21-24	4-8	480-820
CR 87	SR 322	Hurlbert Rd	2	21.5-22.5	4-6	340-1050
CR 91	Danker Rd	CR 93	2	22	6	680-940
CR 93	CR 91	SR 39	2	23-23.5	6	1150-1250

Refer To Appendix D, Maps 1 & 2 For County Highway Limits.
* Route May Have A Seasonal Weight Limit Posting.

Each county highway route described in the above table has more than adequate available capacity for the transportation fleet of OS/OW vehicles to delivery turbine components to the individual turbine access roads. Available highway capacity is not a limiting factor in the selection of potential On-Site haul routes for this project. However, many of the county highways in the project area have a seasonal weight limit restriction of 6 tons/axle. Trucks over 6 tons/axle are excluded from using county highways between March 1 and May 31 when the frost in the ground typically melts. OS/OW turbine loads, gravel loads and cement loads should not be using these restricted routes until the frost restriction has been lifted by town or county officials.

4.7 Structural Capacity

ROADWAY WIDTH. In general, the local county and town roads are all two-lane roads (20'-22' wide) with sufficient travel lane width and soft gravel shoulders to sustain oversize turbine loads without encroachment into the opposing traffic lane. See Table 8.

ROADWAY CONDITION. In general, the local county and town road pavement surfaces are in good condition. No excessive cracking or pot holes were observed in the field. Pavement markings, regulatory and directional signage were clear and in good condition. East Lake Road and Villenova Road are gravel roads, 22'-24' wide, maintained by the Town. Round Top Road was in poor to fair condition and has recently been repaired with asphalt patching. All local roads are constructed with a normal crown for drainage. The crowns were randomly measured in the field and were between 1.5%-3.0%. The slope of the soft gravel shoulders measured between 3.0%-5.0%.

STEEP GRADES. Road grades steeper than 10% make turbine transport difficult without another vehicle available to assist in the move. There is one location in the project area where the road grade is steeper than 10%. It is North Hill Road, 0.45 miles north of Villenova Road. The grade is -11.4% in the northbound direction.

STOPPING SIGHT DISTANCE. Intersections within the project area were also reviewed for traffic safety in terms of adequate (or inadequate) stopping sight distances at the intersection. The roadway characteristics that generally dictate stopping sight distances are horizontal alignment (roadway curvature) and vertical alignment (crest curve sight lines) as they relate to design speed. In general,

the travel speed approaching the intersections within the project area was slow enough not to create an unsafe stopping distance in the event that a vehicle had to stop quickly. For purposes of this study, stopping sight distance was reviewed only where the approach speed to the intersection was 50 MPH or greater. In general, the distance required to stop under normal conditions traveling at 50-60 MPH is between 525-650 feet.

The only intersection within the project area where the horizontal sight distance (at 50-60 MPH) may be less than 525 feet is East Lake Rd at CR 93 (refer to Fig. E2). Just south of this intersection is a 1300-foot horizontal curve. For vehicles traveling north on CR 93, the sight distance to the East Lake Road intersection is approximately 530 feet. Care shall be taken to use police and pilot cars to safely warn oncoming motorists in advance of the intersection while OS/OW transport vehicles are moving through the intersection.

At the time of this initial study, vertical crest curve stopping sight distance was observed in a general manner and did not appear to be a significant safety issue at intersections within the project area because of slow approach speeds. A more detailed analysis of vertical curve stopping sight distance would require an on-the-ground instrument survey to accurately determine entering and exiting grades and the length of crest vertical curves. It was assumed that adequate advance warning in the form of police cars, pilot cars, escorts and flagmen would be a requirement of the special hauling permit.

DRAINAGE STRUCTURES. Drainage structures such as pipe culverts and concrete box culverts were located and measured along all roads in the project. Pipe diameters, pipe materials, box culvert dimensions and depth of cover were measured and entered in the fieldbook as part of the roadway inventory. The results are detailed in Appendix B: Roadway inventory.

For purposes of this study, pipe culverts with less than 24" of cover were considered to be potentially vulnerable to being crushed or otherwise damaged as a result of frequent truck traffic. As a result, four (4) pipe culverts were found to have less than 24" of cover. Their locations are noted below.

- One 48" dia. steel pipe culvert on Hurlbert Rd., 1.85 mile east of Empire Rd. Cover = 12".
- One 42" RCP pipe culvert on CR 93, 0.1 miles north of East Lake Rd. Cover = 16".
- One 48" dia. steel pipe culvert on Round Top Rd., 0.6 miles south of Pope Hill Rd. Cover = 22".
- One 28" x 36" dia. elliptical CMP on CR 72, 2.1 miles east of Wentworth Rd. Cover=16".

For purposes of this study, concrete box culverts (i.e. less than 8' wide) with less than 24" of cover were considered to be potentially vulnerable to being crushed or otherwise damaged as a result of frequent truck traffic. As a result, one concrete box culvert was found to have less than 24" of cover.

- One 36" x 36" box culvert located on CR 72, 0.55 mile east of Wentworth Rd. Cover = 22".

All drainage pipe culverts are shown on Map 6 in Appendix D.

RAILROAD CROSSINGS. No railroad crossings were observed in the project area.

BRIDGES.

UNDERPASSES. No overhead bridges were observed in the project area.

OVERPASSES. Three (3) "culvert bridges" over small streams were observed in the field as well as three (3) steel stringer beam bridges over waterbodies inside the project area. "Culvert bridges" are concrete box culverts with spans of 8 feet or greater and typically have less than two inches of cover.

The three (3) culvert bridge locations are noted below.

- One 18'-11"W x 19'-2"L x 3'H (?) culvert bridge on East Lake Rd, 0.1 mi. west of CR 93. Cover=8".
- One 24'W x 22'L x 6.75'H culvert bridge on CR 72, 0.5 mi. east of Wentworth Rd. Cover=1.5".
- One 24'W x 16'L x 6'H culvert bridge on CR 72, 1.9 mi. east of Wentworth Rd. Cover=2.5".

The three (3) steel stringer beam bridge locations are noted below.

- One 23'W x 67'L bridge on Balcom Cross Rd, 0.3 mi. north of SR 83. BIN 3325880.
- One 30'W x 60'L bridge on Buttermilk Rd (CR 91), 0.5 mi. south of CR 93. BIN 3325890.
- One 32.5'W x 25'L bridge on Buttermilk Rd (CR 91), 1.1 mi. south of CR 93. BIN 3325940.

Physical characteristics such as allowable weight loads, bridge type and condition will be determined by the NYSDOT Structures Division during the actual Special Hauling Permit application process. The route surveyor will submit a route plan to NYSDOT for review and NYSDOT will query the NYSDOT GIS database for a bridge report to identify potential bridge related problems along the route.

DEFICIENT INTERSECTION GEOMETRY AND ROADWAY ALIGNMENT.

Sixteen (16) intersections within the project study area are in need of some temporary widening in order to accommodate oversize turbine loads as they make their way to the individual turbine construction sites. The intersection improvements for these 16 locations are shown on the Intersection Improvement Plans in Appendix A. Typically, the proposed intersection improvements include traffic sign removal, compacted gravel widening, drainage ditch filling and/or drain pipe culvert extensions. Once the gravel widening has been constructed, traffic signs are reset in their original location on portable or removable posts so they can be easily moved when oversize loads pass through the intersection.

When the project is completed, the intersections will be restored to their original condition and the disturbed areas will be reseeded as required depending on location and circumstances.

4.8 Overhead Electrical Wires

Overhead wires such as telephone, electric, internet cables and fiber optic cables were located along each road in the project area. The overhead wire locations are summarized in the Roadway Inventory in Appendix B. Vertical clearance measurements were not taken at the time of the roadway inventory. The tallest load is the substation transformer at 18'-5-1/2". All existing overhead wires lower than 18'-

6" will have to be raised by the responsible utility company. An experienced New York State route surveyor will have to verify the vertical clearance of overhead wires along the local roads during the Special Hauling permit application process.

4.9 Summary and Follow-up for On-Site Route Planning

ON-SITE OS/OW HAUL ROUTES. The principle goal of this transportation haul route study was to collect physical roadway and bridge data to help identify the most "practical" haul routes for Over-Size/Over-Weight (OS/OW) loads to the proposed turbine access roads. For example, a major objective of this study was to eliminate roads in the study area that terminated at intersections with unfavorable alignments for truck turning or resulted in multiple fixed objects in the proposed wheel path such as utility poles and traffic signal strain poles. Another objective was to establish the direction of travel that best facilitated turning movements at skewed intersections inside the project area.

This study identified specific intersections where improvements are likely to be required. This was accomplished by combining aerial photographs with actual field measurements to locate obstructions such as guard rails, traffic signs and utility poles within the anticipated truck turning path. Computer modeling software was then used to simulate turbine blade trailer turning characteristics through the intersections to identify limits of gravel widening. Intersections requiring improvements can be found in Appendix A.

ON-SITE GRAVEL & CEMENT TRUCK HAUL ROUTES. A secondary goal of this haul route study was to identify potential On-Site haul routes for gravel and cement trucks to use for access to the turbine construction sites. These routes are the same as the OS/OW routes shown on Maps 2 through 5 in Appendix D with the exception of Hurlbert Rd (West), Prospect Rd/Ball Hill Rd (North), Villenova Rd (East) and a short section of North Hill Rd (between ACR 27 and Villenova Rd. These specific roads were selected because they provide alternatives for truck circulation within the project area and more direct access to some of the turbine access roads. OS/OW truck loads are excluded from these roads because the geometry and topographic features of the intersections make it very difficult to construct improvements.

4.10 Recommendation

The results of this OS/OW transportation route study are preliminary, but indicate where to direct efforts in planning the final route for this project. The following action plan is suggested as this project moves forward.

1. Work closely with NYSDOT Special Hauling Permits Division (Albany) and get them involved early in the process. Allow a minimum of 6 to 9 months for NYSDOT permitting.
2. Contact an experienced Route Surveyor who will submit a final route as part of permit process required by NYSDOT.
3. Contact the County Highway and Town Highway Departments to understand the procedures for performing work on public roads.

4. Contact the appropriate utility companies 6 to 9 months in advance of the first OS/OW truck trip to notify them that they need to raise wires above the road.
5. Obtain all necessary state, county and local permits.
6. Conduct on-site meetings with the project's construction manager, environmental scientist and transportation contractor to review the haul routes to identify specific issues early in the process and establish an action plan to address them as the project moves forward.

5.0 PROJECT CONTACT INFORMATION

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(716) 672-6446

Raymond E. Smith
Highway Superintendent
Town of Dayton, NY
9943 Nashville Rd.
South Dayton, NY 14138
(716) 532-5139 (B)
(716) 532-4769 (H)

Aaron W. Burnett
Highway Superintendent
Town of Stockton
4896 Munger Road
Stockton, NY 14784
(716) 595-3565

Kenneth W. Chase
Highway Superintendent
Town of Cherry Creek
6267 South Route 83
Cherry Creek, NY 14723
(716) 296-5721

Casey P. Rhinehart (R)
Highway Superintendent
Town of Ellington
4891 South Hill Road
Kennedy, NY 14747
(716) 287-3575 (H)
Mailing address:
PO Box 399, Ellington, NY 14732

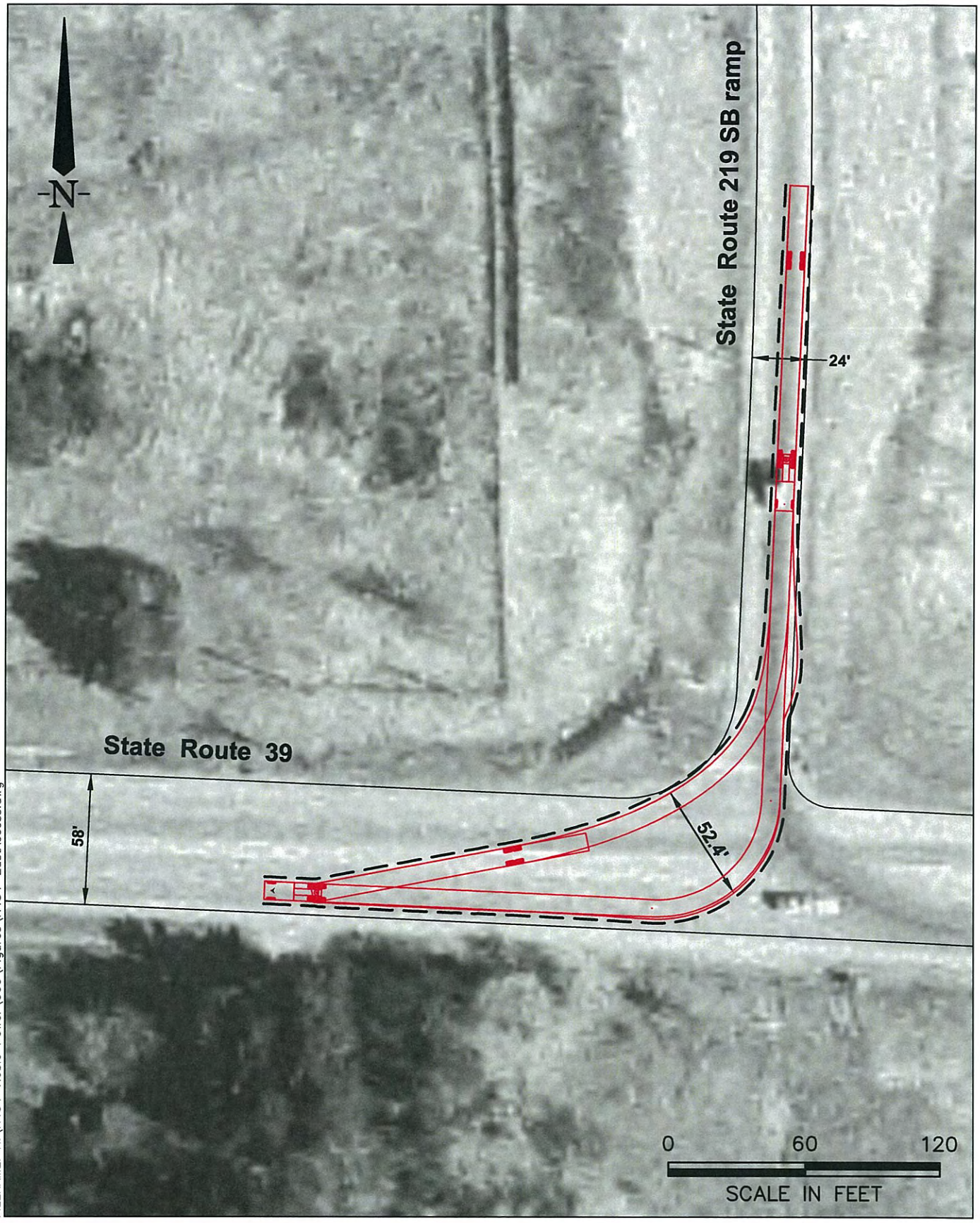
Peter J. Loretto Jr. (D)
Superintendent of Highways
Town of North Collins
5423 Langford Road
Eden, NY 14057
(716) 337-3967

Dennis Dains
Highway Superintendent
Town of Concord
86 Franklin Street
P. O. Box 368,
Springville, NY 14141
(718) 592-4892 or 863-0936

National Grid
(Electric Company for Chautauqua)
300 Erie Blvd. West
Syracuse, NY 13202
(315) 474-1511

Appendix A

Intersection Improvement Plans



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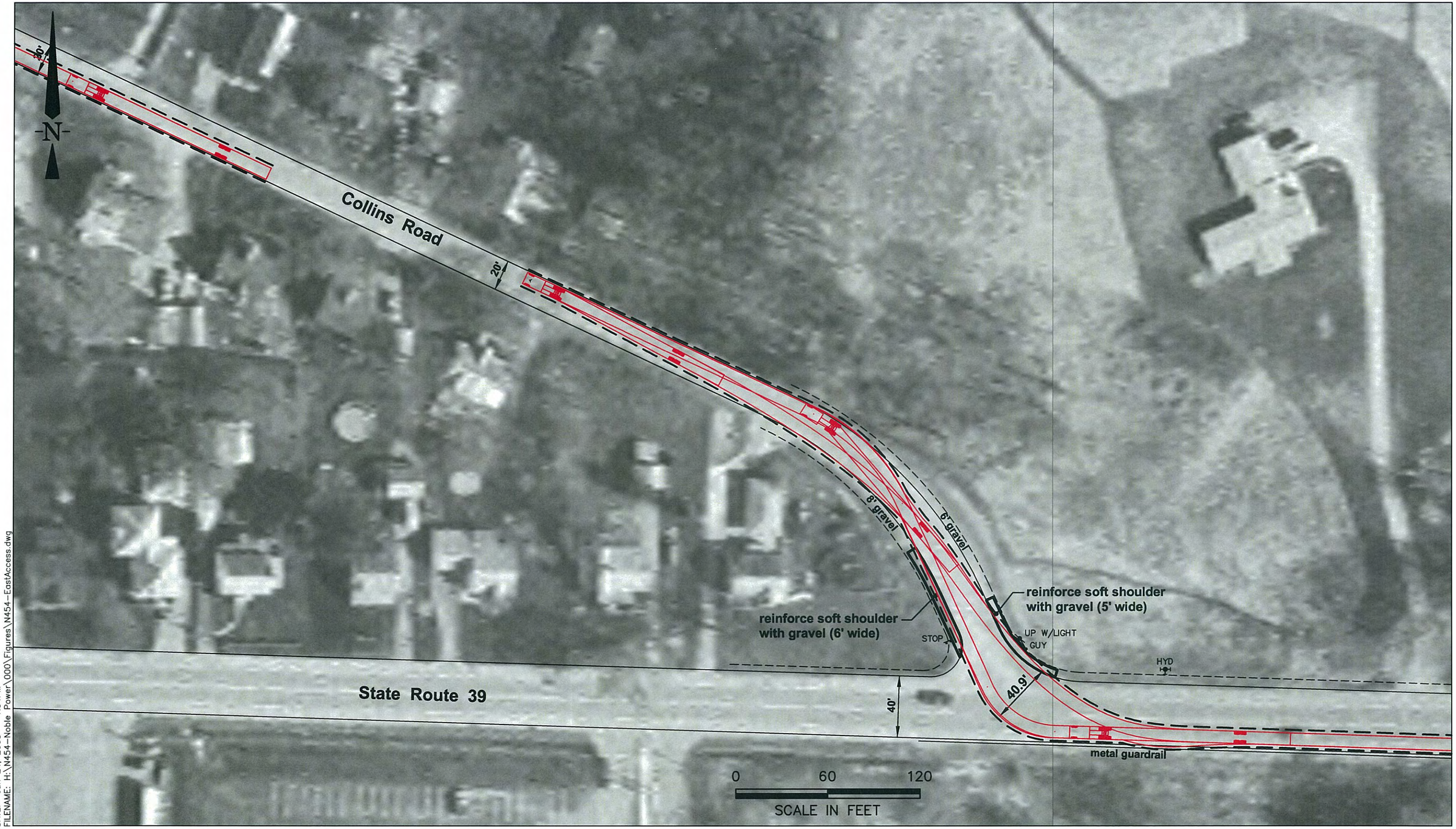
Noble Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Rte 39 @ Rte 219
Concord, New York
Intersection Improvements
Plan

Figure
IB-E1



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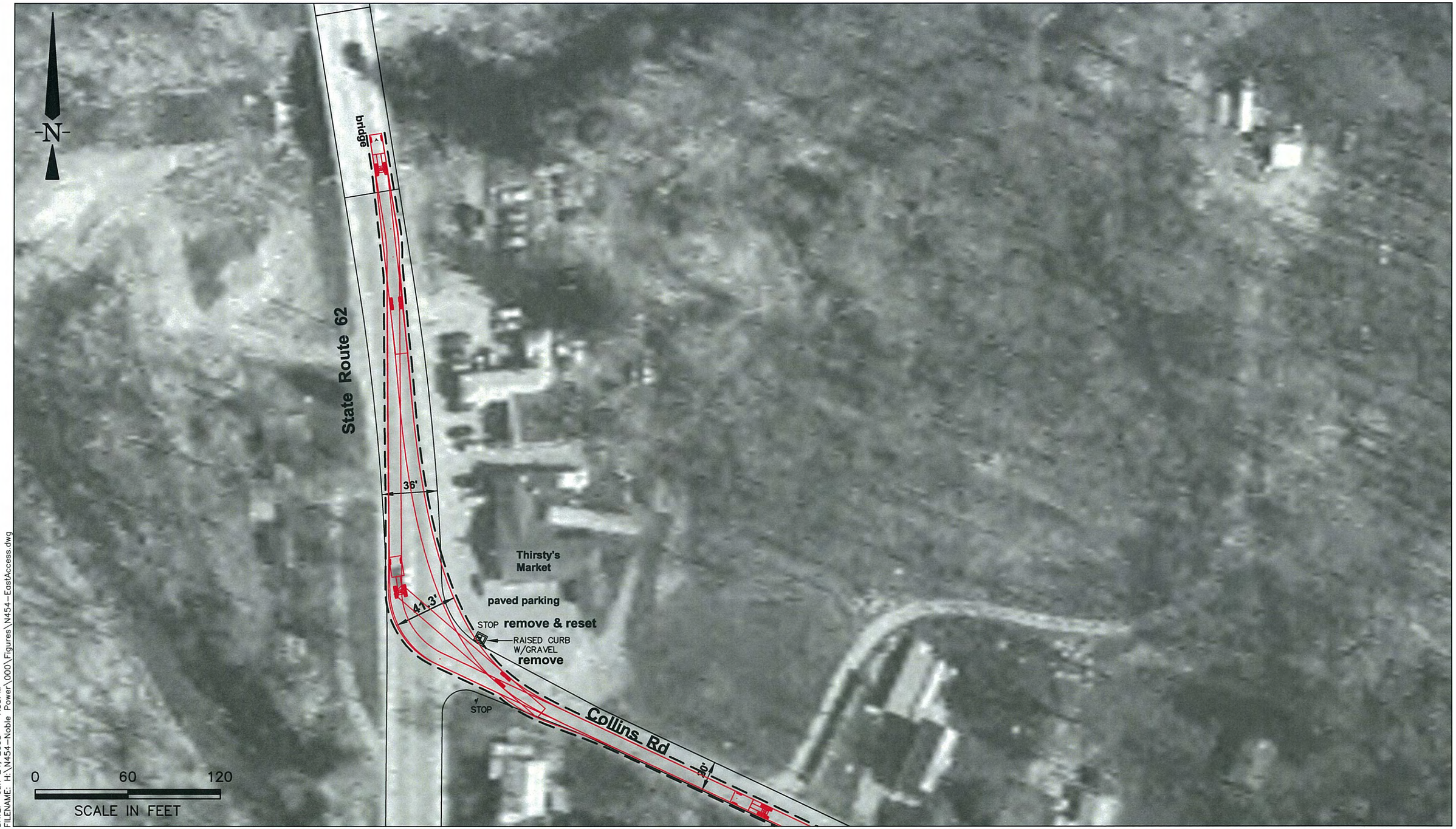
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Route 39 @ Collins Rd, Collins, New York
Intersection Improvements Plan

Figure
IB-E2



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Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Collins Rd @ Route 62, Collins, New York
Intersection Improvements Plan

Figure
IB-E3

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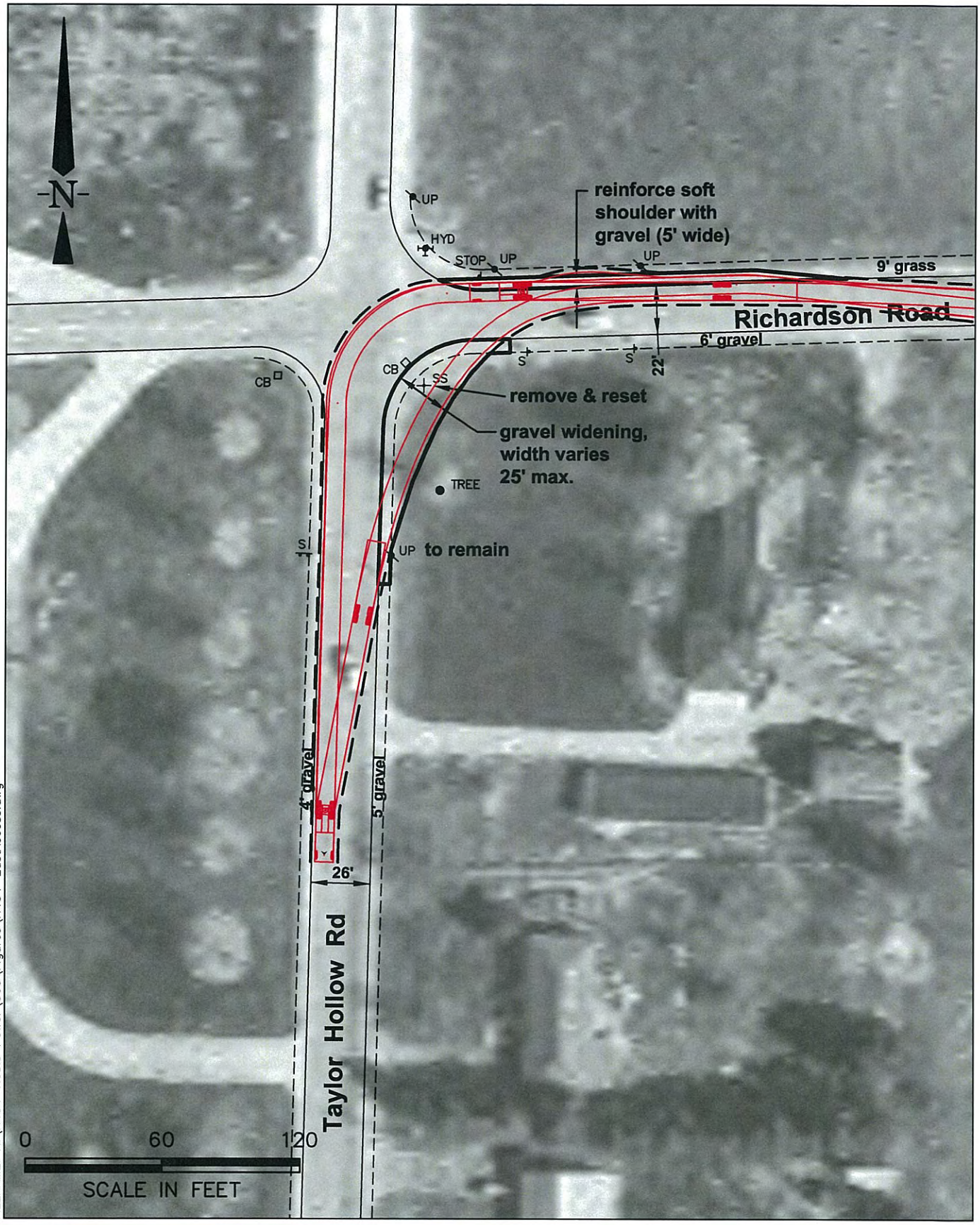
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Route 62 @ Richardson Rd, Collins, New York
Intersection Improvements Plan

Figure
IB-E4



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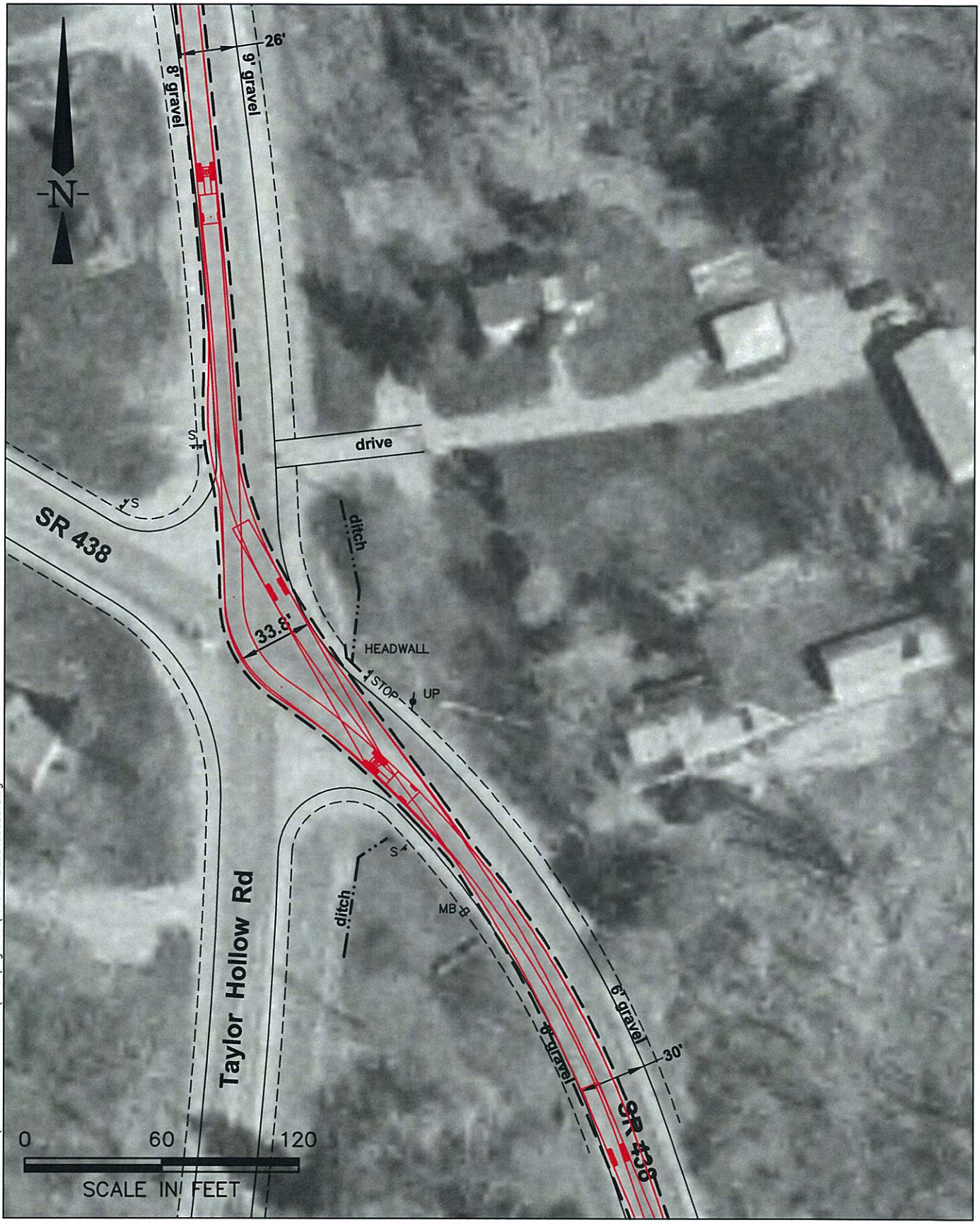
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Richardson Rd @ Taylor Hollow Rd
Collins, New York
Intersection Improvements Plan

Figure IB-E5



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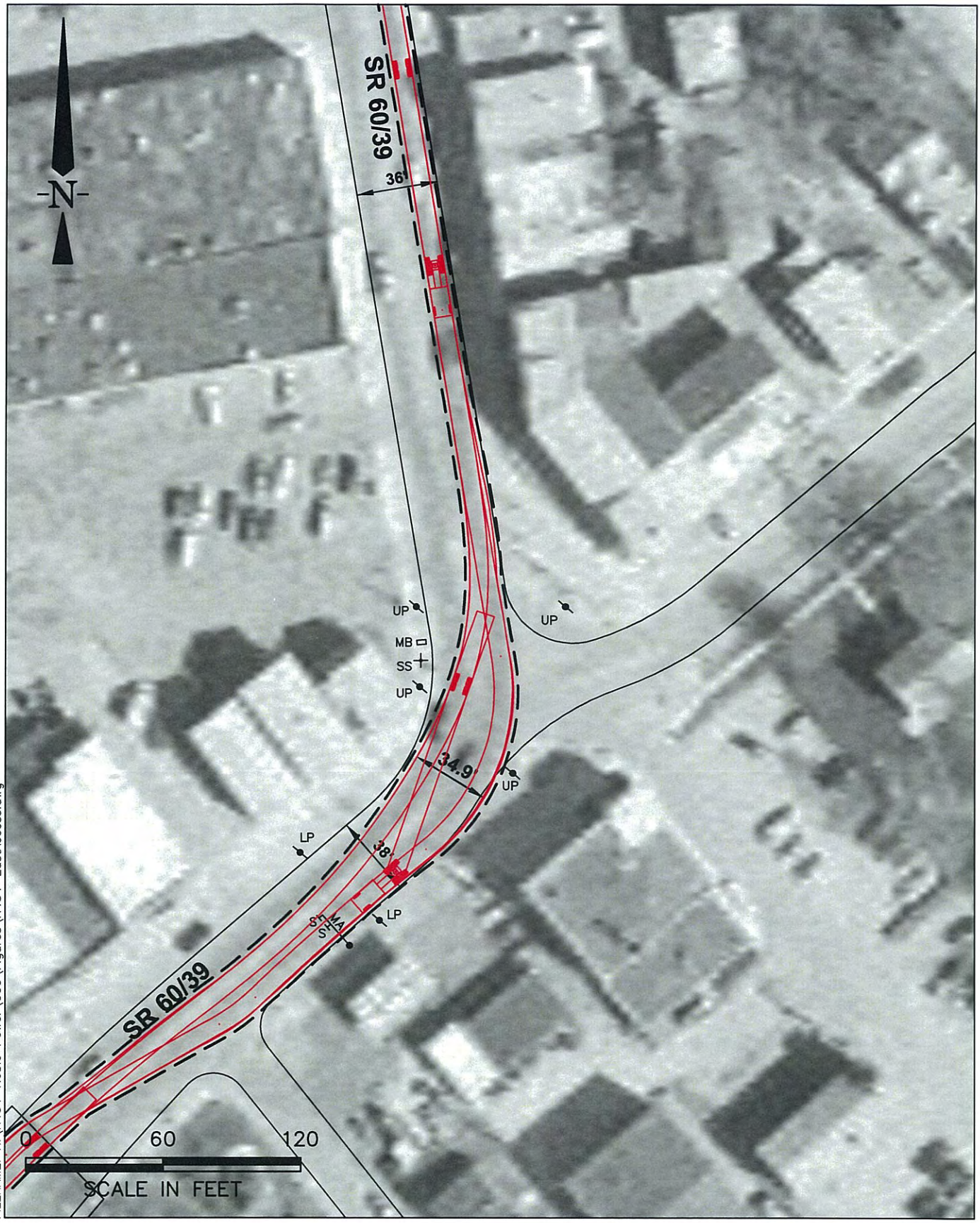
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Taylor Hollow Rd @ Route 438
Collins, New York
Intersection Improvements Plan
Figure IB-E6



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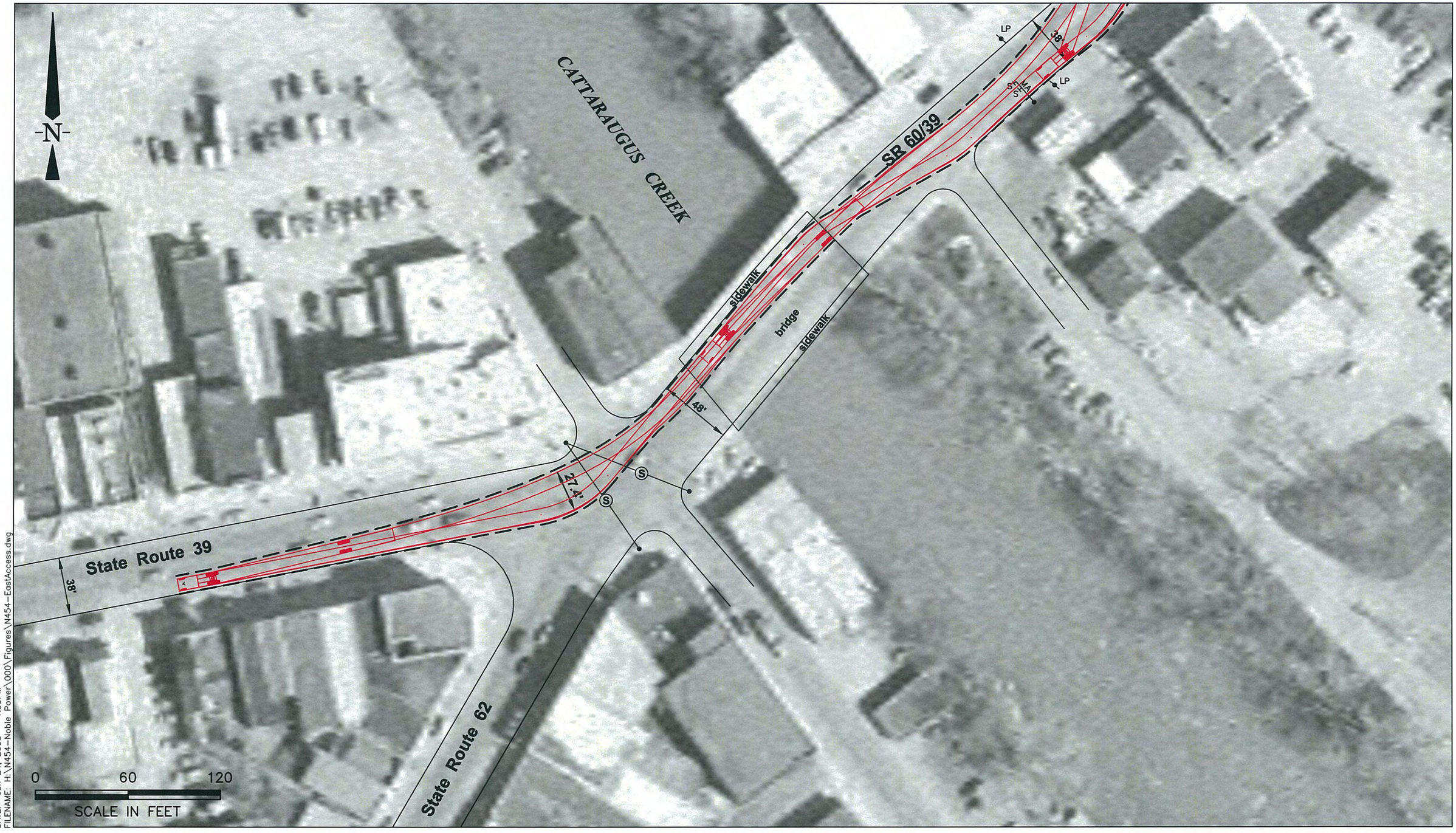
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Main St, Gowanda Village
Collins, New York
Intersection Improvements Plan
Figure IB-E7



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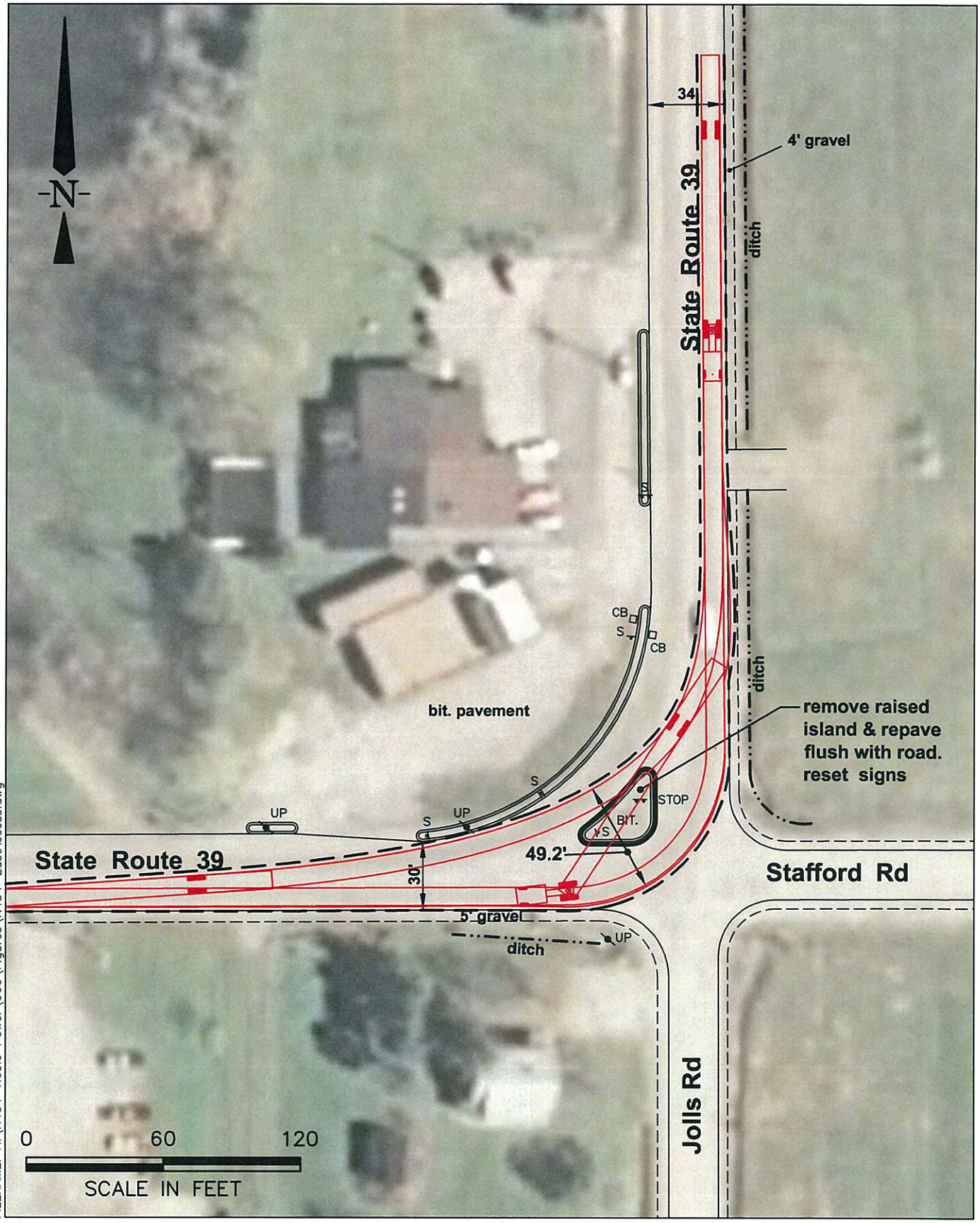
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Gowanda Bridge, Main St, Collins, New York
Intersection Improvements Plan

Figure
IB-E8



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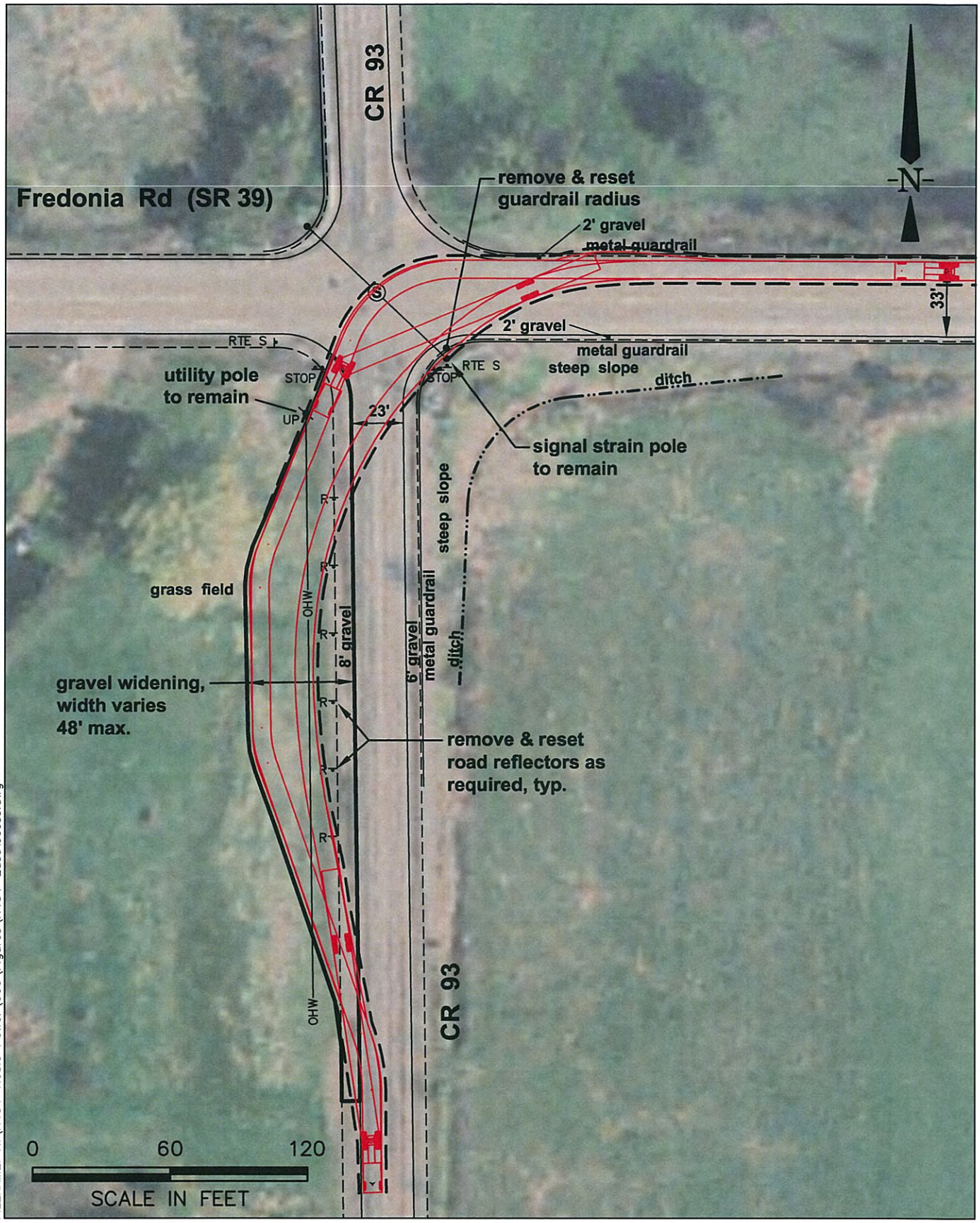
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Route 39 @ Stafford Rd
Perrysburg, New York
Intersection Improvements Plan

Figure IB-E9



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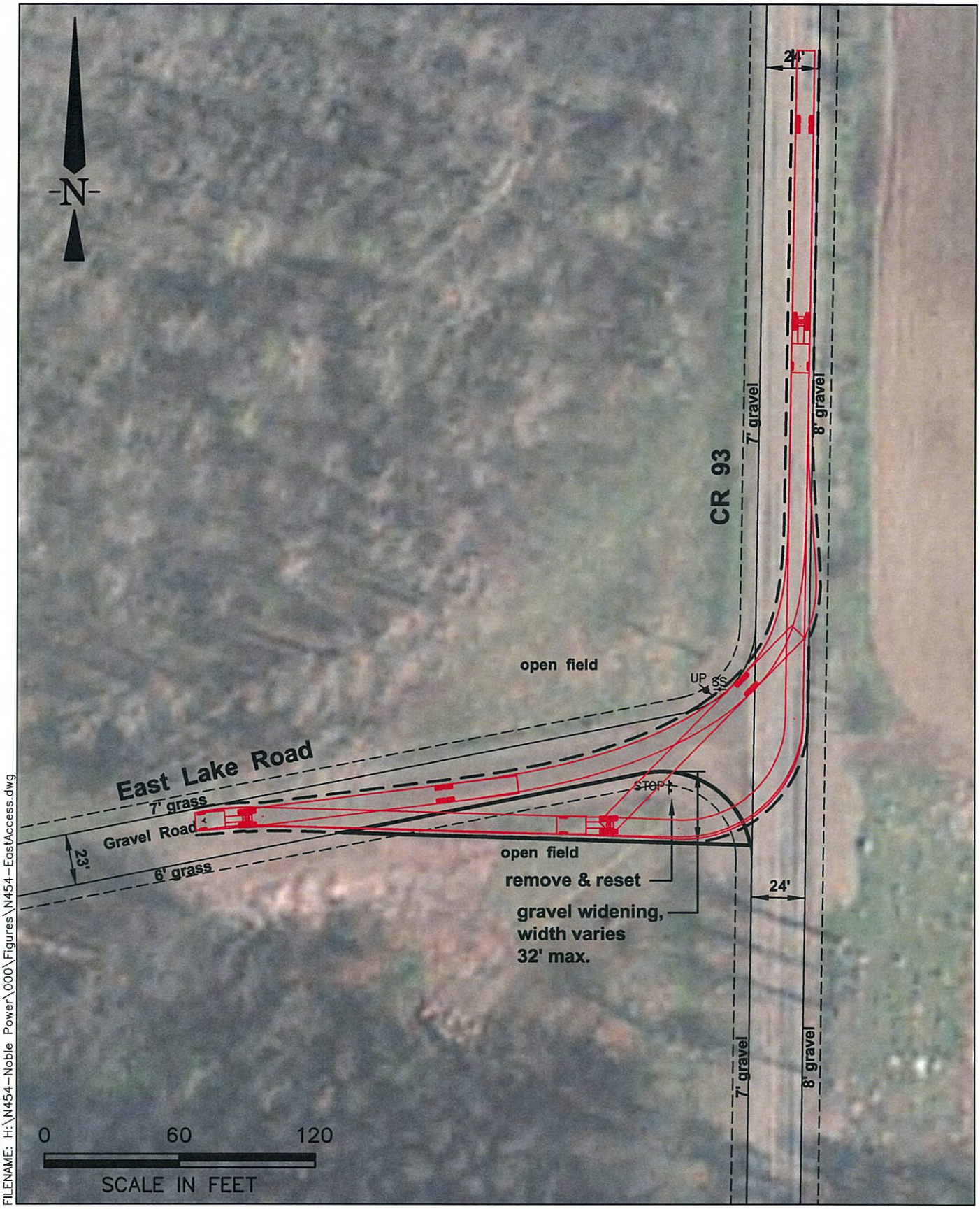
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
Rte 39 @ Rte 93
Hanover, New York
Intersection Improvements
Plan
Figure
E1



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Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
CR 93 @ East Lake Rd
Villenova, New York
Intersection Improvements Plan

Figure E2

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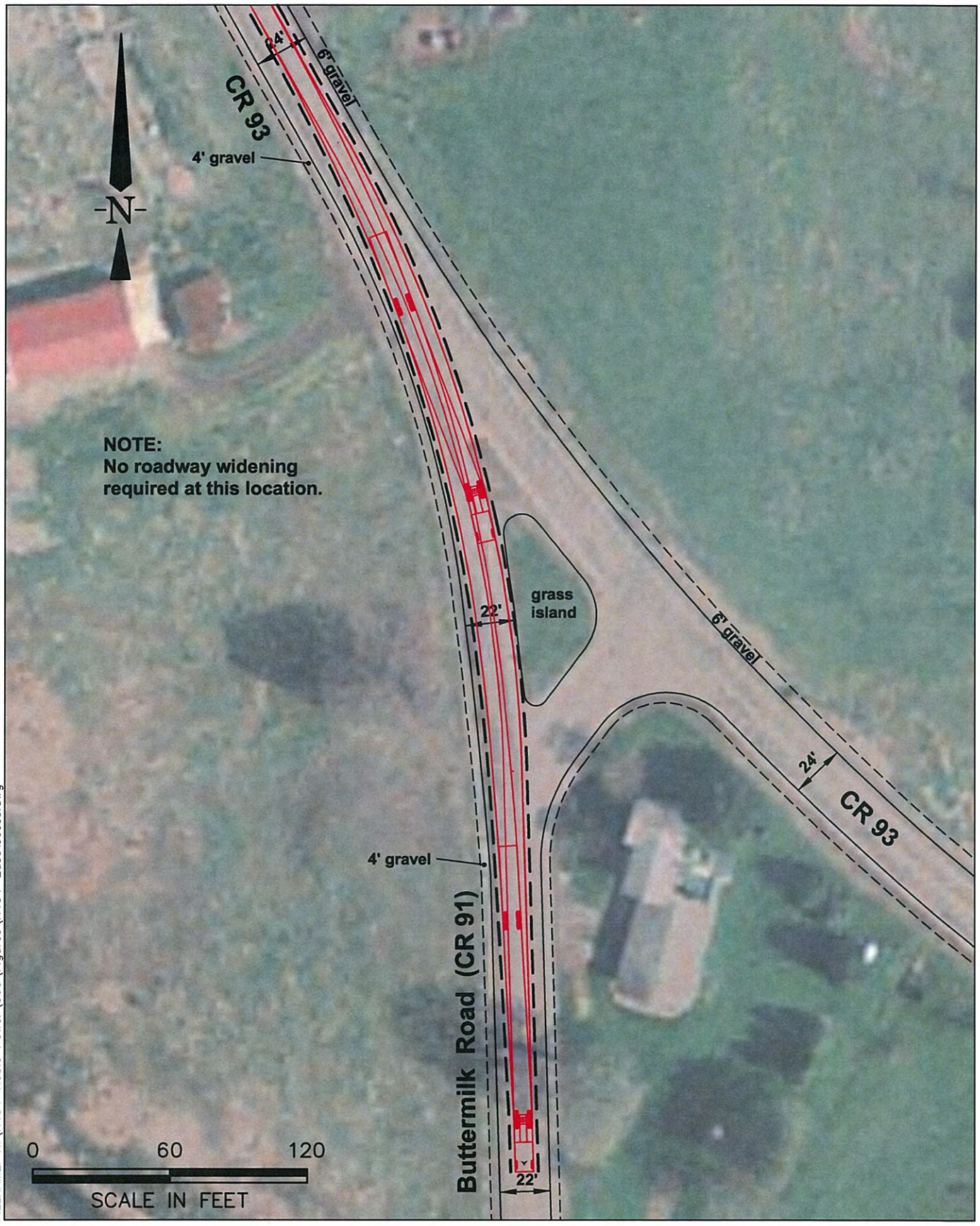
Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
East Lake Rd @ Dye Rd, Villenova, New York
Intersection Improvements Plan

Figure
E3



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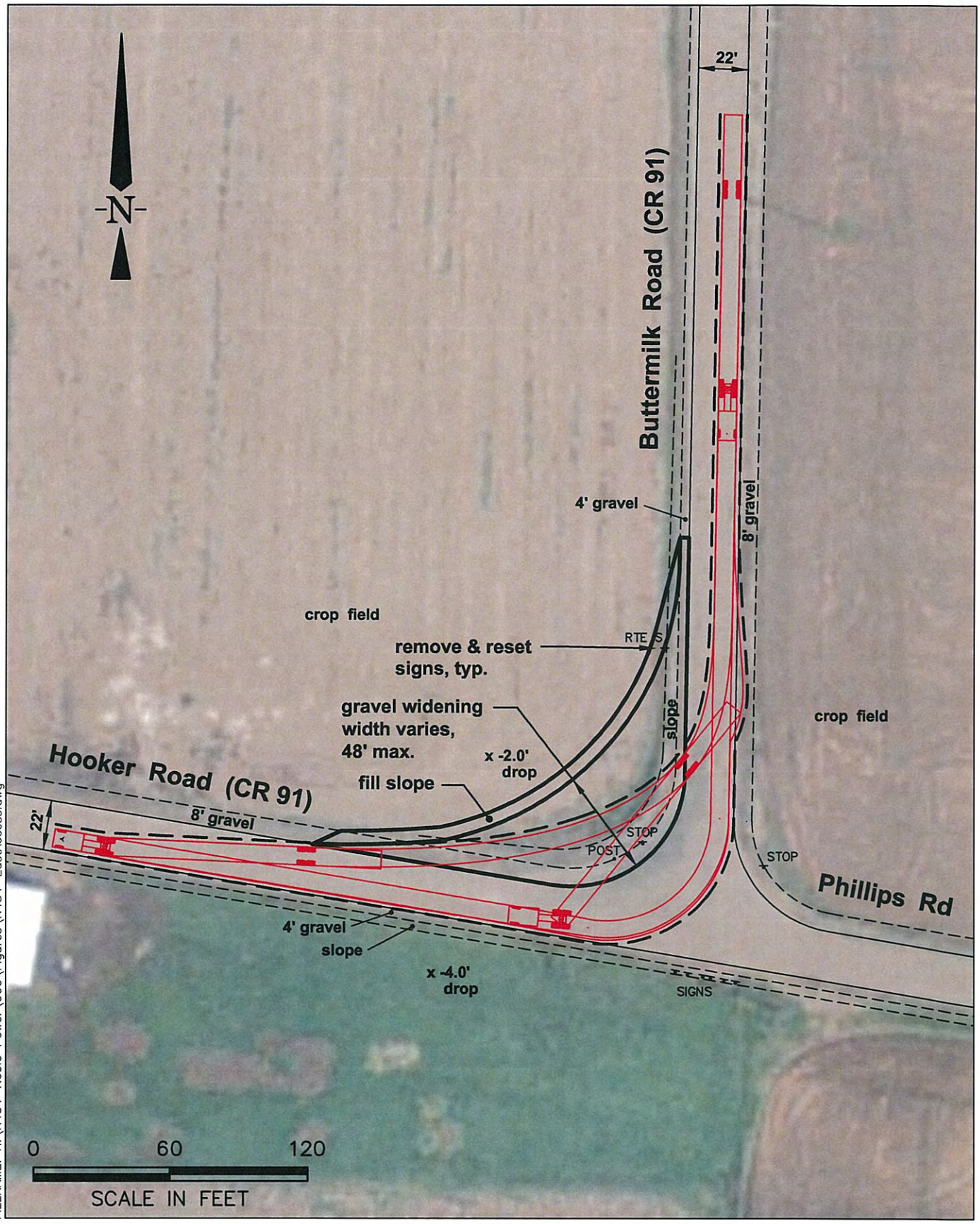
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
CR 93 @ Buttermilk Rd (CR 91)
Villenova, New York
Intersection Improvements Plan
Figure E4



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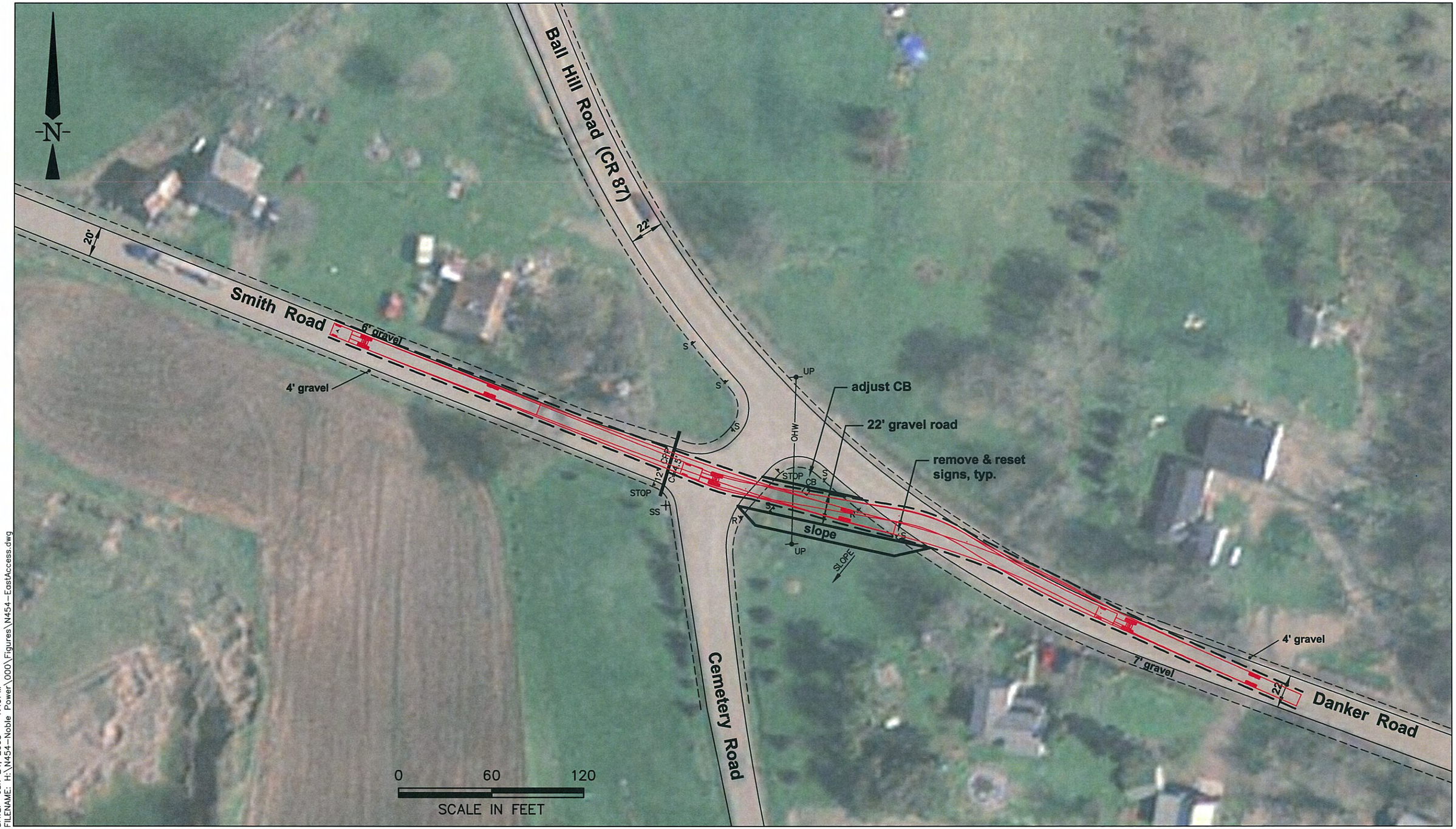
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
Buttermilk Rd @ Hooker Rd
Villenova, New York
Intersection Improvements Plan

Figure E5



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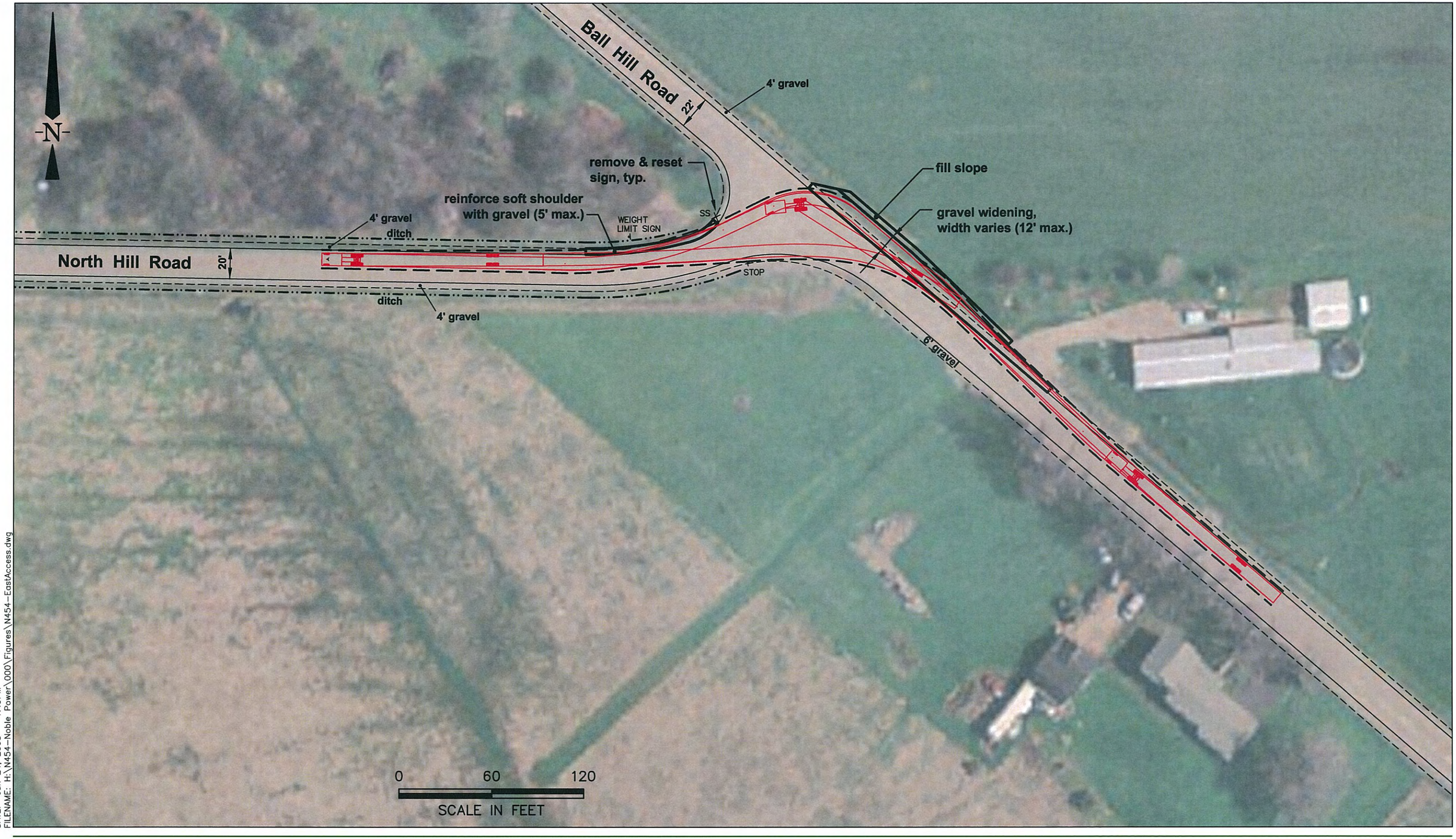
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Ball Hill Rd @ Cemetery & Smith Rds, Villenova, New York
Intersection Improvements Plan

Figure
E6



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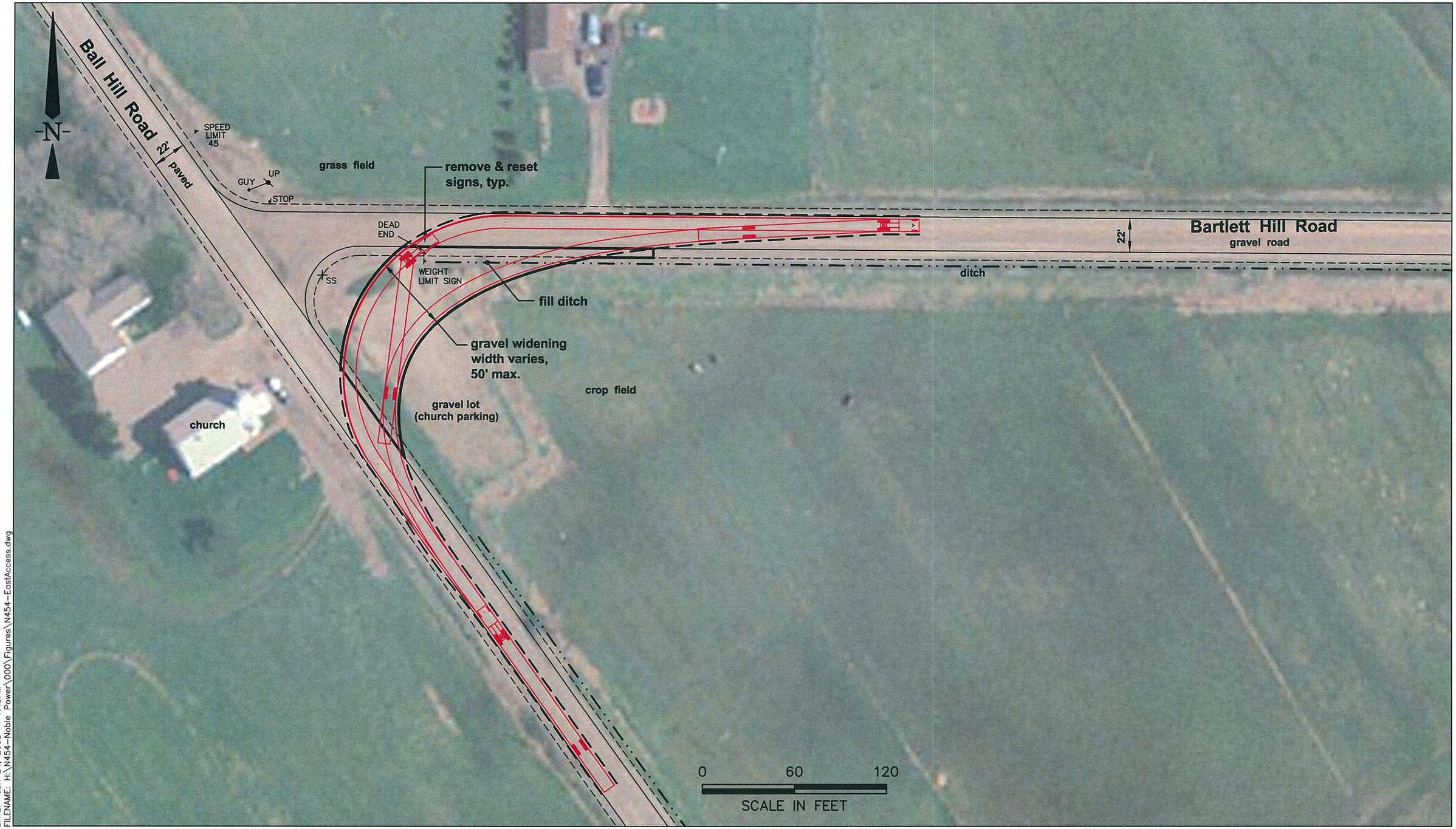
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Ball Hill Rd @ North Hill Rd, Villenova, New York
Intersection Improvements Plan

Figure
E7



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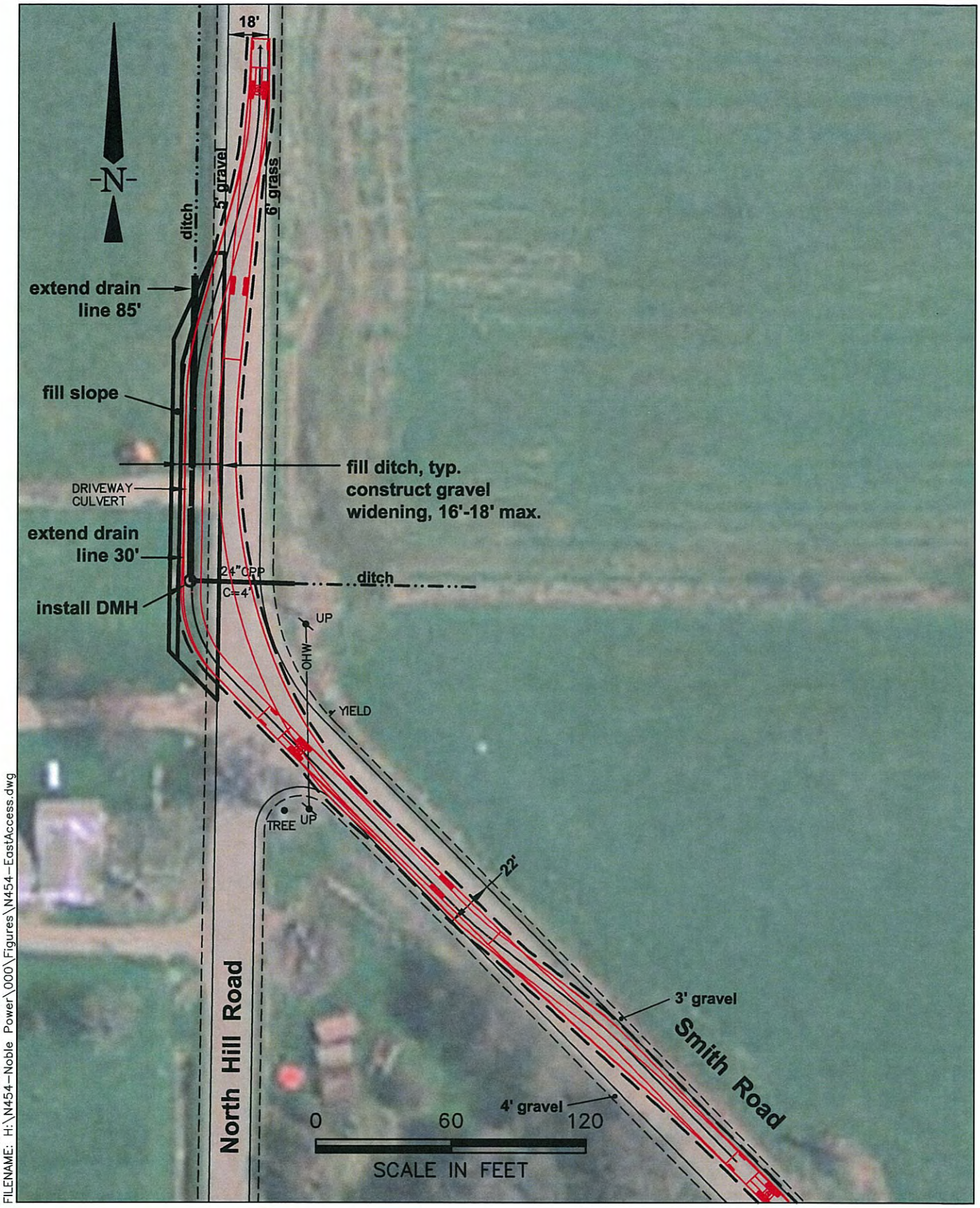
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Ball Hill Rd @ Bartlett Hill Rd, Villenova, New York
Intersection Improvements Plan

Figure
E8



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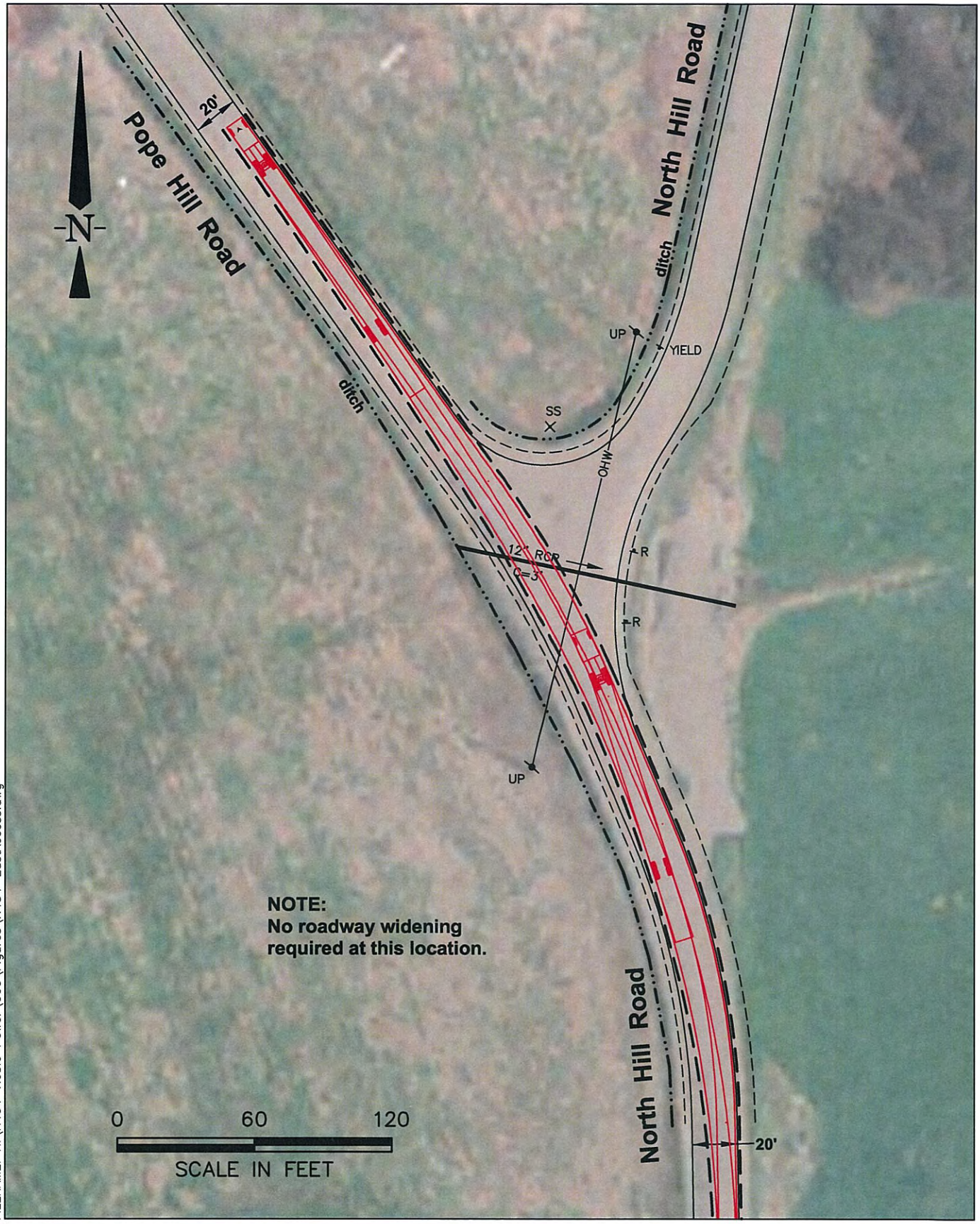
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
Smith Rd @ North Hill Rd
Villenova, New York
Intersection Improvements Plan

Figure E9



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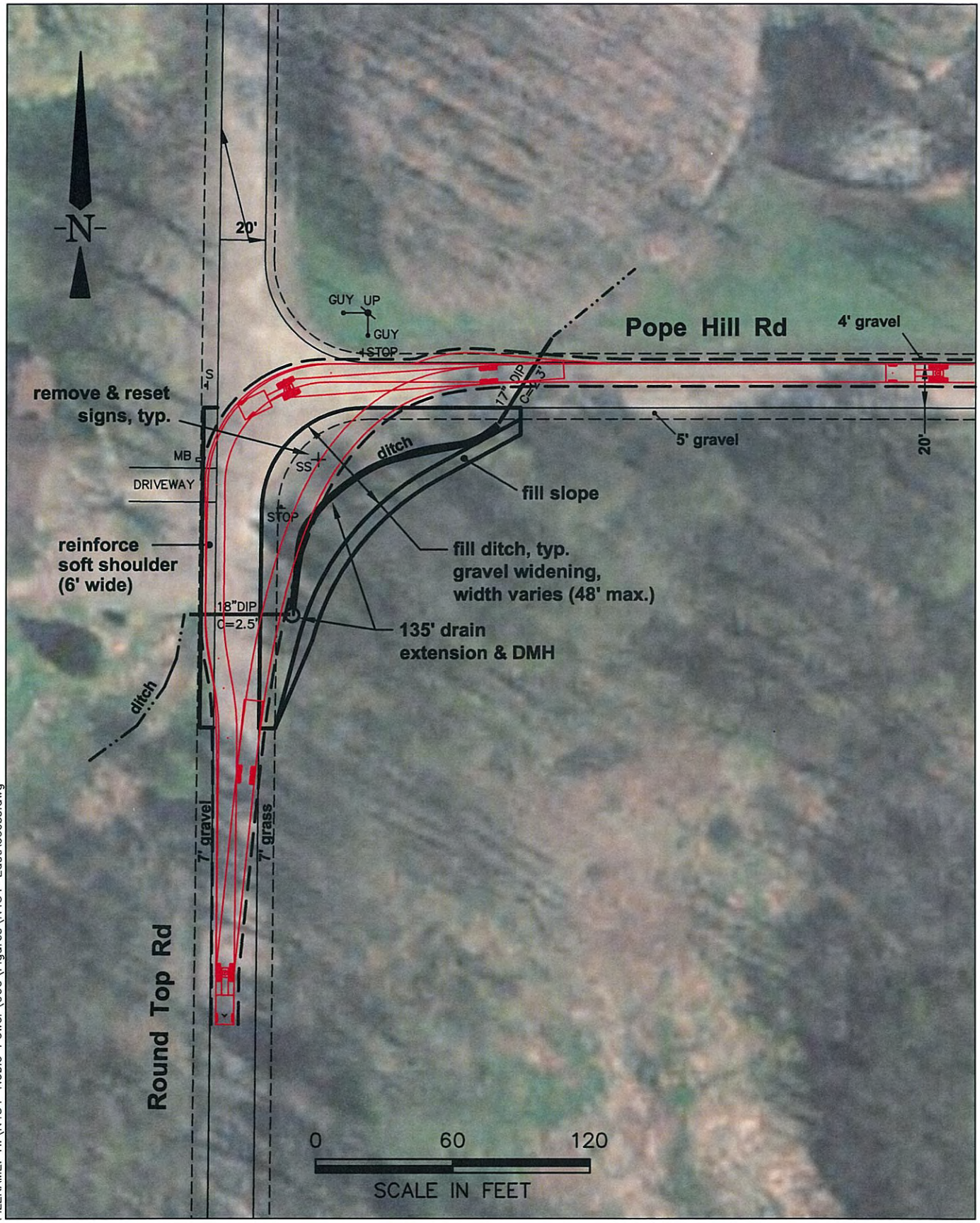
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
North Hill Rd @ Pope Hill Rd
Villenova, New York
Intersection Improvements Plan
Figure E10



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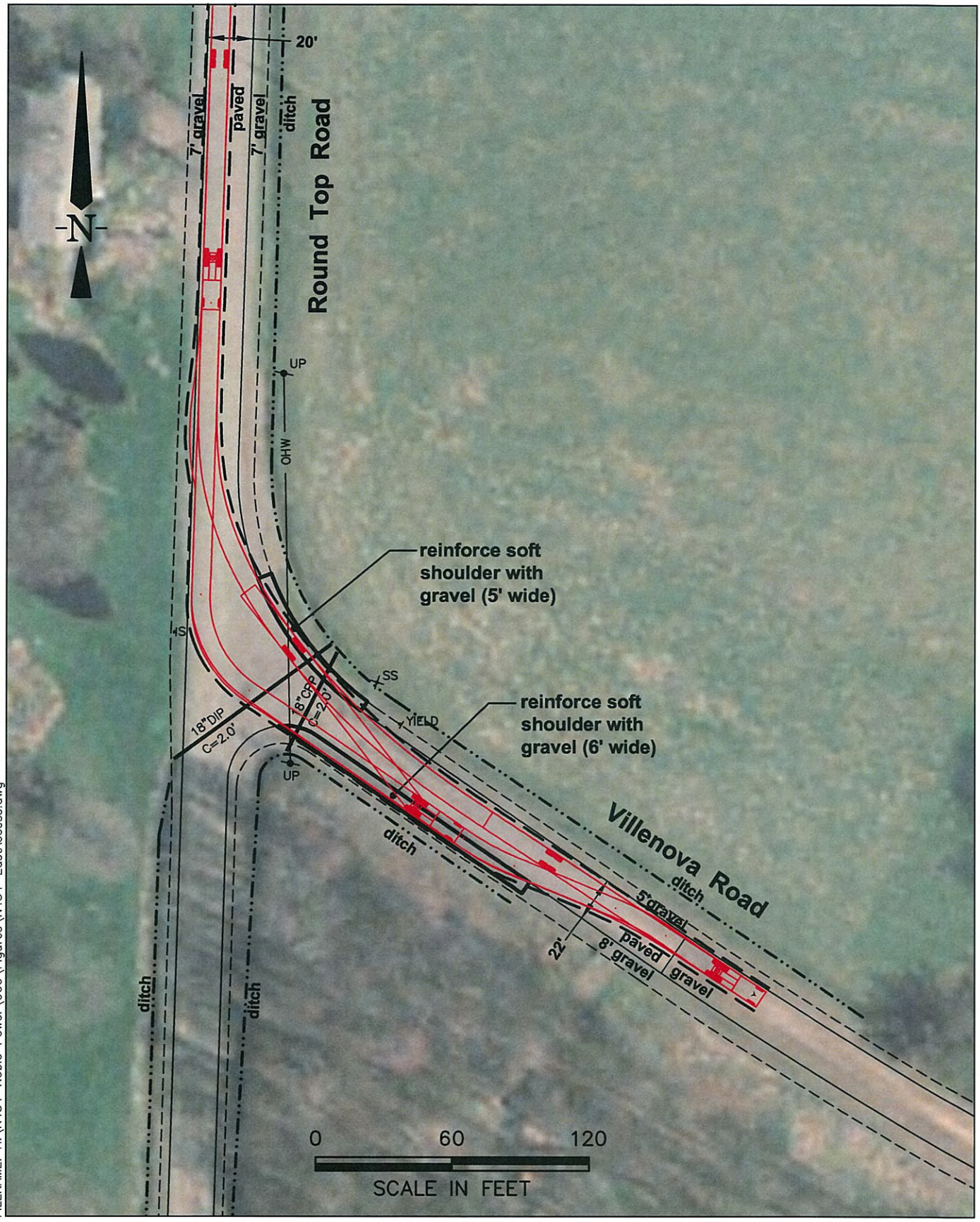
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
Pope Hill Rd @ Round Top Rd
Villenova, New York
Intersection Improvements Plan
Figure E11



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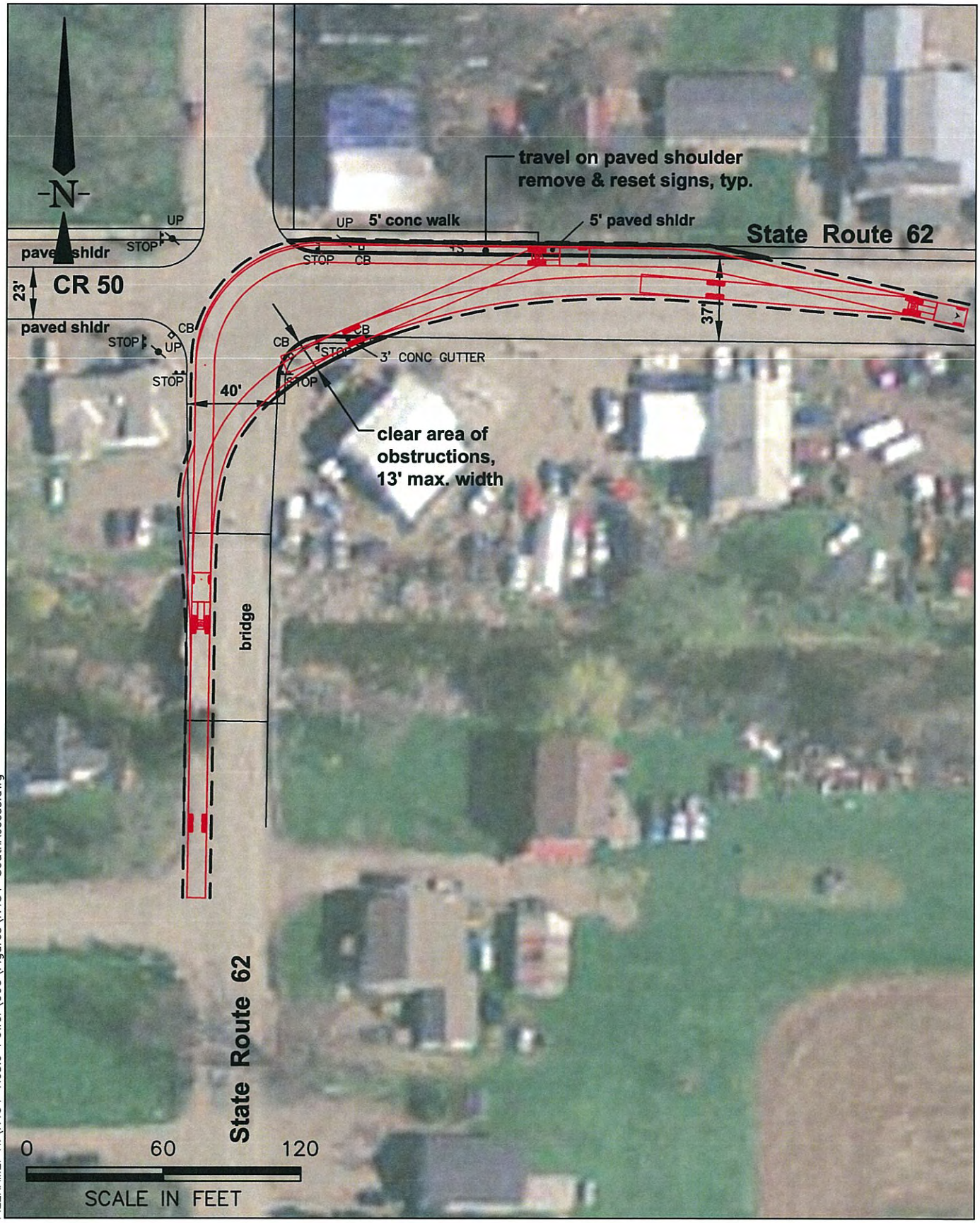
Source: 2007 Aerial New York GIS (NAD 83)

APPENDIX A:
Round Top Rd @ Villenova Rd
Villenova, New York
Intersection Improvements Plan
Figure E12



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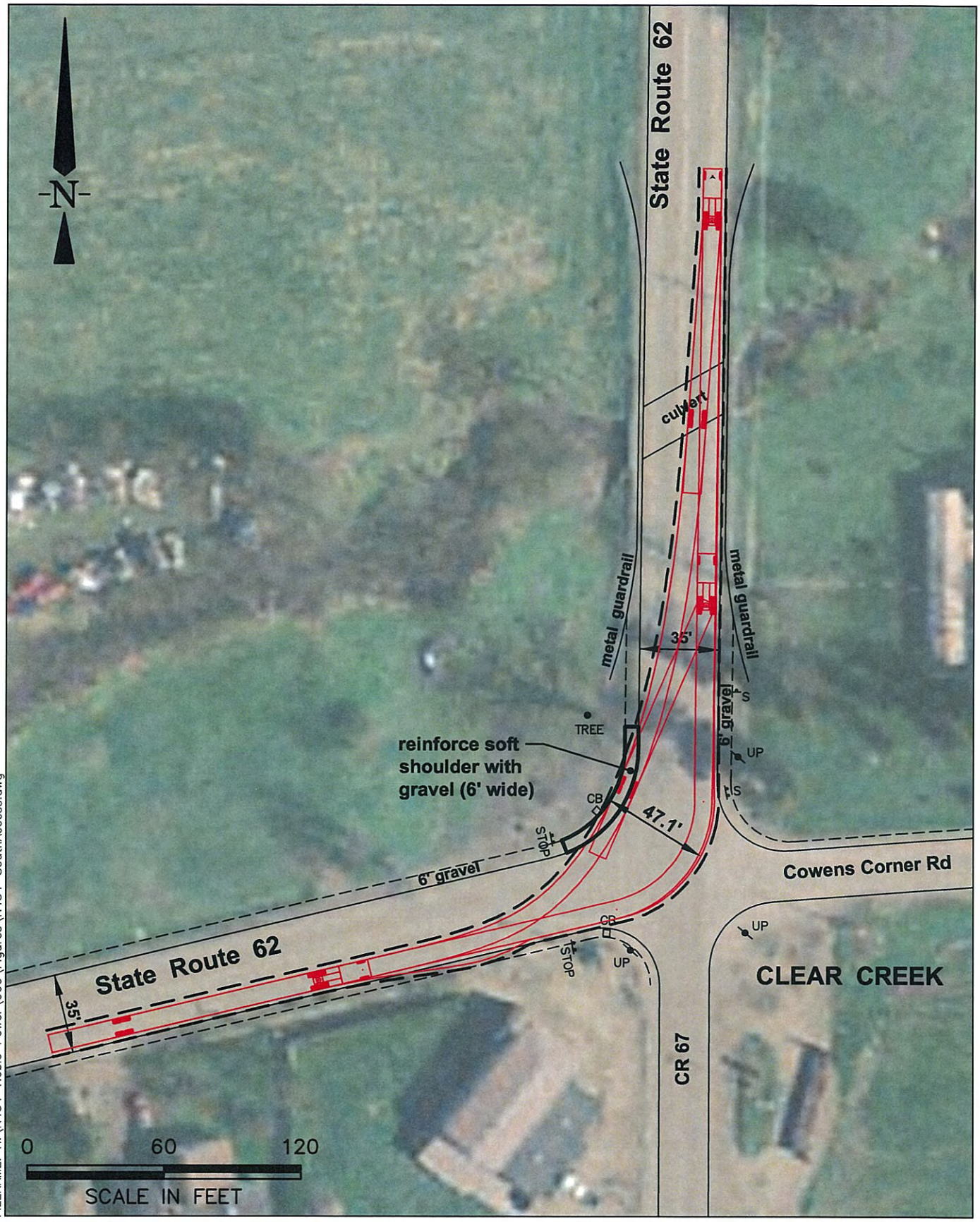
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Rte 62 @ Rte 50
Ellington, New York
Intersection Improvements
Plan
Figure
IB-S1



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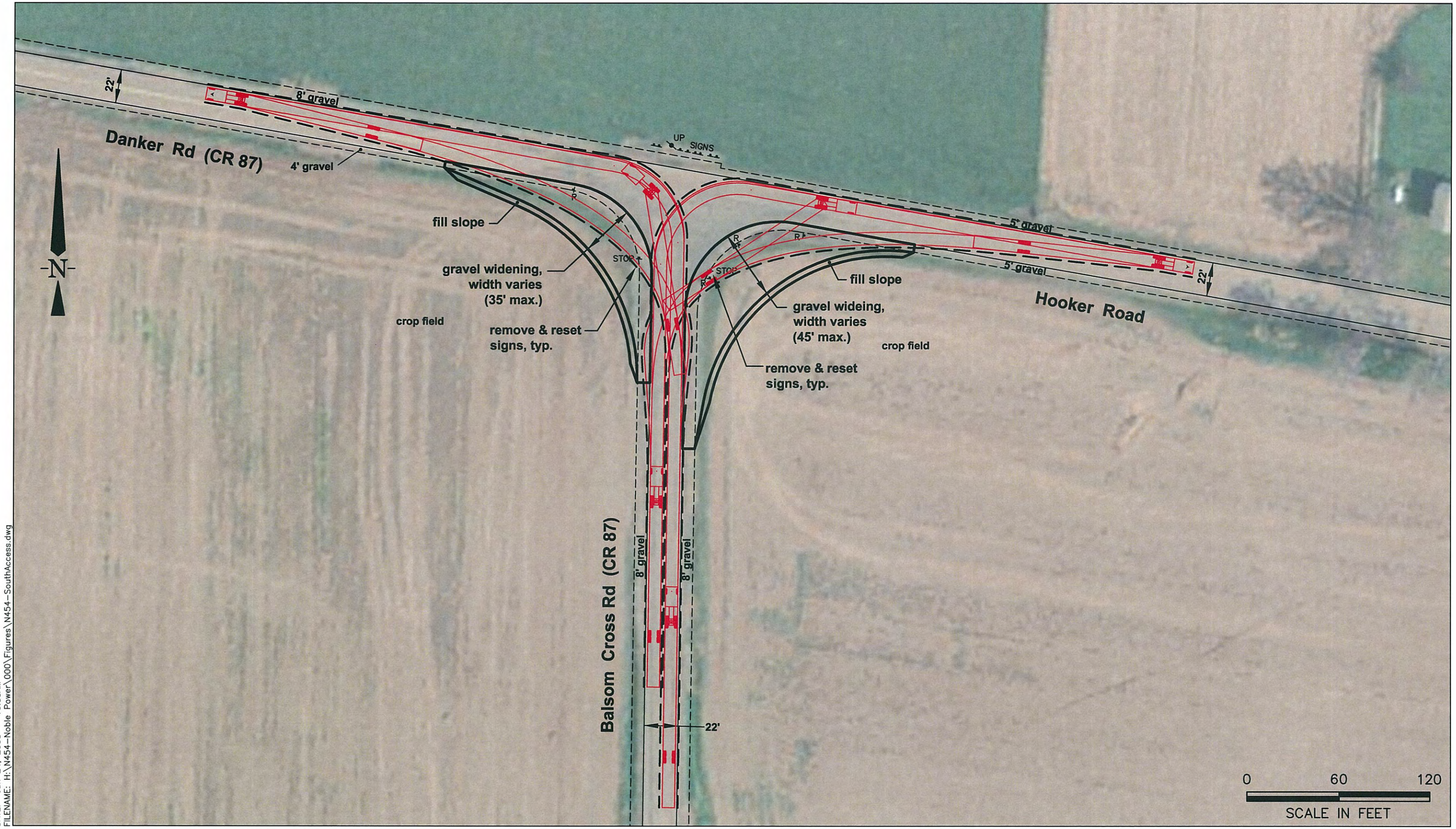
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Rte 62 @ Clear Creek
Ellington, New York
Intersection Improvements Plan
Figure IB-S2



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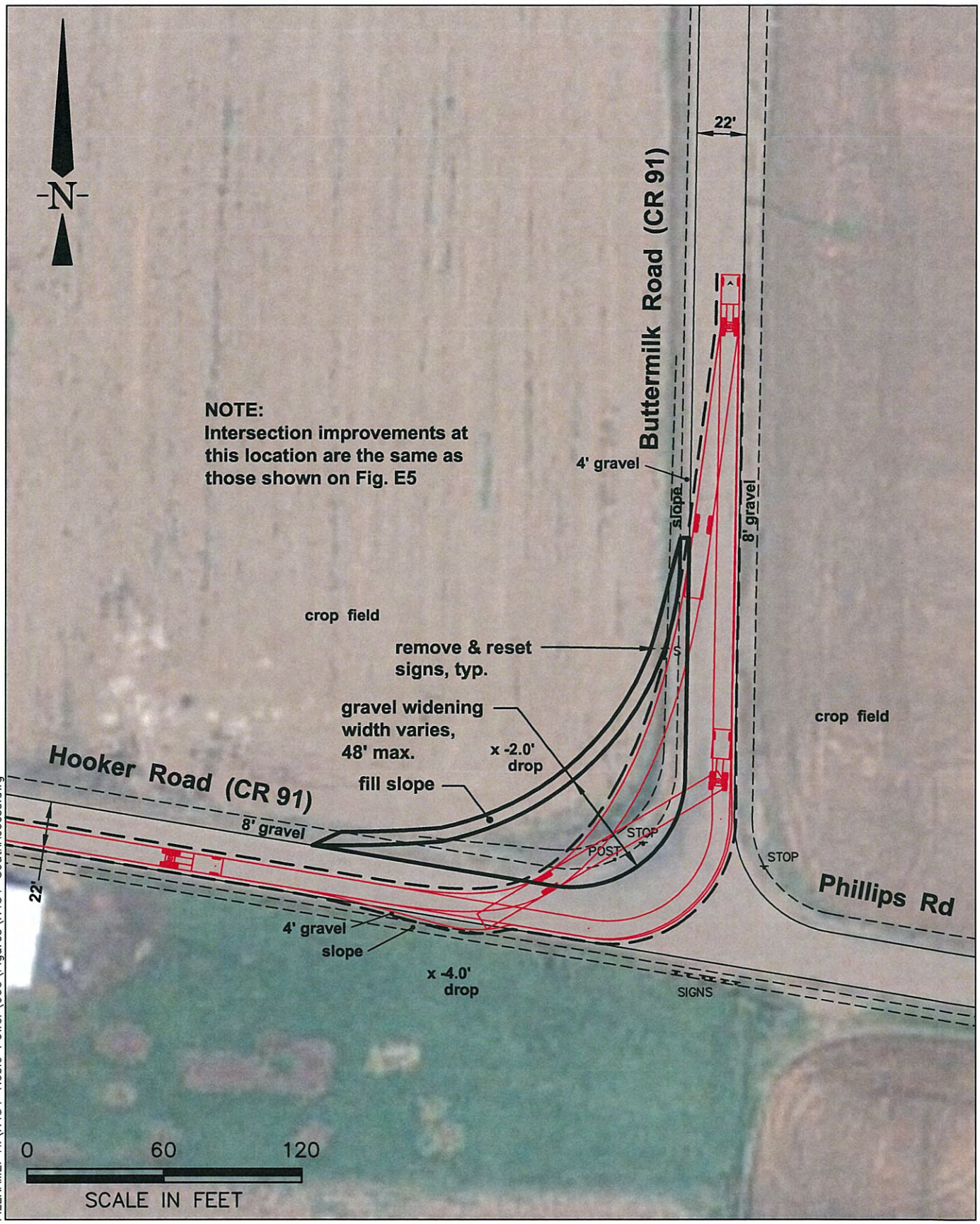
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Balcom Cross Rd @ Danker/Hooker Rd, Villenova, New York
Intersection Improvements Plan

Figure
S1



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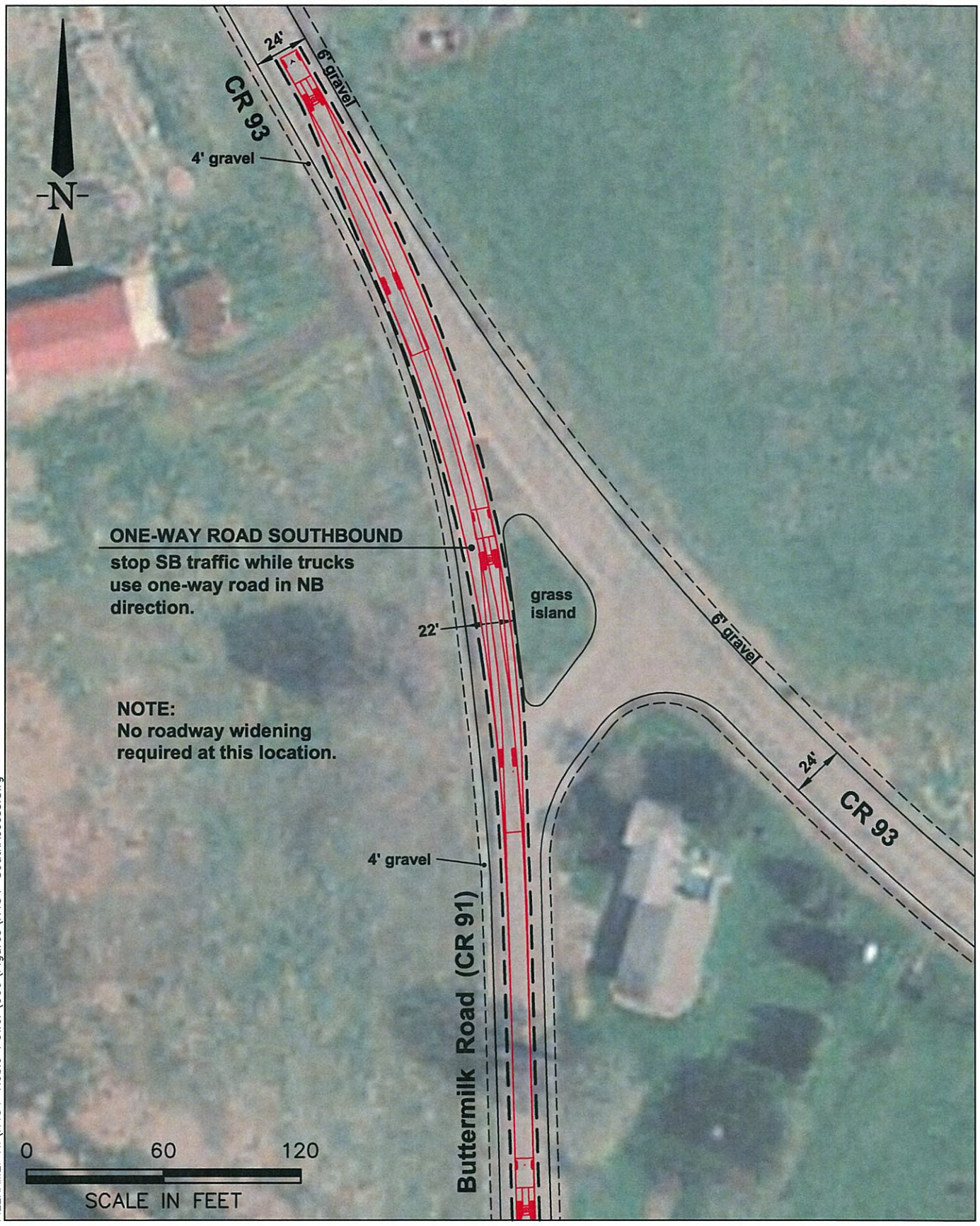
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Hooker Rd @ Buttermilk Rd
Villenova, New York
Intersection Improvements Plan
Figure S2



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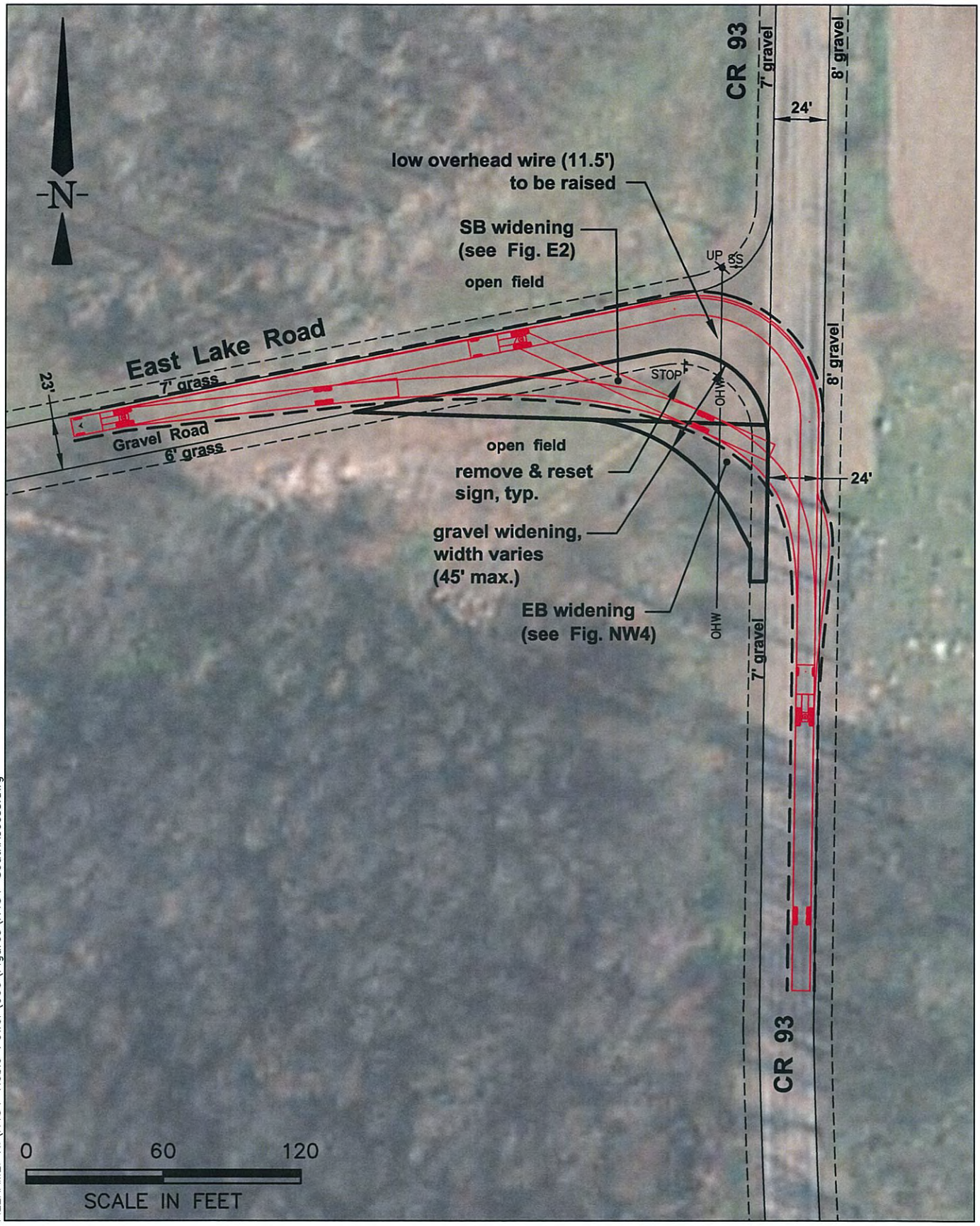
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Buttermilk Rd (CR 91) @ CR 93
Villenova, New York
Intersection Improvements Plan
Figure S3



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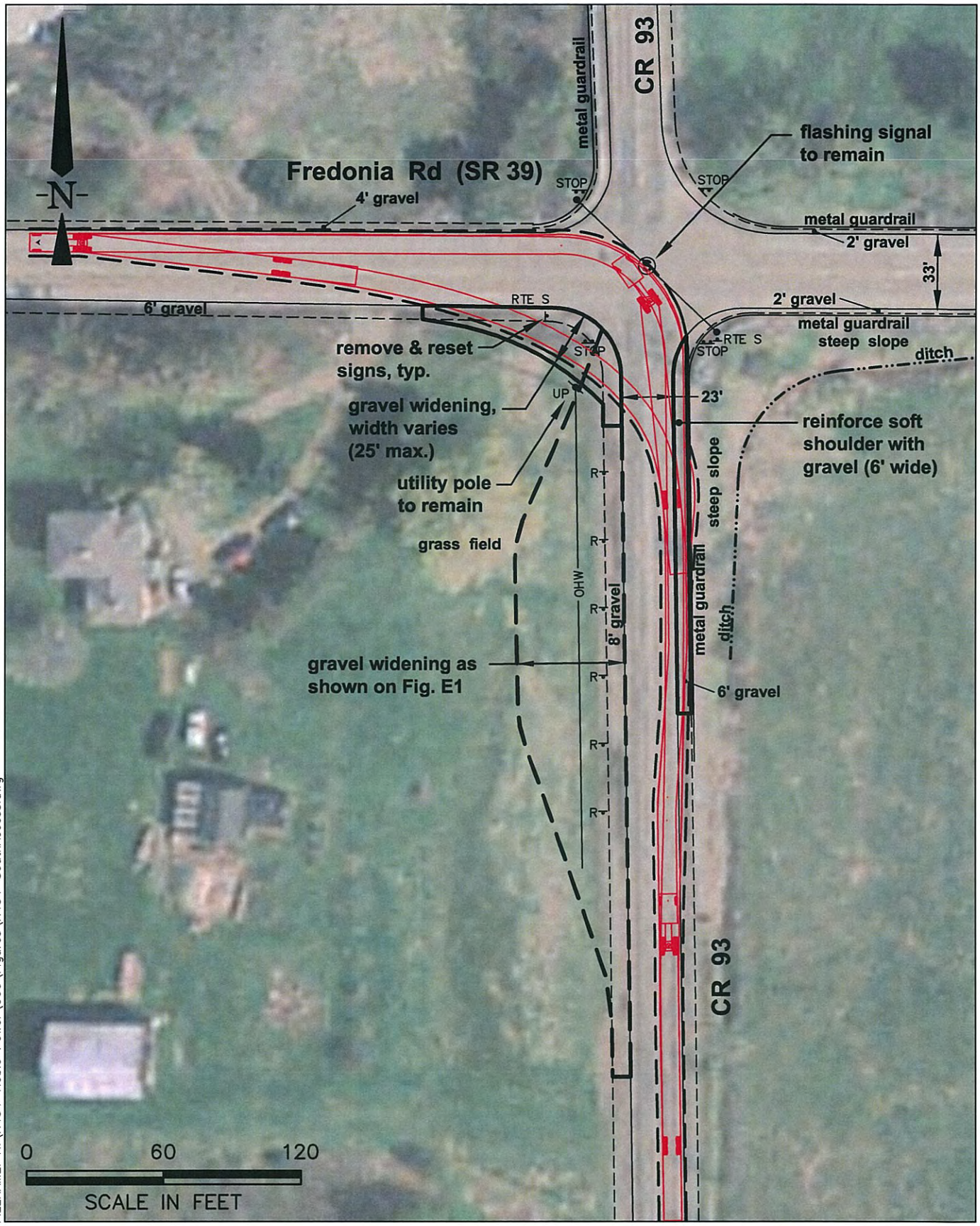
Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Buttermilk Rd (CR 91) @ CR 93
Villenova, New York
Intersection Improvements
Plan
Figure
S4



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Noble ENVIRONMENTAL POWER

Noble Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
CR 93 @ SR 39
Hanover, New York
Intersection Improvements Plan
Figure S5

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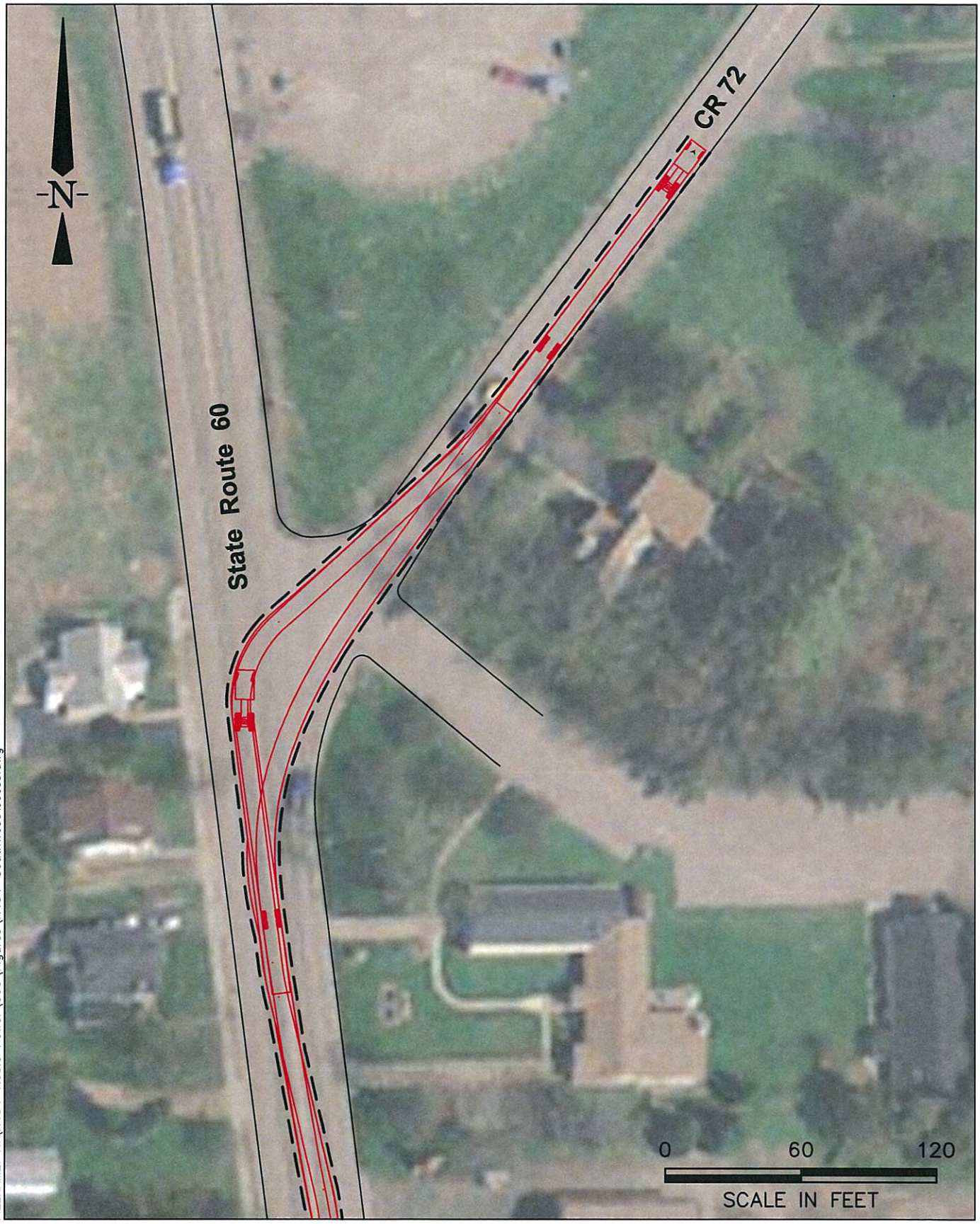
Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:

Maple Ave (CR 58) @ Route 60
Stockton, New York
Intersection Improvements Plan

Figure IB-SW1



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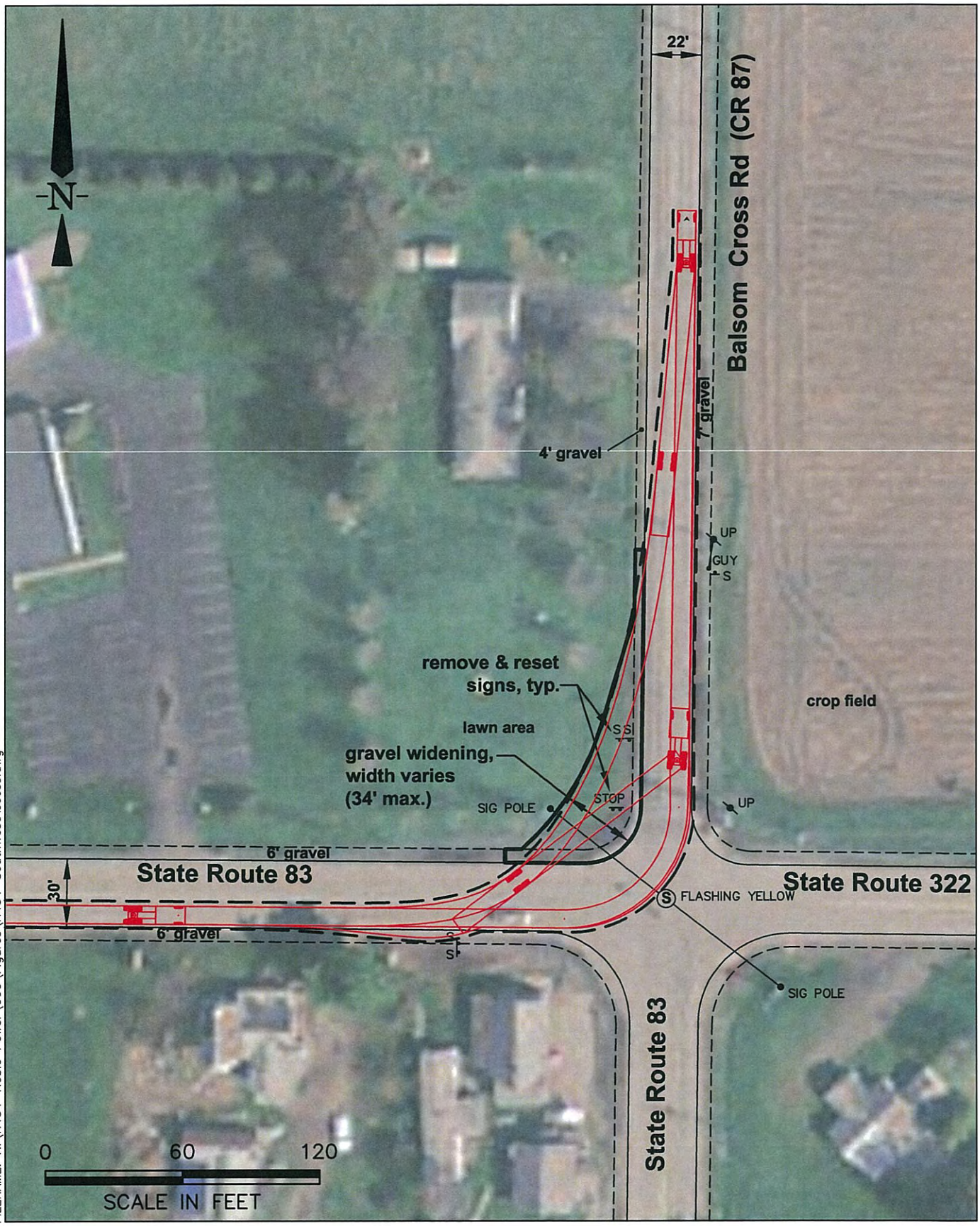
Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Rte 60 @ Rte 72
Stockton/Pomfret, New York
Intersection Improvements Plan

Figure IB-SW2



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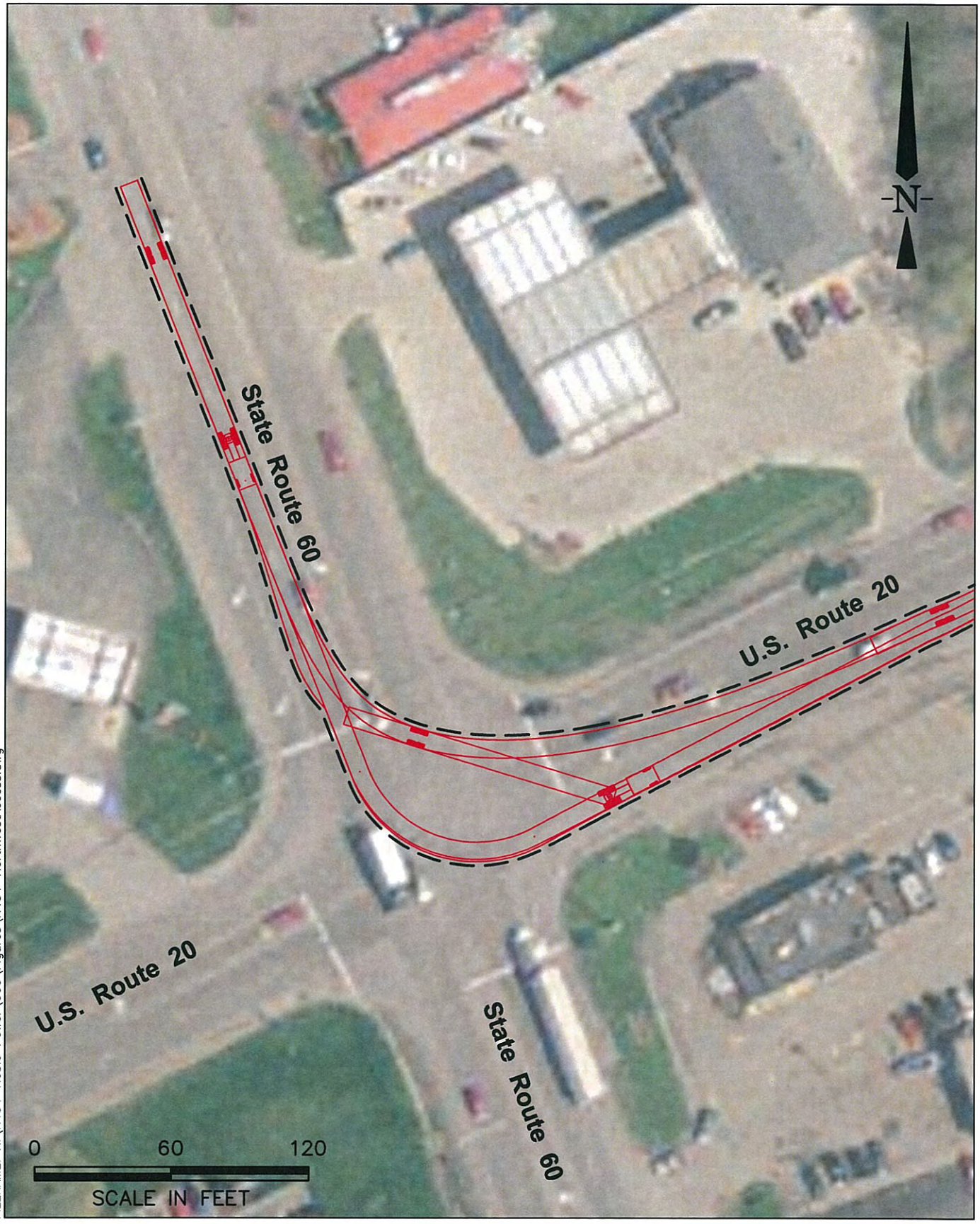
Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Route 83 @ Balcom Cross Rd
Arkwright, New York
Intersection Improvements Plan
Figure SW1



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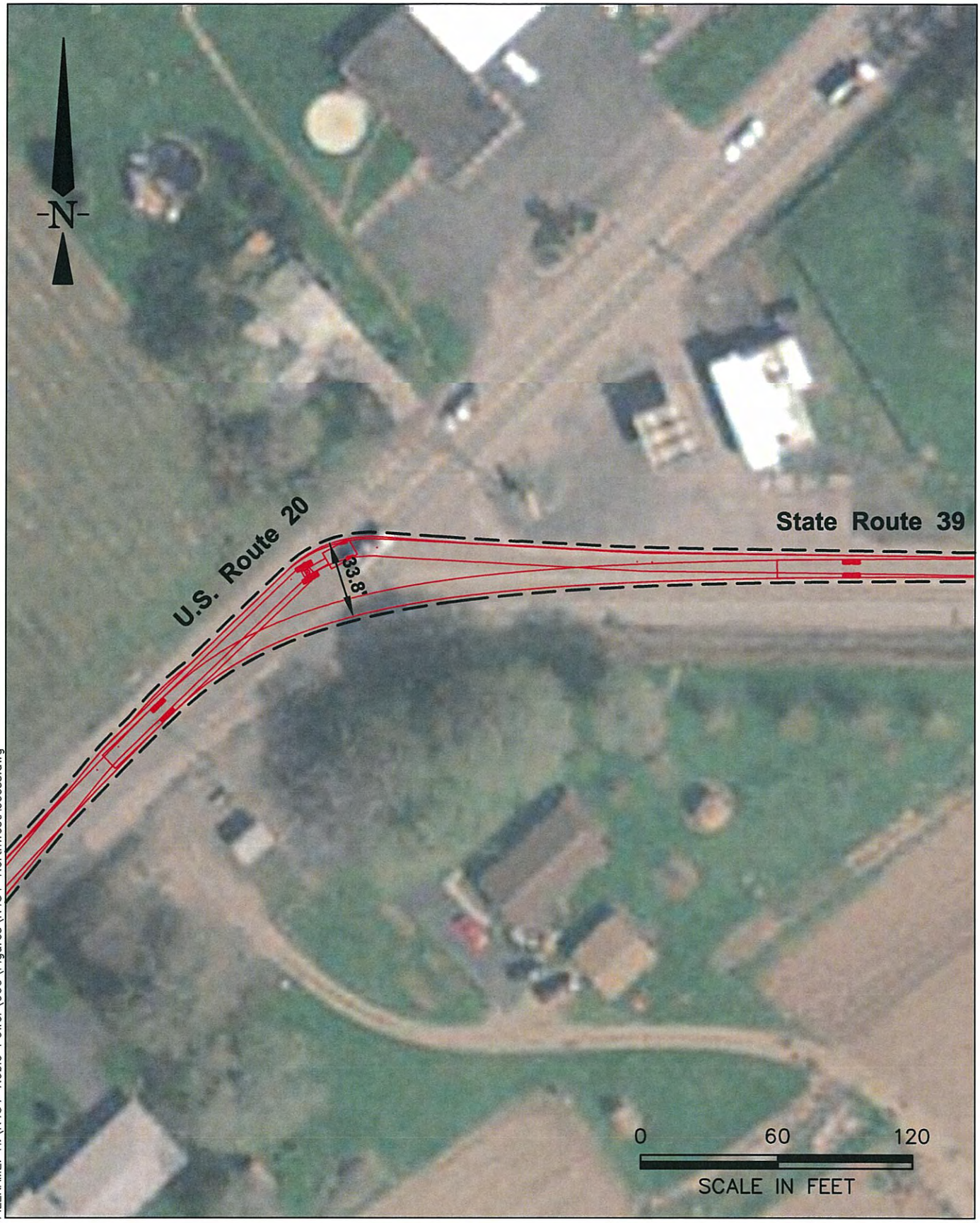
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Route 60 @ US Route 20
Fredonia, New York
Intersection Improvements Plan

Figure IB-NW1



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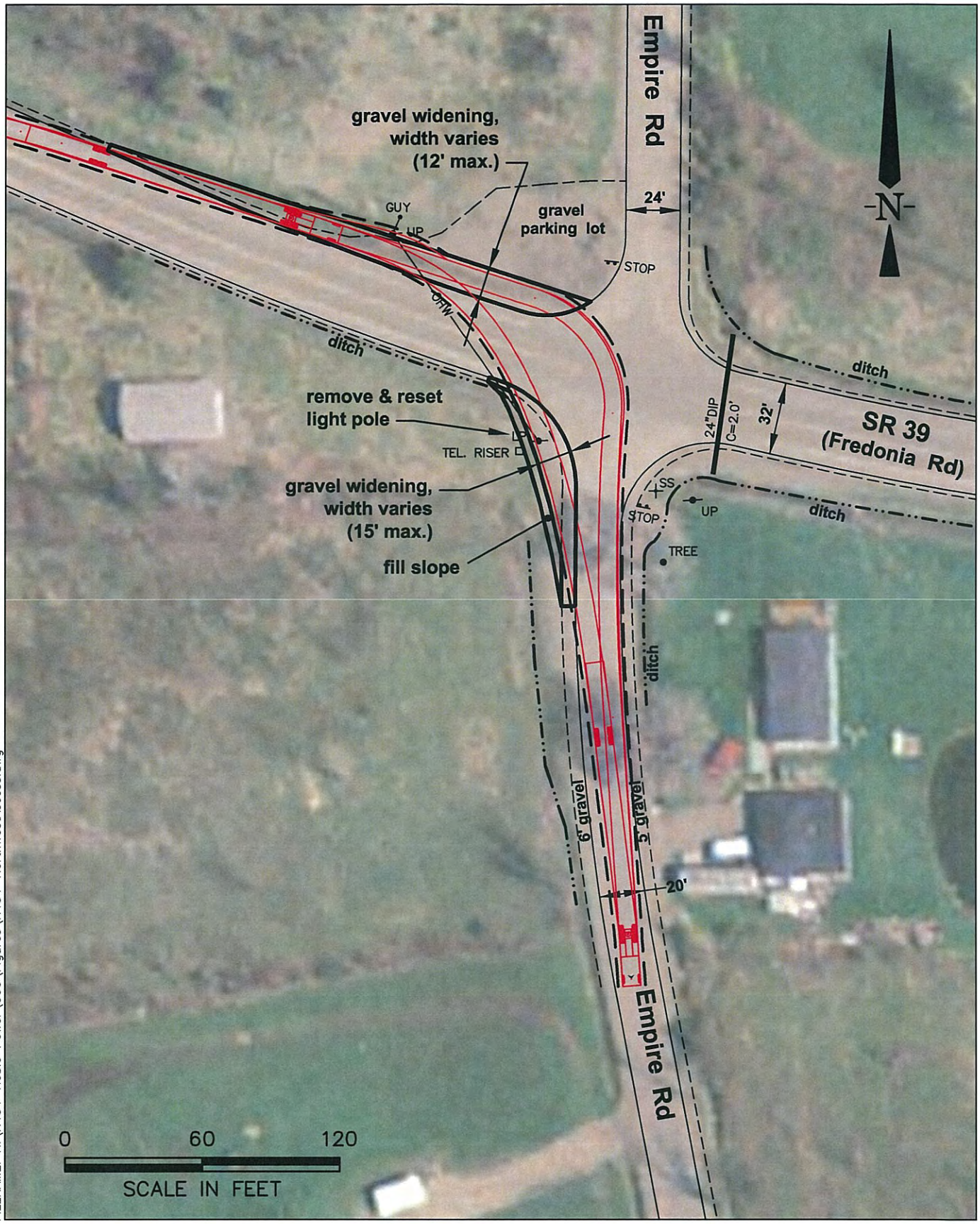
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
US Route 20 @ Route 39
Sheridan, New York
Intersection Improvements Plan

Figure IB-NW2



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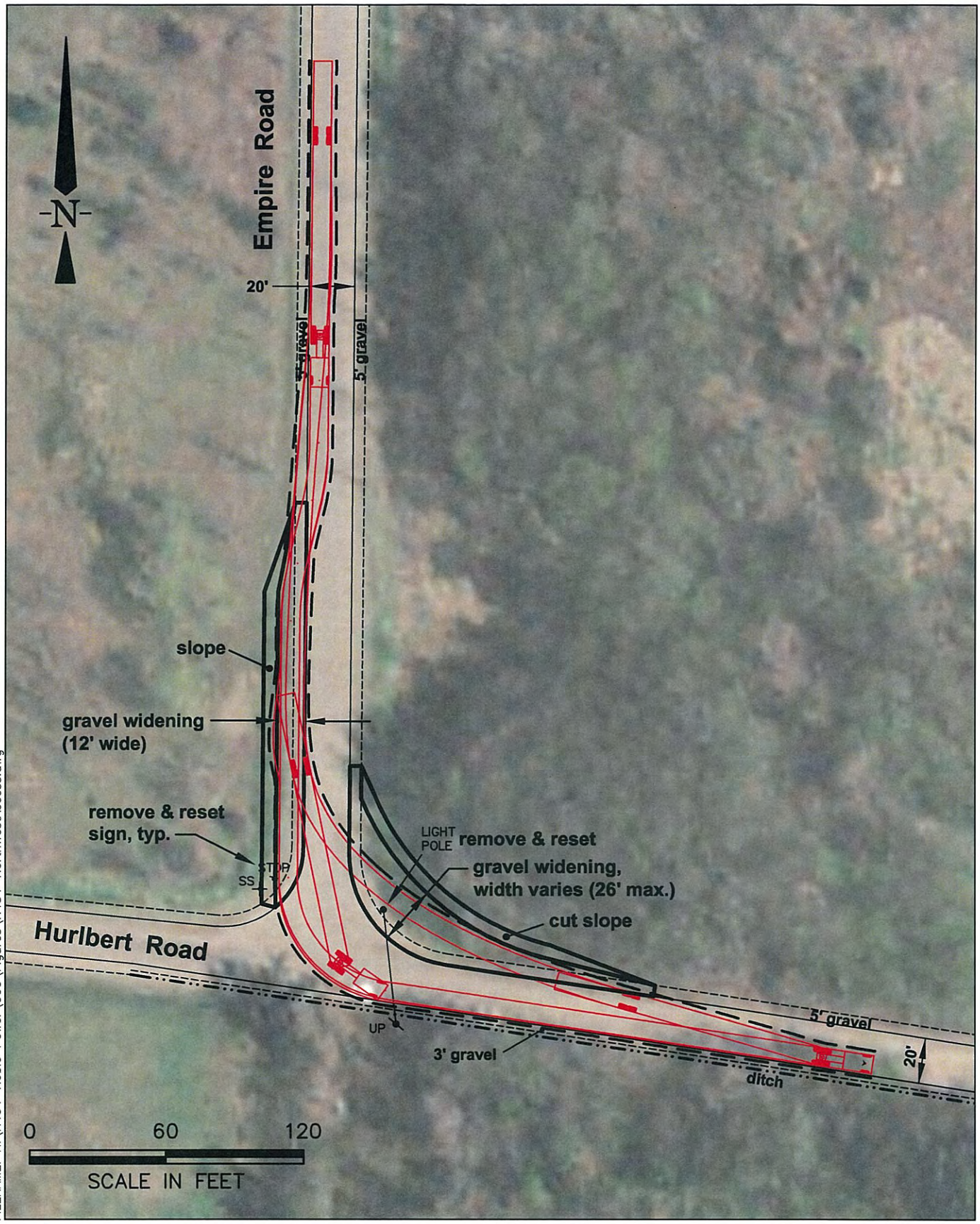
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
State Route 39 @ Empire Rd
Hanover, New York
Intersection Improvements Plan
Figure NW1



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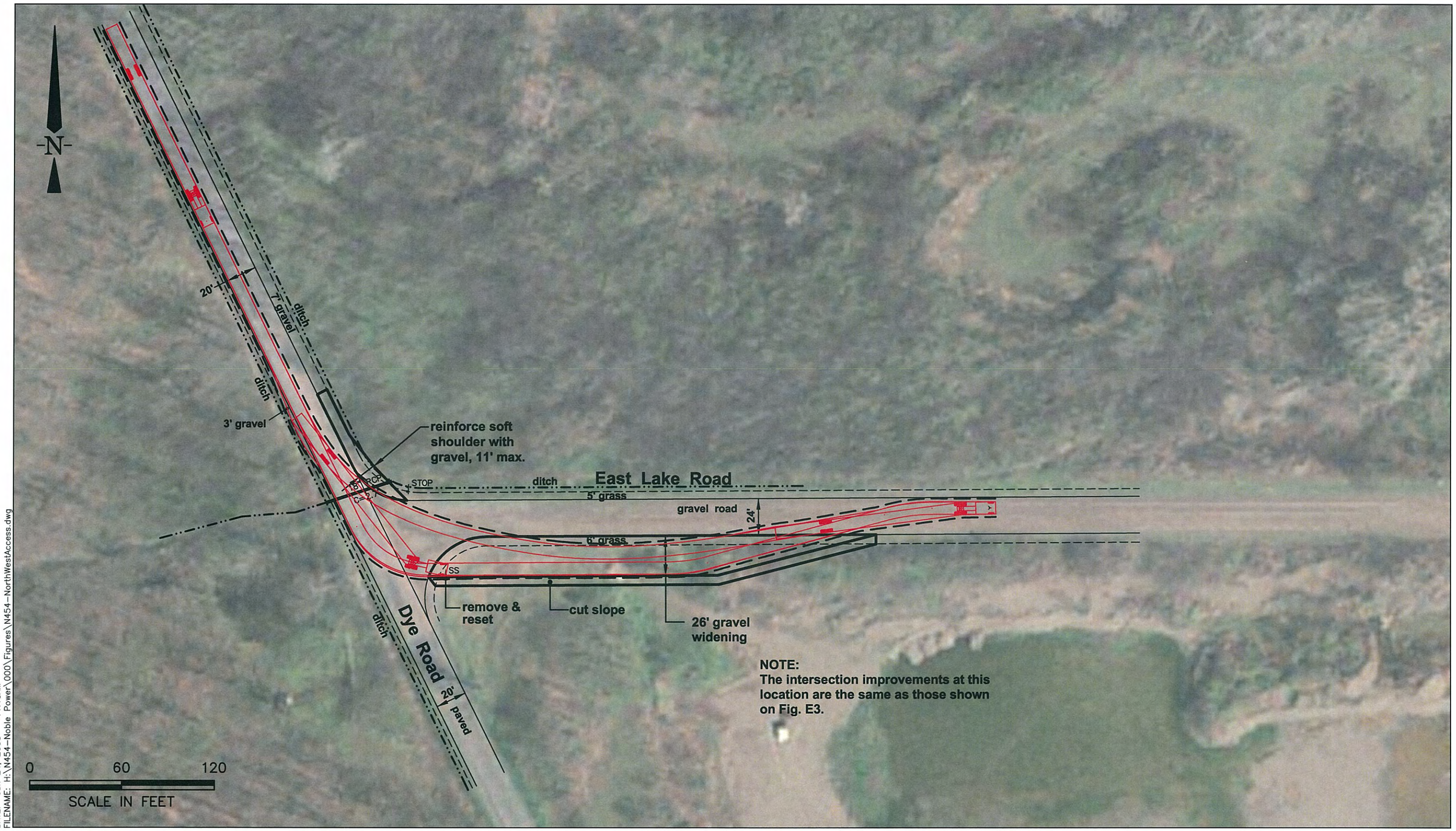
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
Empire Rd @ Hurlbert Rd
Hanover, New York
Intersection Improvements Plan
Figure NW2



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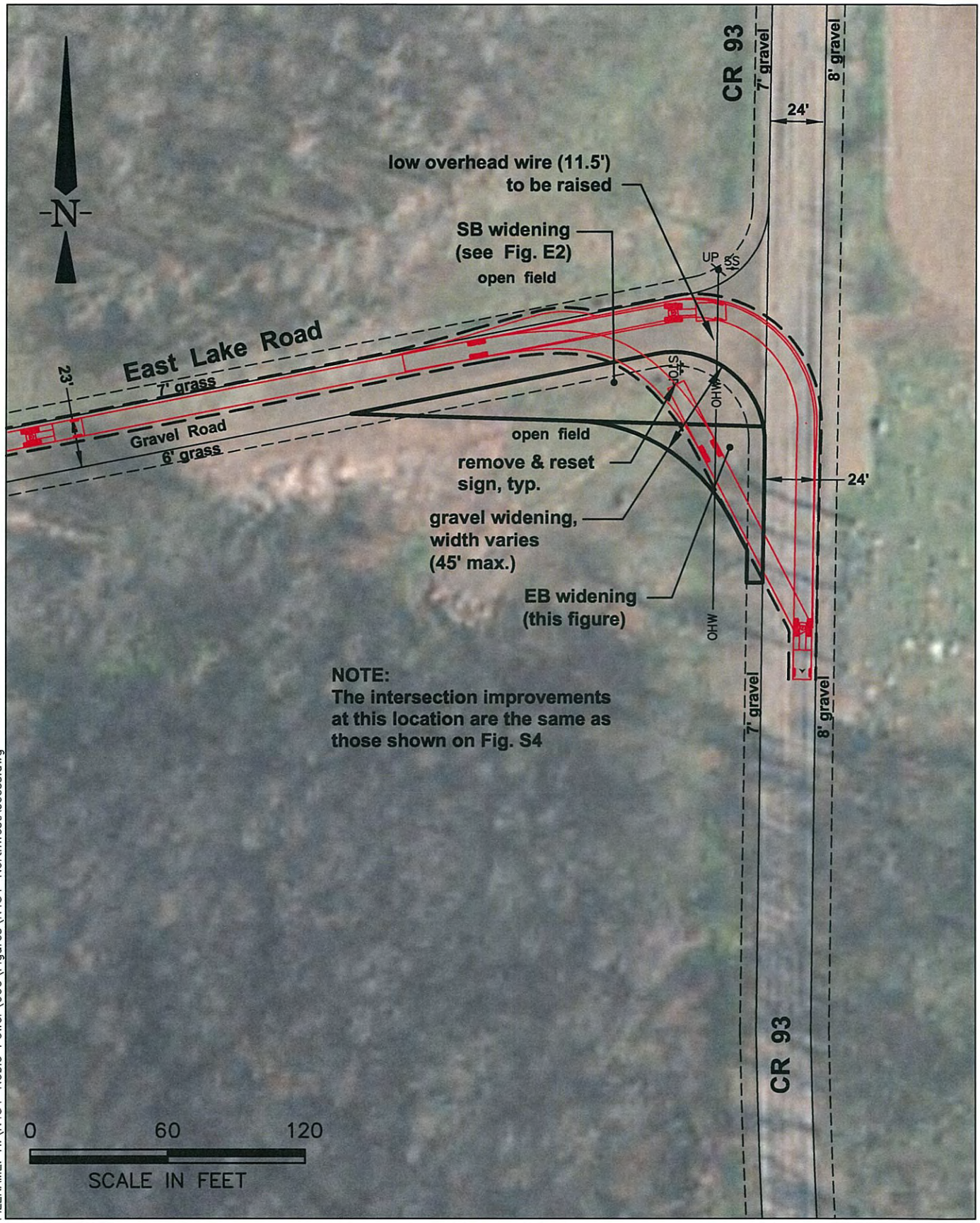
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2005 Aerial New York GIS (NAD 83)

APPENDIX A:
Dye Rd @ East Lake Rd, Villenova, New York
Intersection Improvements Plan

Figure
NW3



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Noble Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Source: 2004 Aerial New York GIS (NAD 83)

APPENDIX A:
East Lake Rd @ CR 93
Villenova, New York
Intersection Improvements Plan
Figure NW4

Appendix B

Roadway Inventory

Project: NOBLE BALL HILL HAUL ROUTE STUDY (Local Routes)
Job No: N454-000
Fieldwork: 5/12 - 5/14/2008
ESS Staff: Roger Hill
Subject: DRAINAGE STRUCTURES

J:/N454 Noble/Technical/
Drainage Structures Inventory.xls

ROUTE: Balcom Cross Rd (aka CR 87) at SR 83 - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Balcom Cross Rd				Paved County road, 20' wide
0.3		**23' x 67'**	**BRIDGE**	**0**	**Steel stringer beam bridge**
					BIN 3325880
0.4	End Balcom Cross Rd				at Hooker Rd (CR 91)

ROUTE: Hooker Rd (aka CR 91) at Buttermilk Rd (aka CR 91) - WB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Hooker Rd				Paved County road. 20' wide
0.6	Danker Rd (CR 87)	24	RCP	2.0	pipe culvert
0.73	Ball Hill Rd (CR 87)	18	CCP	3.0	pipe culvert, partial collapse
0.8		18	RCP	2.0	pipe culvert
0.9		24	RCP	5.0+	pipe culvert
1.1		30	RCP	3.0	pipe culvert
1.91		36	RCP	3.0	pipe culvert
2.11		18	RCP	3.3	pipe culvert
2.6		18	CPP	3.0	pipe culvert
3.2					North Hill Rd intersection
3.4		18	RCP	3.7	pipe culvert
3.5					Bartlett Hill intersection
3.7		18	RCP	3.2	pipe culvert
4.51		18	RCP	3.2	pipe culvert
4.8		17	RCP	4.3	pipe culvert
5.1		18	RCP	3.2	pipe culvert
5.3		24	CPP	3.3	pipe culvert
5.8	Prospect Rd				Town Line - Hanover
5.82					Gage Rd intersection
5.9	End Prospect Rd				at Hurlbert Rd (bad corner)

ROUTE: Empire Rd at SR 39 - SB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Empire Rd				Paved Town road, 20' wide
0.7		36	CMP	3.0	pipe culvert
1.2	end Empire Rd				at Hurlbert Rd

LEGEND

RCP	Reinforced Concrete Pipe
CPP	Corrugated Plastic Pipe
CMP	Corrugated Metal Pipe
DIP	Ductile Iron Pipe
BIN	Bridge ID Number

ROUTE: Hurlbert/Dye Rd at Empire Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
1.2	Hurlbert Rd				Paved Town road, 20' wide
1.65		24	RCP	5.0	pipe culvert
1.9		24	RCP	5.0+	pipe culvert
2.1		15	RCP	3.2	pipe culvert
2.3	Dye Rd				Town Line - Villenova
2.3	Dye Rd				Paved town road, 20' wide
2.4		60	CMP	3.0	pipe culvert
2.56		18	DIP	3.0	pipe culvert
2.56		20	DIP	3.0	pipe culvert
3.05		**48**	**DIP**	**1.0**	**pipe culvert**
3.15		15	CMP	3.3	pipe culvert

ROUTE: East Lake Rd at Dye Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
3.2	East Lake Rd				Gravel Town road, 24' wide
3.2		18	RCP	2.7	pipe culvert
3.7		**W=18'-11"**	**L=19'-2"**	**0.67**	**concrete box culvert, 24" roof**
					29" ht concrete parapet
3.8	End East Lake Rd				at CR 93

ROUTE: CR 93 at East Lake Rd - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.1	CR 93	**42**	**RCP**	**1.3**	**pipe culvert. N side James Rd**
0.1					JCT James Rd (right) - gravel
0.2					Paved County road, 24' wide
0.2		30	RCP	3.2	pipe culvert
0.6		42	RCP	5.0+	pipe culvert
0.6	CR 93				Town Line - Hanover
0.9		24	RCP	3.8	pipe culvert
1.1		36	RCP	3.5	pipe culvert
1.15		45	CPP	3.3	pipe culvert
1.3		24	RCP	8.0+	pipe culvert
1.55		42	RCP	8.0+	pipe culvert
1.9		60	CMP	8.0+	pipe culvert
2.1	End CR 93				at SR 39

ROUTE: Allegany/Flucker Hill Rd at SR 39 - SB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Allegany Rd				Paved Town road, very good
0.25					paved 20'-wide
0.4		36 x 36	BOX	6.0+	Concrete box culvert
1.1		12	RCP	3.2	pipe culvert
1.2					JCT Cottage Rd (left)
1.3		12	RCP	2.6	pipe culvert
1.4	Flucker Hill Rd				Town Line - Villenova
1.5	End Flucker Hill Rd				at James Rd (gravel)

ROUTE: James Rd at Flucker Hill Rd - WB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	James Rd				Gravel Town road
0.1					15'-wide, Fair-Good, small ruts
0.4					Steep -8.4%
0.6					curve right
0.75	End James Rd				at CR 93

ROUTE: CR 93 at East Lake Rd - SB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	CR 93				at East Lake Rd - SB
0.08					JCT Wango Rd (right)-gravel
0.55		60 x 60	BOX	2.0	Concrete box culvert
0.8		32 x 24	CMP	3.5	Elliptical pipe culvert
0.95		24	RCP	3.3	pipe culvert (filled)
1.1		36	RCP	2.4	pipe culvert
1.2					JCT Bartlett Hill Rd (gravel)
1.25		36 x 28	CMP	2.6	Elliptical pipe culvert
1.35		36 x 36	BOX	3.0	Concrete box culvert
1.7		42	RCP	3.3	pipe culvert
2.05		36	RCP	3.3	pipe culvert
2.1	CR 91 Buttermilk Rd				Bear right. Traffic island
2.2		120 x 24	BOX	2.7	10' x 2' concrete box culvert
2.2					Paved county road, 22' wide
2.6	CR 91 Buttermilk Rd	**30' x 63'**	**BRIDGE**	**0**	**steel stringer beams** county bridge BIN 3325890
3.12		**32.5' x 25'**	**BRIDGE**	**0**	**steel stringer beams** county bridge BIN 3325940
3.5	End Buttermilk Rd				at Hooker Rd (CR 91 cont.)

ROUTE: Cemetery Rd at SR 83 - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Cemetery Rd				Paved Town road, 19' wide
0.3		**18.3' x 66.5'**	**BRIDGE**	**0**	**Steel stringer beam bridge** 4.5" corrug. metal/conc deck No BIN found
0.5	End Cemetery Rd				at Smith Rd

ROUTE: Smith Rd at Cemetery Rd - WB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Smith Rd				Paved Town road, 20' wide
0.01		12	CPP	4.5	pipe culvert
0.5					JCT Butcher Rd (left)
0.8		84	CMP	6.0+	pipe culvert
0.9					JCT Villenova Rd - 18' gravel
1.51		24	RCP	8.0+	pipe culvert
1.7		24-60-60-24	CPP	4.5	pipe culverts. 24",60",60",24"
2.0		12	RCP	3.6	pipe culvert
2.2	Smith Rd				JCT North Hill Rd
2.4	North Hill Rd	12	RCP	5.0+	pipe culvert
2.5		24	RCP	8.0+	pipe culvert
2.55	North Hill Rd				JCT Pope Hill Rd (left)
2.7	Pope Hill Rd				Paved Town road, 20' wide
2.9		18	DIP	8.0+	pipe culvert
3.5		19	DIP	3.0	pipe culvert
3.8		???	???		pipe culvert under water
4.0		36	DIP	3.3	pipe culvert
4.3		36	DIP	3.0	pipe culvert
4.45		24	CPP	2.3	pipe culvert
4.6		24	RCP	2.5	pipe culvert
4.7		17	DIP	2.3	pipe culvert
4.7	End Pope Hill Rd				at Round Top Rd

ROUTE: Round Top Rd at SR 83 - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Round Top Rd				Paved Town road, 20' wide
0.05					Steep grade, +9.1%
0.05		26	DIP	2.0	pipe culvert
0.2	End Round Top Rd				at Villenova Rd

ROUTE: Round Top Rd at Pope Hill Rd - SB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Round Top Rd				Paved Town road, 20' wide
0.01		18	DIP	2.5	pipe culvert
0.1		36	DIP	2.3	pipe culvert
0.4		48	DIP	2.7	pipe culvert
0.6		**48**	**DIP**	**1.8**	**pipe culvert**
1.1		18	CMP	3.2	pipe culvert
1.5		12	CMP	4.5	pipe culvert
1.7		18	CPP	2.6	pipe culvert
1.9		18	CPP	2.0	pipe culvert
2.2		12	CMP	3.0	pipe culvert
2.35		4	PVC	3.0	pipe culvert
2.4		18	CPP	3.4	pipe culvert
2.6		24	DIP	2.0	pipe culvert
2.7	Round Top Rd				JCT Villenova Rd
2.7	Villenova Rd				curve left
2.8	Villenova Rd				end pavement, begin gravel
2.9	Villenova Rd				Gravel Town road, 23' wide
3.4		28	DIP	2.0	pipe culvert
3.7		12	CMP	2.3	pipe culvert
3.9		**18**	**CPP**	**1.7**	**pipe culvert**
3.95	End Villenova Rd				JCT North Hill Rd - paved

ROUTE: Wentworth Rd at CR 72 - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Wentworth Rd				Gravel Town road, 26' wide
0.05					end pavement/begin gravel
0.2		**48**	**CMP**	**1.25**	**pipe culvert**
0.3					end gravel/begin pavement
0.31		**20'W x 31'L**	**BRIDGE**	**0**	**steel stringer beam** 5 @ 36H x 12W 6" timber slat deck BIN 2212810
0.4					end pavement/begin gravel
0.5	Wentworth Rd				gravel, 28' wide
0.7	Wentworth Rd				end gravel/begin pavement
0.7					paved 26' wide
0.85		18	CPP	2.0	pipe culvert
1.0		**24**	**CPP**	**1.8**	**pipe culvert**
1.1	End Wentworth				at SR 83 / Round Top Rd

Project: NOBLE BALL HILL HAUL ROUTE STUDY (Local Routes)
Job No: N454-000
Fieldwork: 5/12 - 5/14/2008
ESS Staff: Roger Hill
Subject: DRAINAGE STRUCTURES

ROUTE: Villenova Rd at North Hill Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Villenova Rd				Gravel Town road, 16' wide
0.1		24	RCP	2.6	pipe culvert
0.9	End Villenova Rd				at Smith Rd

ROUTE: North Hill Rd at Villenova Rd - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	North Hill Rd				Paved Town road
0.1					paved, 20' wide
0.45					Steep grade down
0.5		60-60-60	CPP	10.0+	3 - 60" stream culverts repair from wash-out ?
0.55					Steep grade +8.2 %
0.9	End North Hill Rd				at Smith Rd

ROUTE: North Hill Rd at Pope Hill Rd - NB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	North Hill Rd				Paved Town road
0.05					paved 20' wide
0.05		72	DIP	3.0	pipe culvert
0.9	End North Hill Rd				at Ball Hill Rd

ROUTE: Bartlett Hill Rd at Ball Hill Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Bartlett Hill Rd				Gravel Town road
0.1					gravel, 28' wide
0.45		**36**	**DIP**	**1.0**	**pipe culvert**
0.9					**ROAD CLOSED sign**
0.9					gravel, 18' wide
0.92		**24**	**DIP**	**0.5-**	**pipe culvert**
1.0					**Steep grade down, -12.2%**
1.1		**13'W x 15'L**	**BRIDGE**		**Damaged. Conc deck 9.5"**
					Width=12', Ht=5'
1.2		**48**	**DIP**	**0**	**pipe culvert**
1.5					JCT Dye Rd (paved)
1.8	Bartlett Hill Rd (cont.)				gravel , 22' wide
2.0		48-96-96	DIP	2.1	1 @ 48" CMP, 2@96" DIP
2.1	End Bartlett Hill Rd				at CR 93

ROUTE: Wango Rd at CR 93 - WB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Wango Rd				Gravel Town road
0.1					gravel, 24' wide
0.2		72	DIP	0.5-	pipe culvert
0.5		**12**	**DIP**	**1.6**	**pipe culvert**
0.55	End Wango				at Dye Rd (paved)

ROUTE: Dye Rd at East Lake Rd - SB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	Dye Rd				Paved Town road, 20' wide
0.01		18	DIP	2.3	pipe culvert
0.1		**24 x 60**	**BOX**	**0.7**	**concrete box culvert. 14" roof**
0.6		19	DIP	1.3	pipe culvert
0.66		28	DIP	0.5-	pipe culvert
1.0		24	RCP	2.1	pipe culvert
1.2		**4.3' x 11.5'**	**BOX**	**1.0-**	**concrete box culvert (4'-4" x 11'-6")**
1.5		18	DIP	3.6	pipe culvert
1.9		**36**	**CMP**	**1.3**	**aluminum pipe culvert**
2.8		15	DIP	4.2	pipe culvert
3.0		36	DIP	4.3	pipe culvert
3.0					paved 20' wide
3.4	End Dye Rd				at Danker (aka CR 87)

ROUTE: SR 39 at Empire Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	SR 39				at Empire Rd
0.25		18	DIP	3.8	Pipe culvert
0.6		Unknown		>12	Pipe culvert
0.75		30	DIP	6	Pipe culvert
1.0		24	CMP	4	Pipe culvert
2.0		8x20		>12	Concrete box culvert (golf)
2.0					32' wide road
2.15					pipe culvert (not found)
2.25	SR 39				Flashing yellow CR 93 (sw)
2.6		24	DIP	2.3	Pipe culvert
3.0		24	DIP	3.6	Pipe culvert
3.3	End SR 39				at Allegany Rd

ROUTE: CR 72 at Wentworth Rd - EB

		DRAINAGE STRUCTURES			
Odometer	Road Name	Size (in.)	Type	Cover (ft.)	Comment
0.0	CR 72 E / SR 83 S				At Wentworth Rd
0.1		12	RCP	> 8	
0.3		12'w x 5'h	BOX	2.7	concrete box culvert
0.5		**6.75'h x 22'l**	**BRIDGE**	**1.5"**	**culvert bridge, 12" conc. deck**
0.55		**3' x 3'**	**BOX**	**1.8**	**concrete box culvert**
0.7		24	RCP	4.8	
0.8		18	DIP	3.5	
1.3	Begin SR 83 south				4 way Intersect, South Hill Rd
1.4		10' x 5'	BOX	6.0	concrete box culvert
1.65		30	CPP	2.4	
1.9		**16'l x 6'h**	**BOX**	**2.5"**	**box culvert, 12" conc deck**
2.1		**28x36**	**CMP**	**1.3**	
2.40		36x48	CMP	2.0	
3.6	End SR 83 south				At Balcom Cross Rd

END DRAINAGE STRUCTURES INVENTORY

Project: NOBLE BALL HILL HAUL ROUTE STUDY (Local Routes)
Job No: N454-000
Fieldwork: 5/12 - 5/14/2008
ESS Staff: Roger Hill
Subject: OVERHEAD WIRES

J:/N454 Noble/Technical/
OHW Inventory.xls

ROUTE: Balcom Cross Rd (aka CR87) at SR 83 - NB

Odometer	Road Name	Type	Comment
0.0	Balcom Cross Rd	OHW	Paved County Road. 20' wide
0.3		OHW	15.1' high
0.4	End Balcom Cross Rd	OHW	at Hooker Rd (CR 91)

ROUTE: Hooker Rd (aka CR 91) at Buttermilk Rd (aka CR 91) - WB

Odometer	Road Name	Type	Comment
0.0	Hooker Rd	OHW	Paved County road. 20' wide
0.05		OHW	
0.06		OHW	
0.1		OHW	
0.2		OHW	
0.21		OHW	
0.4		OHW	greater than 18.5' high
0.5		OHW	greater than 18.5' high @ Dye Road
0.52		OHW	Telephone
0.6	Danker Rd (CR 87)		
0.62		OHW	Telephone
0.7		OHW	
0.72		OHW	2 wires
0.73	Ball Hill Rd (CR 87)		
0.74		OHW	Cemetery Road
1.1			22' wide paved
1.3		OHW	
1.4		OHW	
1.45		OHW	Telephone
1.7		OHW	Electric
1.9		OHW	Electric
2.1		OHW	Electric
2.5		OHW	Electric
2.7		OHW	Telephone
2.8		OHW	Telephone
3.0		OHW	Telephone
3.02		OHW	Electric
3.1		OHW	Telephone
3.2			North Hill Rd intersection
3.21		OHW	Telephone
3.23		OHW	Telephone
3.25		OHW	Telephone
3.3		OHW	Electric
3.35		OHW	Telephone
3.5			Bartlett Hill intersection
3.5		OHW	2 wires
3.72		OHW	4 wires
3.8		OHW	Service
3.9		OHW	Service
4		OHW	

ROUTE: Hooker Rd (aka CR 91) at Buttermilk Rd (aka CR 91) - WB Continued

Odometer	Road Name	Type	Comment
4.2		OHW	
4.4		OHW	Telephone
4.5		OHW	Telephone
4.65		OHW	2 wires
4.7		OHW	
5.0		OHW	
5.4			Slope stabilization (gabions) ponds
5.6		OHW	
5.7		OHW	3 wires
5.8	Prospect Rd	OHW	Town Line - Hanover
5.82		OHW	Gage Rd intersection
5.9	End Prospect Rd		at Hulbert Rd (bad corner)

ROUTE: Empire Rd at SR 39 - SB

Odometer	Road Name	Type	Comment
0.0	Empire Rd		Paved Town road, 20' wide
0.05		OHW	Telephone
0.15		OHW	Telephone
0.3		OHW	Telephone
0.5		OHW	
0.8		OHW	Telephone
1.0		OHW	
1.2	End Empire Rd		at Hurlbert Rd

ROUTE: Hurlbert/Dye Rd at Empire Rd - EB

Odometer	Road Name	Type	Comment
1.2	Hurlbert Rd		Paved Town road, 20' wide
1.2		OHW	
1.3		OHW	
1.6	Hurlbert Rd		20' wide
1.65		OHW	2 wires
1.8		OHW	Low
2.2		OHW	Low
2.3		OHW	
2.3	Dye Rd		Town Line - Villenova
2.3	Dye Rd		Paved town road, 20' wide
2.50		OHW	
2.52		OHW	
2.53		OHW	
2.54		OHW	
2.6		OHW	
2.7		OHW	Telephone
2.9		OHW	

Project: NOBLE BALL HILL HAUL ROUTE STUDY (Local Routes)
Job No: N454-000
Fieldwork: 5/12 - 5/14/2008
ESS Staff: Roger Hill
Subject: OVERHEAD WIRES

ROUTE: East Lake Rd at Dye Rd - EB

Odometer	Road Name	Type	Comment
3.2	East Lake Rd		Gravel Town road, 24' wide
3.8		OHW	
3.8	End East Lake Rd		at CR 93

ROUTE: CR 93 at East Lake Rd - NB

Odometer	Road Name	Type	Comment
0.1	CR 93	OHW	
0.1			James Rd (gravel) intersection
0.2	CR 93		24' wide
0.2		OHW	
0.3		OHW	
0.6	CR 93		Town Line - Hanover
1.2		OHW	
1.4		OHW	2 wires
1.6		OHW	
1.7		OHW	
2.1	End CR 93		at SR 39

ROUTE: Allegany/Flucker Hill Rd at SR 39 - SB

Odometer	Road Name	Type	Comment
0.0	Allegany Rd		Paved Town road, very good
0.02		OHW	
0.04		OHW	
0.1		OHW	Low
0.15		OHW	
0.2		OHW	greater than 18.5' high
0.25			20' wide paved
0.4		OHW	greater than 18.5' high
0.5		OHW	
0.55		OHW	
0.6		OHW	Telephone
0.7		OHW	
0.8		OHW	
0.85		OHW	
0.9		OHW	
1.0		OHW	greater than 18.5' high
1.05		OHW	
1.15		OHW	2 wires
1.2		OHW	3 wires
1.2			Cottage Rd intersection
1.3		OHW	greater than 18.5' high
1.4		OHW	
1.4	Flucker Hill Rd		Town Line - Villenova
1.5	End Flucker Hill Rd		at James Rd (gravel)

ROUTE: James Rd at Flucker Hill Rd - WB

Odometer	Road Name	Type	Comment
0.0	James Rd		Gravel Town road
0.1			15'-wide, Fair-Good, small ruts
0.4			Steep -8.4%
0.6			curve right
0.75	End James Rd		at CR 93

ROUTE: CR 93 at East Lake Rd - SB

Odometer	Road Name	Type	Comment
0.0	CR 93		at East Lake Rd - SB
0.05		OHW	
0.08			JCT Wango Rd (right)-gravel
0.3		OHW	
0.35		OHW	
0.45		OHW	
0.5		OHW	Telephone
0.85		OHW	
1.2			JCT Bartlett Hill Rd (gravel)
1.25		OHW	
1.3		OHW	
1.35		OHW	
1.6		OHW	
1.72		OHW	
1.8		OHW	
2.0		OHW	
2.1		OHW	
2.1	CR 91 Buttermilk Rd		Bear right. Traffic island
2.2		OHW	greater than 18.5' high
2.2			Paved county road, 22' wide
2.4		OHW	greater than 18.5' high
2.45		OHW	greater than 18.5' high
2.5		OHW	greater than 18.5' high
2.6		OHW	greater than 18.5' high
2.65		OHW	greater than 18.5' high
2.7		OHW	greater than 18.5' high
3		OHW	greater than 18.5' high
3.1		OHW	greater than 18.5' high
3.5	End Buttermilk Rd		at Hooker Rd (CR 91 cont.)

ROUTE: Cemetery Rd at SR 83 - NB

Odometer	Road Name	Type	Comment
0.0	Cemetery Rd		Paved Town road, 19' wide
0.01		OHW	3 wires
0.1	Cemetery Rd		19' wide
0.5	End Cemetery Rd		at Smith Rd

ROUTE: Smith Rd at Cemetery Rd - WB

Odometer	Road Name	Type	Comment
0.0	Smith Rd		Paved Town road, 20' wide
0.01		OHW	
0.02		OHW	2 wires
0.04		OHW	
0.5			JCT Butcher Rd (left)
0.7		OHW	greater than 18.5' high
0.81		OHW	greater than 18.5' high
0.9			JCT Villenova Rd - 18' gravel
1.1			20' wide paved
1.5		OHW	greater than 18.5' high
2.2	Smith Rd		JCT North Hill Rd
2.2		OHW	
2.3		OHW	
2.42		OHW	3 wires
2.55		OHW	
2.55	North Hill Rd		JCT Pope Hill Rd (left)
2.6		OHW	
2.7	Pope Hill Rd		Paved Town road, 20' wide
3.2		OHW	2 wires
3.7		OHW	
4.05		OHW	greater than 18.5' high
4.1		OHW	Telephone
4.4		OHW	greater than 18.5' high
4.5		OHW	2 wires
4.65		OHW	greater than 18.5' high
4.7		OHW	
4.7	End Pope Hill Rd		at Round Top Rd

ROUTE: Round Top Rd at SR 83 - NB

Odometer	Road Name	Type	Comment
0.0	Round Top Rd		Paved Town road, 20' wide
0.05			Steep grade, +9.1%
0.2	End Round Top Rd		at Villenova Rd

ROUTE: Villenova Rd at North Hill Rd - EB

Odometer	Road Name	Type	Comment
0.0	Villenova Rd		Gravel Town road, 16' wide
0.05			16' wide gravel
0.15		OHW	greater than 18.5' high
0.9	End Villenova Rd		at Smith Rd

ROUTE: Round Top Rd at Pope Hill Rd - SB

Odometer	Road Name	Type	Comment
0.0	Round Top Rd		Paved Town road, 20' wide
0.05		OHW	greater than 18.5' high
0.2		OHW	
0.21		OHW	
0.9		OHW	greater than 18.5' high
0.9			20' wide paved
0.95		OHW	greater than 18.5' high
1.05		OHW	greater than 18.5' high
1.55		OHW	greater than 18.5' high
1.8		OHW	
2.3		OHW	greater than 18.5' high
2.35		OHW	greater than 18.5' high
2.5		OHW	greater than 18.5' high
2.7	Round Top Rd		JCT Villenova Rd
2.7	Villenova Rd		curve left
2.8	Villenova Rd		end pavement, begin gravel
2.9	Villenova Rd		Gravel Town road, 23' wide
3.41		OHW	greater than 18.5' high
3.95		OHW	greater than 18.5' high. East side int.
3.95	End Villenova Rd		JCT North Hill Rd - paved

ROUTE: Wentworth Rd at CR 72 - NB

Odometer	Road Name	Type	Comment
0.0	Wentworth Rd		Gravel Town road, 26' wide
0.05			end pavement/begin gravel
0.2			pipe culvert
0.3			end gravel/begin pavement
0.4			end pavement/begin gravel
0.5	Wentworth Rd		gravel, 28' wide
0.7	Wentworth Rd		end gravel/begin pavement
0.7			paved 26' wide
0.8		OHW	
1.1	End Wentworth		at SR 83 / Round Top Rd

ROUTE: North Hill Rd at Villenova Rd - NB

Odometer	Road Name	Type	Comment
0.0	North Hill Rd		Paved Town road
0.01		OHW	
0.1			paved, 20' wide
0.45			Steep grade down
0.55			Steep grade +8.2 %
0.9	End North Hill Rd		at Smith Rd

ROUTE: North Hill Rd at Pope Hill Rd - NB

Odometer	Road Name	Type	Comment
0.0	North Hill Rd		Paved Town road
0.05			paved 20' wide
0.4		OHW	
0.5		OHW	greater than 18.5' high
0.9	End North Hill Rd		at Ball Hill Rd

ROUTE: Bartlett Hill Rd at Ball Hill Rd - EB

Odometer	Road Name	Type	Comment
0.0	Bartlett Hill Rd		Gravel Town road
0.1			gravel, 28' wide
0.4		OHW	
0.5		OHW	greater than 18.5' high
0.55		OHW	greater than 18.5' high
0.9			ROAD CLOSED sign
0.9			gravel, 18' wide
1.0			Steep grade down, -12.2%
1.1			Damaged. Conc deck 9.5"
			Width=12', Ht=5'
1.5			JCT Dye Rd (paved)
1.8	Bartlett Hill Rd (cont.)		gravel , 22' wide
2.1	End Bartlett Hill Rd		at CR 93

ROUTE: Wango Rd at CR 93 - WB

Odometer	Road Name	Type	Comment
0.0	Wango Rd		Gravel Town road
0.1			gravel, 24' wide
0.55	End Wango		at Dye Rd (paved)

ROUTE: Dye Rd at East Lake Rd - SB

Odometer	Road Name	Type	Comment
0.0	Dye Rd		Paved Town road, 20' wide
0.4		OHW	greater than 18.5' high
0.5		OHW	greater than 18.5' high
0.55		OHW	
0.65		OHW	greater than 18.5' high
0.7		OHW	greater than 18.5' high
0.75		OHW	2 wires
1.1		OHW	greater than 18.5' high
1.21		OHW	greater than 18.5' high. South of Ball Hill Road
2.1		OHW	greater than 18.5' high
2.2		OHW	greater than 18.5' high
2.25		OHW	greater than 18.5' high
2.3		OHW	2 wires
2.4		OHW	greater than 18.5' high
3.0			paved 20' wide

ROUTE: Dye Rd at East Lake Rd - SB Continued

Odometer	Road Name	Type	Comment
3.2		OHW	
3.25		OHW	
3.4	End Dye Rd		at Danker (aka CR 87)

ROUTE: SR 39 at Empire Rd - EB

Odometer	Road Name	Type	Comment
0.0	SR 39		at Empire Rd
0.2		OHW	Telephone
0.3		OHW	Telephone
0.4		OHW	
0.5		OHW	Telephone
0.7		OHW	2 wires
0.8		OHW	
0.9		OHW	
1.05		OHW	
2.1		OHW	
1.2		OHW	Telephone
1.30		OHW	
1.4		OHW	
1.45		OHW	
1.55		OHW	Telephone
2.0	SR 39		22' wide
2.05		OHW	
2.1		OHW	
2.2		OHW	
2.23		OHW	
2.25	SR 39		Flashing yellow CR 93 (sw)
2.5		OHW	
2.6		OHW	
2.7		OHW	
2.85		OHW	Telephone
3.0		OHW	
3.1		OHW	
3.2		OHW	Telephone
3.22		OHW	Telephone
3.28		OHW	2 wires
3.3		OHW	
3.3	End SR 39		at Allegany Rd

END OVERHEAD WIRES INVENTORY

Appendix C

Off Site Route and Location Road Photos

1a. End Route 219S at Route 39, Springville, NY

1b. Route 39W at End Route 219, Springville, NY

1c. Route 39W at Collins Rd, Collins, NY

1d. Collins Rd By-Pass Looking West

2a. Collins Rd at Route 62 Looking West

2b. Collins Rd at Route 62N Looking North

2c. Route 62N at Richardson Rd Looking North

2d. Richardson Rd at Route 62 Looking East

N-138

3a. Versailles Plank Rd Bridge over Cattaraugus Creek

3b. Richardson Rd at Taylor Hollow Rd Looking SW

3c. Taylor Hollow Rd at Route 438S Looking South

3d. Aldrich St Bridge Looking SW

4a. End Route 438S at Routes 39/62, Gowanda, NY

4b. Routes 39/62, Gowanda Village Looking South

4c. Routes 39/62 Gowanda Village Looking West

4d. Gowanda Bridge over Cattaraugus Creek

N-140

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Haul Route Study
Chautauqua County, NY

Off-Site Route Photos

Photo Sheet 4

5a. Gowanda Bridge Looking SW

5b. Route 62 – 39 Split, Gowanda, Looking West

5c. Route 39W – Steep Grades, Perrysburg, NY

5d. Route 39W at Stafford Rd Looking South

6a. Route 39W at CR 93S, Hanover, NY, Looking West

6b. CR 93 at Route 39 Looking South

6c. Route 62 at CR 50, Ellington Center - South Access

6d. Route 62N, Ellington Center – South Access

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Off-Site Route Photos

Photo Sheet 6

7a. Route 62N, Clear Creek – South Access

7b. Route 62N, Clear Creek, Looking North

7c. CR 58 at Route 60, Cassadaga – SW Access

7d. Route 60N, Cassadaga – SW Access

8a. Route 60N at CR 72 – SW Access

8b. Route 60 at CR 72, Looking East – SW Access

8c. Route 83S at Center Rd – NW Access (Alt)

8d. Center Rd at CR 72 – NW Access (Alt)

9a. Route 60S at US Route 20 – NW Access

9b. US Route 20E at Route 60 – NW Access

9c. US Route 20E at Route 39 – NW Access

9d. Route 39E Forestville Center – NW Access

10a. Route 39E Forestville Center – NW Access

10b. Route 39E at Empire Rd – NW Access

10c. Route 39E at Empire Rd Looking SE

10d. Empire Rd at Hurlbert Rd Looking South

11a. Empire Rd at Hurlbert Rd Looking East

11b. Dye Rd at East Lake Rd Looking South

11c. East Lake Rd at Dye Rd Looking East

11d. CR93 at Buttermilk Rd (CR91) Looking South

12a. Buttermilk Rd – Big Bridge Looking South

12b. Buttermilk Rd – Big Bridge Looking SW

12c. Buttermilk Rd – Small Bridge Looking SW

12d. Buttermilk Rd – Small Bridge Looking South

13a. Buttermilk Rd at Hooker Rd Looking South

13b. Buttermilk Rd at Hooker Rd Looking SW

13c. Ball Hill Rd at Cemetery/Smith Rds Looking West

13d. Smith Rd at Cemetery/ Ball Hill Rds Looking East

14a. SR 38S at Balcom Cross Rd (CR87) Looking East

14b. SR83 at Balcom Cross Rd Looking NE

14c. Balcom Cross Rd Bridge Looking North

14d. Balcom Cross Rd Bridge Looking NW

N-150

15a. Balcom Cross Rd (CR87) at Hooker Rd Looking North

15b. Balcom Cross Rd (CR87) at Danker Rd Looking NW

15c. Balcom Cross Rd (CR87) at Hooker Rd Looking NE

15d. Ball Hill Rd at North Hill Rd Looking NW

16a. Ball Hill Rd at Bartlett Hill Rd Looking East

16b. Ball Hill Rd at Bartlett Hill Rd Looking South

16c. Smith Rd at North Hill Rd Looking NW

16d. North Hill Rd at Pope Hill Rd Looking North

17a. Pope Hill Rd at Round Top Rd Looking West

17b. Pope Hill Rd at Round Top Rd – SE Corner

17c. Round Top Rd at Villenova Rd Looking SE

17d. Villenova Rd – Gravel Road Looking East

18a. Cemetery Rd Bridge Looking North

18b. Cemetery Rd Bridge Looking NW

18c. Wentworth Rd Bridge Looking North

18d. Wentworth Rd Bridge Looking SE

Appendix D

Haul Route Maps

Lake Erie

N

ERIE COUNTY

CHAUTAUQUA COUNTY
CATTARAUGUS COUNTY

VERSAILLES PLANK RD BRIDGE

Fig. IB-E5

SR 62

CR 438

EAST ACCESS ALTERNATIVE 1 (Gowanda By-Pass)

CR 58

EAST ACCESS ALTERNATIVE 2

RICHARDSON RD

Fig. IB-E4

EAST ACCESS

SR 39

Fig. IB-E1

SR 219 EXPRESSWAY

TBD

P.O.B.

TBD

SPRINGVILLE

Taylor Hollow Road

Fig. IB-E2

Fig. IB-E3

Fig. IB-E6

ALDRICH BRIDGE

GOWANDA BRIDGE

Fig. IB-E7

Fig. IB-E8

Fig. IB-E9

EAST ACCESS ALTERNATIVE 3

NORTHWEST ACCESS ALTERNATIVE 2

FORESTVILLE

SR 39

Box Culvert

TBD

SR 20

P.O.B.

TBD

Fig. IB-NW2

Fig. IB-NW1

FREDONIA

TBD

ALTERNATE P.O.B.

NORTHWEST ACCESS ALTERNATIVE 1

BALL HILL STUDY AREA

PECK HILL RD

CENTER RD CR 79

SR 60

CR 72

Box Culvert

CR 72

Box Culverts

SOUTHWEST ACCESS

CASSADAGA

Fig. IB-SW2

P.O.B.

TBD

TBD

Fig. IB-SW1

SR 83

SOUTH ACCESS

Box Culvert

Box Culvert

Box Culvert

Fig. IB-S1

TBD

SR 62

P.O.B. ELLINGTON

Fig. IB-S2

TBD

LEGEND:

- RECOMMENDED OS/OW HAUL ROUTES
- POTENTIAL ALTERNATE OS/OW HAUL ROUTES
- CR COUNTY ROUTE
- SR STATE ROUTE
- P.O.B. POINT OF BEGINNING
- TBD TO BE DETERMINED
- BRIDGE/BOX CULVERT
- Fig. IB-E1 INTERSECTION IMPROVEMENT PLAN

GRAPHIC SCALE

0 6000 12000 FEET

0 1.0 2.0 MILES

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No.	REVISION	DATE	APP BY
DRAWN BY:		CHECKED BY:	
DESIGNED BY:		APPROVED BY:	

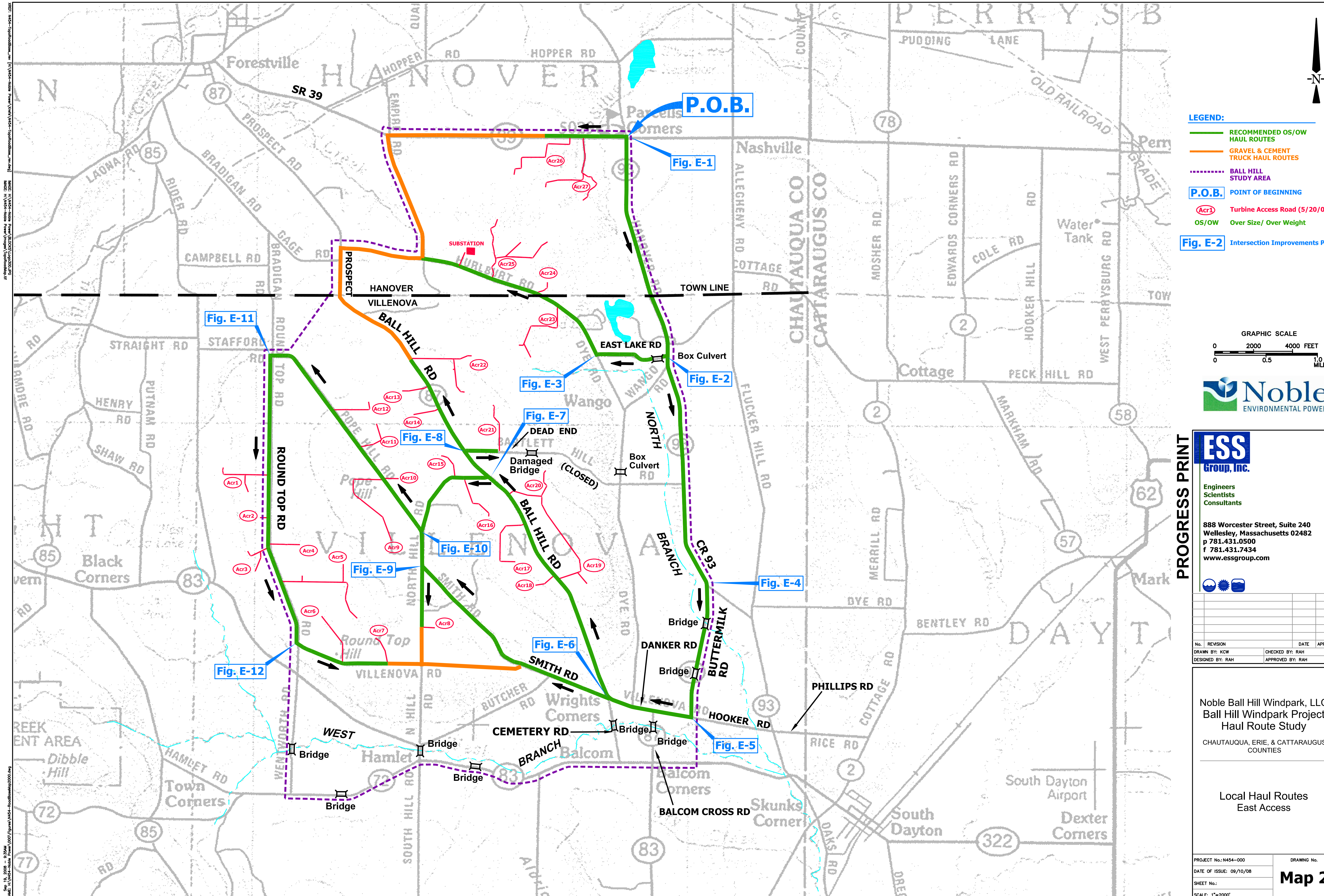
Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study

CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Off-Site
Haul Routes

PROJECT No.: N454-000	DRAWING No.
DATE OF ISSUE: 06/27/08	Map 1
SHEET No.:	
SCALE: 1"=6000'	

DATE: Jun 25, 2008 — 3:02PM
IMAGE: N:\N454-Noble Power\000\Figures\N454-RouteStudy5000.jpg


P.O.B.
Fig. E-1
Fig. E-2
Fig. E-3
Fig. E-4
Fig. E-5
Fig. E-6
Fig. E-7
Fig. E-8
Fig. E-9
Fig. E-10
Fig. E-11
Fig. E-12
SR 39
HANOVER
VILLENOVA
TOWN LINE
PROSPECT
BALL HILL RD
ROUND TOP RD
EAST LAKE RD
Box Culvert
DEAD END
Damaged Bridge
(CLOSED)
NORTH BRANCH
CR 93
BUTTERMILK RD
DANKER RD
Bridge
PHILLIPS RD
HOOKER RD
SMITH RD
CEMETERY RD
BALCOM CROSS RD
WEST BRANCH
SUBSTATION
Forestville
Nashville
Wango
Cottage
Black Corners
Wrights Corners
Hamlet
Balcom
Balcom Corners
Skunks Corner
South Dayton
Town Corners
Dexter Corners
South Dayton Airport
Water Tank
CHAUTAUQUA CO
CATTARAUGUS CO
LEGEND:
RECOMMENDED OS/OW HAUL ROUTES
GRAVEL & CEMENT TRUCK HAUL ROUTES
BALL HILL STUDY AREA
P.O.B. POINT OF BEGINNING
Acr1 Turbine Access Road (5/20/08)
OS/OW Over Size/ Over Weight
Fig. E-2 Intersection Improvements Plan
GRAPHIC SCALE
0 2000 4000 FEET
0 0.5 1.0 MILE
-N-

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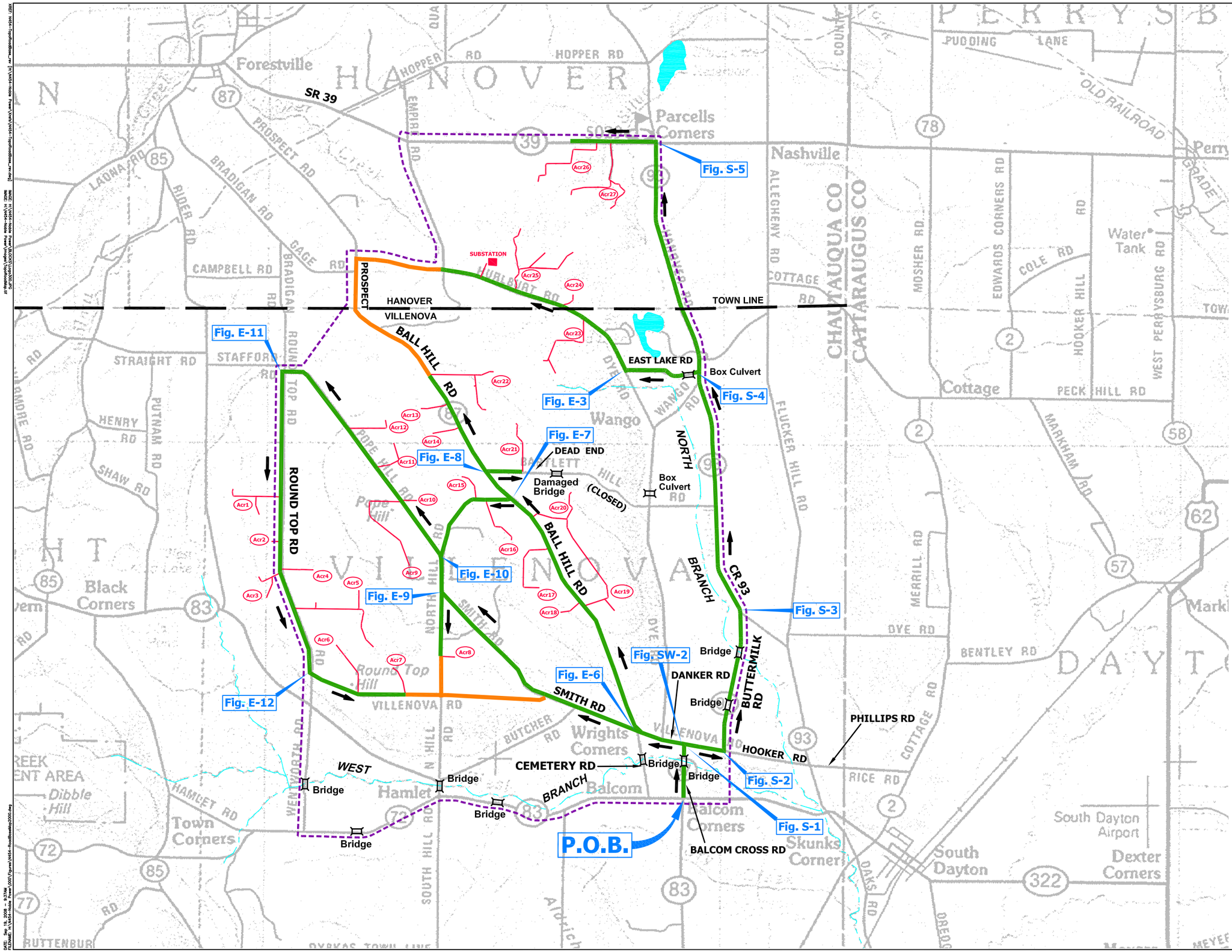
DRAWN BY: KCW		CHECKED BY: RAH	
DESIGNED BY: RAH		APPROVED BY: RAH	

Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study

CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Local Haul Routes
East Access

PROJECT No.: N454-000
DATE OF ISSUE: 09/10/08
SHEET No.:
SCALE: 1"=2000'
DRAWING No.
Map 2


HANOVER
Forestville
Parcells Corners
Nashville
Cottage
Water Tank
Wango
Hamlet
Balcom Corners
Wrights Corners
Round Top Hill
Black Corners
Dibble Hill
Town Corners
Skunks Corner
South Dayton
Dexter Corners
South Dayton Airport
SR 39
HOPPER RD
PUDDING LANE
OLD RAILROAD
PROSPECT RD
BRADIGAN RD
GAGE RD
LADWA RD
RIDER RD
CAMPBELL RD
STRAIGHT RD
STAFFORD RD
ROUND TOP RD
HENRY RD
SHAW RD
HAMLET RD
PUTNAM RD
SUBSTATION
HURLBURT RD
TOWN LINE
HANOVER
VILLENOVA
PROSPECT
BALL HILL RD
EAST LAKE RD
Box Culvert
DEAD END
Damaged Bridge
(CLOSED)
NORTH BRANCH
CR 93
BUTTERMILK RD
DANKER RD
SMITH RD
VILLENOVA RD
CEMETERY RD
WEST BRANCH
HOOKER RD
PHILLIPS RD
RICE RD
BALCOM CROSS RD
P.O.B.
Bridge
ALLEGHENY RD
COTTAGE RD
MOSHER RD.
EDWARDS CORNERS RD
COLE RD
HOOKER HILL RD
WEST PERRYSBURG RD
PECK HILL RD
MERRILL RD
BENTLEY RD
DYE RD
WANGO RD
FLUCKER HILL RD
MARKHAM RD
OAKS RD
CHAUTAUQUA CO
CATTARAUGUS CO
Fig. S-1
Fig. S-2
Fig. S-3
Fig. S-4
Fig. S-5
Fig. SW-2
Fig. E-2
Fig. E-3
Fig. E-6
Fig. E-7
Fig. E-8
Fig. E-9
Fig. E-10
Fig. E-11
Fig. E-12
Acr1
Acr2
Acr3
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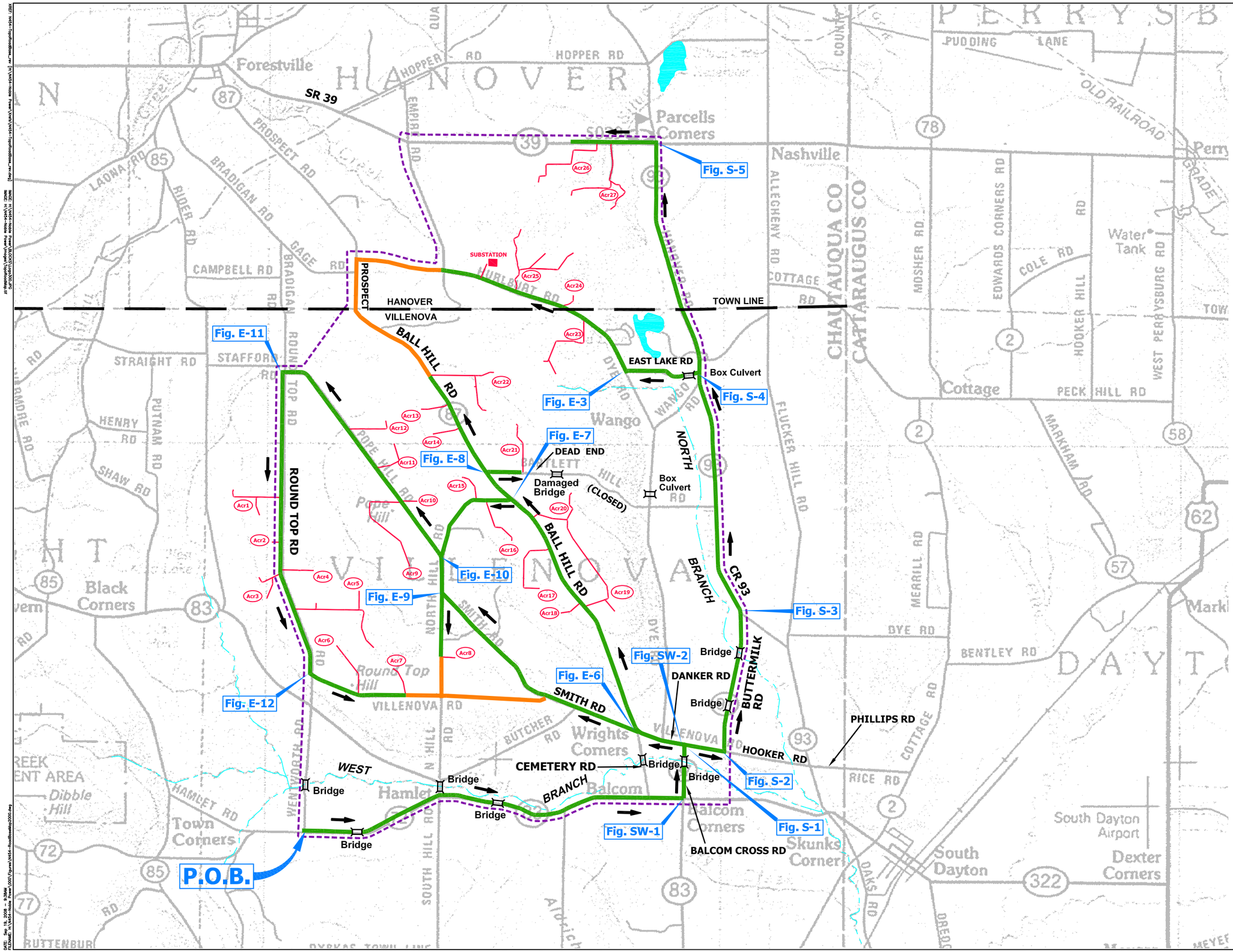
Acr25
Acr26
Acr27
N
LEGEND:
RECOMMENDED OS/OW HAUL ROUTES
GRAVEL & CEMENT TRUCK HAUL ROUTES
BALL HILL STUDY AREA
P.O.B. POINT OF BEGINNING
Acr1 Turbine Access Road (5/20/08)
OS/OW Over Size/ Over Weight
Fig. E-2 Intersection Improvements Plan
GRAPHIC SCALE
0 2000 4000 FEET
0 0.5 1.0 MILE
Noble ENVIRONMENTAL POWER
PROGRESS PRINT
ESS Group, Inc.
Engineers
Scientists
Consultants
888 Worcester Street, Suite 240
Wellesley, Massachusetts 02482
p 781.431.0500
f 781.431.7434
www.essgroup.com
No. REVISION DATE APP BY
DRAWN BY: KCW CHECKED BY: RAH
DESIGNED BY: RAH APPROVED BY: RAH
Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES
Local Haul Routes
South Access
PROJECT No.: N454-000
DRAWING No.
DATE OF ISSUE: 09/10/08
SHEET No.:
Map 3
SCALE: 1"=2000'


P.O.B.
Fig. S-5
Fig. S-4
Fig. S-3
Fig. S-2
Fig. S-1
Fig. SW-1
Fig. SW-2
Fig. E-2
Fig. E-3
Fig. E-4
Fig. E-5
Fig. E-6
Fig. E-7
Fig. E-8
Fig. E-9
Fig. E-10
Fig. E-11
Fig. E-12
HANOVER
VILLENOVA
TOWN LINE
SR 39
Forestville
Parcells Corners
Nashville
Wango
Cottage
Black Corners
Dibble Hill
Town Corners
Wrights Corners
Hamlet
Balcom
Balcom Corners
Skunks Corner
South Dayton
Dexter Corners
South Dayton Airport
Water Tank
Round Top Hill
Pope Hill
Box Culvert
Damaged Bridge
(CLOSED)
Bridge
SUBSTATION
HOPPER RD
PUDDING LANE
OLD RAILROAD
CAMPBELL RD
PROSPECT RD
BRADIGAN RD
GAGE RD
RIDER RD
LADWA RD
STRAIGHT RD
STAFFORD RD
ROUND TOP RD
HENRY RD
SHAW RD
HAMLET RD
WEST BRANCH
NORTH BRANCH
BALL HILL RD
BALL HILL
PROSPECT
EAST LAKE RD
DANKER RD
SMITH RD
CEMETERY RD
BALCOM CROSS RD
HOOKER RD
PHILLIPS RD
BUTTERMILK RD
CR 93
ALLEGHENY RD
COTTAGE RD
EDWARDS CORNERS RD
COLE RD
HOOKER HILL RD
WEST PERRYSBURG RD
PECK HILL RD
MOSHER RD
MERRILL RD
BENTLEY RD
BYE RD
RICE RD
OAKS RD
MARKHAM RD
FLUCKER HILL RD
CHAUTAUQUA CO
CATTARAUGUS CO
Acr1
Acr2
Acr3
Acr4
Acr5
Acr6
Acr7
Acr8
Acr9
Acr10
Acr11
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Acr15
Acr16
Acr17
Acr18
Acr19
Acr20
Acr21
Acr22
Acr23
Acr24
Acr25
Acr26
Acr27
N
GRAPHIC SCALE
0 2000 4000 FEET
0 0.5 1.0 MILE
LEGEND:
RECOMMENDED OS/OW HAUL ROUTES
GRAVEL & CEMENT TRUCK HAUL ROUTES
BALL HILL STUDY AREA
P.O.B. POINT OF BEGINNING
Acr1 Turbine Access Road (5/20/08)
OS/OW Over Size/ Over Weight
Fig. E-2 Intersection Improvements Plan
Noble ENVIRONMENTAL POWER
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p 781.431.0500
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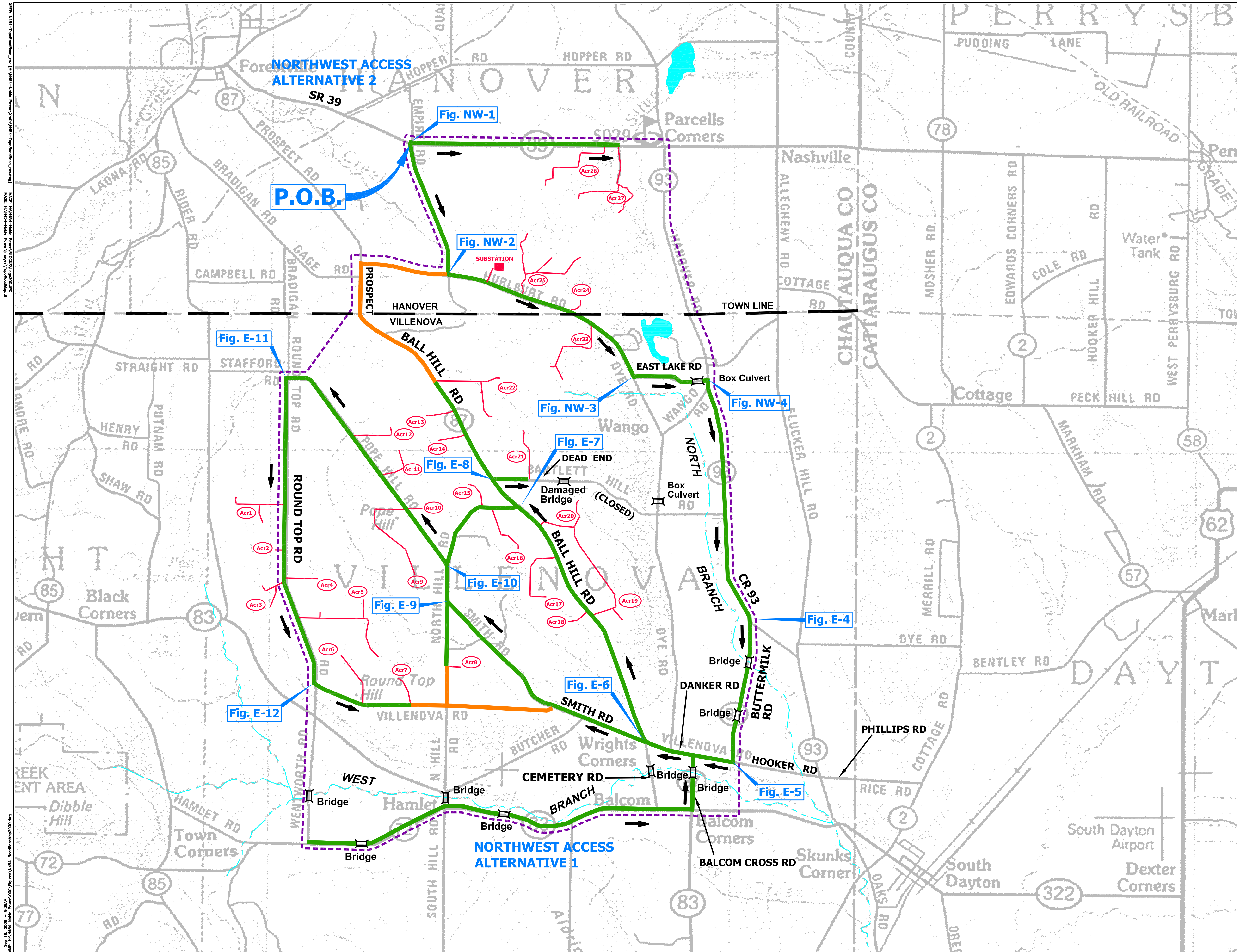
Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES
Local Haul Routes
Southwest Access
PROJECT No.: N454-000
DATE OF ISSUE: 09/10/08
SHEET No.:
SCALE: 1"=2000'
DRAWING No.
Map 4



LEGEND:

- RECOMMENDED OS/OW HAUL ROUTES
- GRAVEL & CEMENT TRUCK HAUL ROUTES
- BALL HILL STUDY AREA
- P.O.B. — POINT OF BEGINNING
- Acr1 — Turbine Access Road (5/20/08)
- OS/OW — Over Size/ Over Weight
- Fig. E-2 — Intersection Improvements Plan

GRAPHIC SCALE
0 — 2000 — 4000 FEET
0 — 0.5 — 1.0 MILE

Noble ENVIRONMENTAL POWER

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No.	REVISION	DATE	APP BY

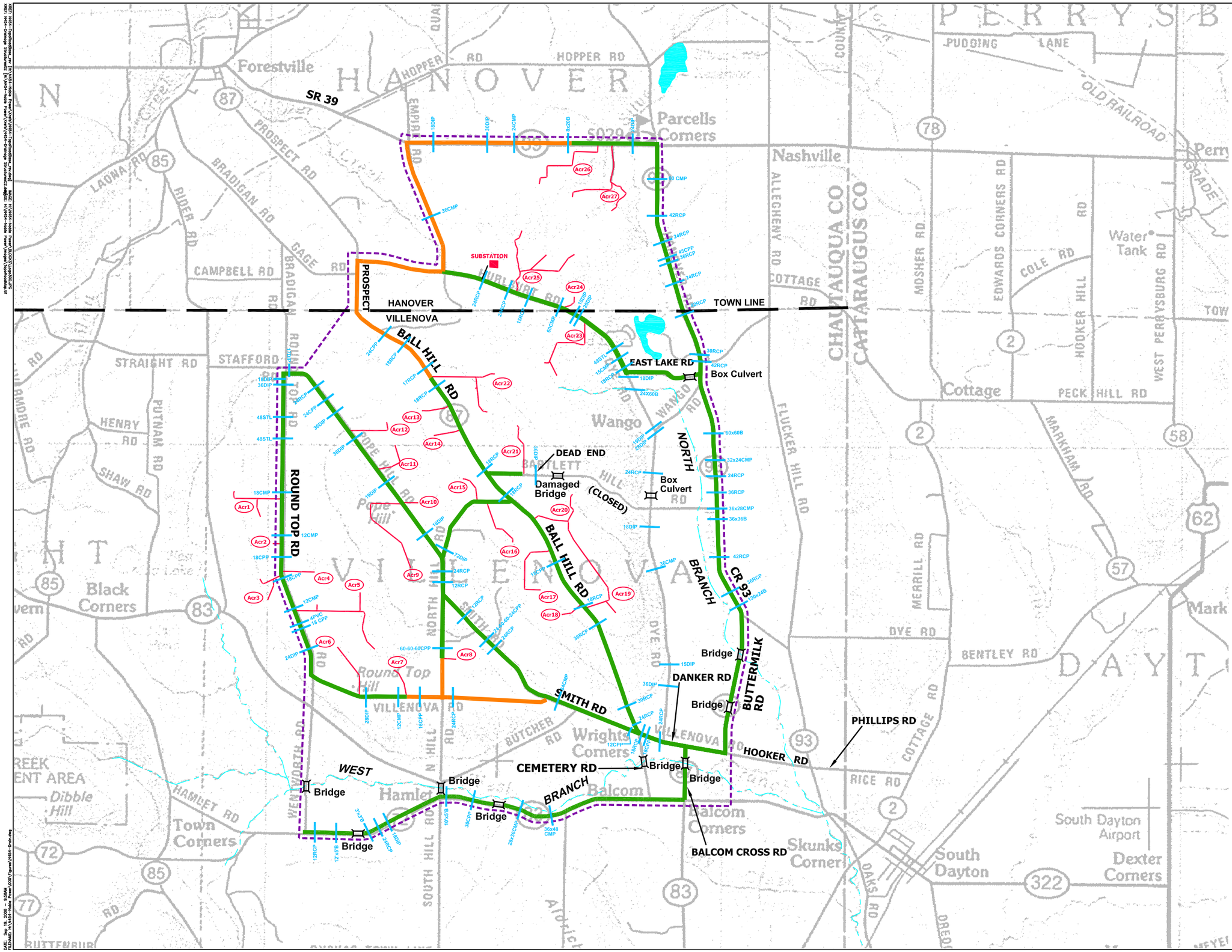
DRAWN BY: KCW — CHECKED BY: RAH
DESIGNED BY: RAH — APPROVED BY: RAH

Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study

CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES

Local Haul Routes
Northwest Access

PROJECT No.: N454-000
DATE OF ISSUE: 09/10/08
SHEET No.:
SCALE: 1"=2000'
DRAWING No.
Map 5


HANOVER
VILLENOVA
TOWN LINE
Forestville
Parcells Corners
Nashville
Wango
Cottage
Water Tank
Black Corners
Round Top Hill
Hamlet
Balcom
Balcom Corners
Wrights Corners
Skunks Corner
South Dayton
Dexter Corners
South Dayton Airport
Dibble Hill
Town Corners
Pope Hill
Bartlett Hill
SR 39
PROSPECT RD
BRADIGAN RD
GAGE RD
CAMPBELL RD
STAFFORD RD
STRAIGHT RD
HENRY RD
PUTNAM RD
SHAW RD
RIDER RD
LAONA RD
HOPPER RD
PUDDING LANE
OLD RAILROAD
ALLEGHENY RD
COTTAGE RD
EDWARDS CORNERS RD
COLE RD
HOOKER HILL RD
WEST PERRYSBURG RD
MDSHER RD
MERRILL RD
DYE RD
BENTLEY RD
PECK HILL RD
MARKHAM RD
FLUCKER HILL RD
RICE RD
OAKS RD
COUNTY LINE RD
CHAUTAUQUA CO
CATTARAUGUS CO
SUBSTATION
PURDY CREEK RD
EAST LAKE RD
Box Culvert
DEAD END
Damaged Bridge
(CLOSED)
NORTH BRANCH
CR 93
BALL HILL RD
ROUND TOP RD
SMITH RD
BUTTERMILK RD
DANKER RD
PHILLIPS RD
HOOKER RD
CEMETERY RD
BALCOM CROSS RD
WEST BRANCH
Bridge
Acr1
Acr2
Acr3
Acr4
Acr5
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Acr25
Acr26
Acr27
N
LEGEND:
RECOMMENDED OS/OW HAUL ROUTES
BALL HILL STUDY AREA
GRAVEL & CEMENT HAUL ROUTES
Acr1 Turbine Access Road (5/20/08)
Drainage Structure
CPP Corrugated Plastic Pipe
CMP Corrugated Metal Pipe
DIP Ductile Iron Pipe
STL Steel Pipe
RCP Reinforced Concrete Pipe
PVC Polyvinyl Chloride Pipe
Bridge
B Concrete Box Culvert
GRAPHIC SCALE
0 2000 4000 FEET
0 0.5 1.0 MILE
Noble ENVIRONMENTAL POWER
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p 781.431.0500
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No. REVISION DATE APP BY
DRAWN BY: KCW CHECKED BY: RAH
DESIGNED BY: RAH APPROVED BY: RAH
Noble Ball Hill Windpark, LLC
Ball Hill Windpark Project
Haul Route Study
CHAUTAUQUA, ERIE, & CATTARAUGUS COUNTIES
Bridge & Drainage Structures
PROJECT No.: N454-000
DATE OF ISSUE: 09/10/08
SHEET No.:
SCALE: 1"=2000'
DRAWING No.
Map 6

Aviation Study Report

AVIATION SYSTEMS INC.

Date:

To: Richard Opalanko
Noble Environmental Power, LLC
8 Railroad Avenue 2nd Floor Suite 8
Essex, CT 06426

ASI #: 06-N-0391.022
Client Site ID: Chautauqua, NY
FAA #:

We are sending you herewith the following via:

☐ **US Mail** ☑ **Overnight** ☐ **Fax** ☑ **Email** ☐ **2nd Day**

☐ ASI FAR Part 77 Airspace Obstruction Report
☑ Search Area Study Report
☐ Copies of our filing(s) with FAA and/or State
☐ Responses from FAA and/or State
☐ ASI Opinion Letter
☑ Quad Chart
☐ See attachments for Airport Runway data and/or AM Stations(s)
☐ Certified Survey

Comments:
REVISED STUDY AND CHART

Sincerely,

Aviation Systems, Inc.
By:

23430 Hawthorne Blvd. • Suite 200, Skypark Building 3 • Torrance, CA 90505
Tel: 310.378.3299 • Fax: 310.791.1546 • email: asi@aviationsystems.com • ww.aviationsystems.com

AVIATION SYSTEMS, INC.
(310) 378-3299 FAX: (310) 791-1546
asi@aviationsystems.com
www.aviationsystems.com

AREA STUDY REPORT

To:

Richard Opalanko
Noble Environmental Power, LLC
7430 State Rte 11
Churubusco, NY 12923

Date: December 8, 2006

Location: Forestville, NY

Client Case No.: Chautauqua, NY

ASI Case No.: 06-N-0391.022

Search Area Parameters:

- Search Area Center Coordinates: 42° - 24' – 29.19" /079° - 07' – 10.86" [NAD 27]
  42° - 24' – 30.00" /079° - 07' – 10.00" [NAD 83]
- Search Area Radius: 5.05 x 5.48 NM
- Search Area Center Elevation: 1730' [AMSL]
- Requested Structure Height: 420' [AGL]

Relevant Facilities Search:

- The nearest public use or military airfield affecting the search area under FAR Part 77 is Chautauqua County/Dunkirk Airport.
- The centerpoint of the search area is 8.16 NM/49,573 feet Southeast (114°True) from that airport.
- The nearest point of the search area to the runway is 4.54 NM/27,556 feet.
- The reference elevation is 693 feet AMSL.
- Other Public and Private Airports or Heliports within 3 NM of the search area: (None ☒;Yes, see attachment(s) ☐.)

- The attached "Maximum Height" plot (Exhibit A) divides the search area into sectors (as necessary) showing the maximum AMSL height limitations imposed by the aircraft visual and instrument procedures, enroute airways, and radar vectoring altitudes affecting the sector. The limitations have been calculated in accordance with FAR Part 77 and FAA Orders 7400.2 and 8260.3B and represent the maximum heights to which structures could be erected without incurring a "Hazard Determination" from the FAA.
- In instances where no operational procedures were discovered in this study which would impede construction of a structure in all or any portion of the search area, the height limitations shown are calculated by adding a safety buffer to the highest terrain found within the search area plus the requested structure height (If no structure height is provided, a maximum height of 500' AGL is applied). This buffer is to accommodate for the possibility of any unseen terrain variations within the area and enhance the safety margin. This height limitation is termed the "Target Height".

CONCLUSIONS:

-Sector A is a 40:1 Slope Surface of the Runway 15 turning departure which rises from 1610' AMSL to 1800' AMSL.
-Sector B is a Flat Surface limited to 2149' AMSL by the Primary Area of the Intermediate Segment of the GPS Rwy 33 Approach.
-Sector C is a Slope Surface of the GPS Secondary Area which rises from 2149' AMSL to the "Target Height" of 2575' AMSL.
-Sector D is a Flat Surface limited to 2449' AMSL by the outer portion of the Intermediate Area of the GPS Rwy 33 Approach.
-Sector E is a Slope Surface of the outer portion of the Intermediate Secondary Area of which rises from 2449' AMSL to 2575' AMSL.
-Sector F is a Flat Surface which reaches the "Target Height" of 2575' AMSL.

COMMENTS:

-In Sector A a 420' AGL turbine would not be feasible. In all the remaining Sectors, a 420' AGL turbine should be feasible.
-There are no joint use long range radars within 60 NM of the search area.
-FAA filing is required for any structure over 200' AGL.

NOTE: ***Because of changing airspace conditions and FAA evaluation criteria, the information contained on the exhibit(s) is for planning purposes only and should not be used for actual FAA filings. Specific sites within the search area must be separately studied to determine the FAA filing requirements and obstruction standards impacts unique to the specific sites.***

Exhibit A

No Notice Maximum
Height = 200' AGL

A

B

C

D

E

F

NOBLE ENVIRONMENTAL POWER, LLC
CHAUTAUQUA, NY
06-N-0391.022

SECTOR A – 1610' AMSL to 1800' AMSL
SECTOR B – 2149' AMSL
SECTOR C – 2149' AMSL to 2575' AMSL
SECTOR D – 2449' AMSL
SECTOR E – 2449' AMSL to 2575' AMSL
SECTOR F – 2575' AMSL

Aviation Study Supplement

AVIATION SYSTEMS INC.
Aviation Consultants

October 30, 2007

Mr. Richard S. Opalanko, PE
Noble Environmental Power, LLC
8 Railroad Avenue
Essex, CT 06426

Re: Ball Hill, 07-N-0391.016

Dear Mr. Opalanko:

Per your request, Aviation Systems, Inc. has performed a re-evaluation of a Sector (Sector A) of the Chautaugua, NY area study. That area is now referred to as Ball Hill.

To provide a more precise indication of the AMSL limits for Sector A, the area was segmented into blocks of approximately 800 x 4000 feet. The 800 feet dimension is the distance needed to gain 20 feet on a 40:1 slope. The 4000 feet dimension is a lateral spread that accommodates the variation in slope limits due to the effect of the turning departure procedures.

Ground elevations within the sector range from 1050 AMSL in the northwest corner to 1680 feet AMSL along the southeast edge. Slope limits range from 1440 feet AMSL in the northwest corner to 2020 feet AMSL in the northeast corner. Slope limits between indicated levels must be interpolated.

If you have any questions concerning this chart and the depicted data please do not hesitate to call.

Sincerely,

Gary M. Allen, Esq., PhD.
President

Enclosures: Map

2510 West 237th Street • Suite 210 • Torrance, CA 90505
Tel: 310.530.3188 • Fax: 310.530.3850 • Email: gallen@aviationsystems.com • www.aviationsystems.com

042° 25' 00.00" N | 042° 26' 00.00" N | 042° 27' 00.00" N

N-181

079° 10' 00.00" W

079° 08' 00.00" W

079° 06' 00.00" W

1600	1525	1475
1620	1545	1495
1640	1565	1515
1660	1585	1535
1680	1605	1555
1700	1625	1575
1720	1645	1595
1740	1665	1615
1760	1685	1635
1780	1705	1655
1800	1725	1675
1820	1745	1695
1840	1765	1715
1860	1785	1735
1805	1755	1720
1825	1775	1740
1845	1795	1760
1865	1815	1780
1885	1835	1800
1905	1855	1820
1925	1875	1840
1945	1895	1860
1915		1880
1935		1900
1955		1920
1975		1940
		1960
		1980
		2000
		2020
		1440
		1460
		1480
		1500
		1520
		1540
		1560
		1580
		1600
		1620
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		1660
		1680
		1700
		1720
		1740
		1760
		1780
		1800
		1820
		1840
		1860
		1880
		1900
		1920
		1940

NOBLE ENVIRONMENTAL POWER – BALL HILL
07-N-0391.016

SECT0R A – EACH 800 FEET EQUALS 20 FOOT RISE

042° 25' 00.00" N | 042° 26' 00.00" N | 042° 27' 00.00" N

FAA Lighting Plan

AVIATION SYSTEMS INC.
Aviation Consultants

July 3, 2008

Mr. Richard S. Opalanko, PE
Nobel Environmental Power, LLC
8 Railroad Avenue
Essex, CT 06426

Re: Ball Hill Lighting Plan, 08-N-0391.008

Dear Rick:

Enclosed please find the current list of proposed turbine locations along with lighting recommendations for each turbine in the Ball Hill Wind Project. This lighting plan was developed in compliance with the FAA Advisory Circular (AC) 70/7460-1K, Change 2 and on the basis of our discussions with FAA Wind Turbine Obstruction Evaluation Specialists regarding their current policy and could be modified on the final issuance of FAA Determinations of No Hazard.

The lighting plan calls for the lighting of 34 out of 60 wind turbines, the equivalent of 56%. Please note any changes to the project may require the development of a new lighting plan.

Sincerely,

Jerry Chavkin
Vice President, Airspace Operations

Enclosures: Wind Turbine List
Map

2510 West 237th Street • Suite 210 • Torrance, CA 90505
Tel: 310.530.3188 • Fax: 310.530.3850 • Email: jc@aviationsystems.com • www.aviationsystems.com

NOBLE ENVIRONMENTAL POWER
Noble Ball Hill Windpark Lighting Plan
08-N-0391.008

Turbine	Latitude (N)			Longitude (W)			Recommended
ID	Deg	Min	Sec	Deg	Min	Sec	Marking/Lighting
T1	42	24	41.33	79	10	20.95	SFRL
T2	42	24	35.17	79	9	59.03	NONE
T3	42	24	25.37	79	10	3.32	SFRL
T4	42	24	14.05	79	9	57.91	NONE
T5	42	23	58.88	79	10	5.15	SFRL
T6	42	23	47.92	79	10	0.94	NONE
T7	42	23	59.40	79	9	26.14	NONE
T8	42	23	46.37	79	9	26.71	SFRL
T9	42	23	52.15	79	9	0.87	SFRL
T11	42	23	25.61	79	9	14.84	SFRL
T13	42	23	16.01	79	9	6.29	NONE
T14	42	23	6.39	79	8	56.35	SFRL
T15	42	23	22.44	79	8	46.80	NONE
T16	42	23	13.54	79	8	38.58	NONE
T17	42	23	6.38	79	8	28.47	SFRL
T18	42	24	34.92	79	8	52.14	SFRL
T19	42	24	19.18	79	8	44.42	NONE
T20	42	24	11.43	79	8	31.39	SFRL
T21	42	24	0.93	79	8	25.00	NONE
T22	42	25	14.49	79	8	43.82	SFRL
T23	42	25	3.83	79	8	38.39	NONE
T24	42	24	51.84	79	8	33.15	SFRL
T25	42	24	34.72	79	8	19.80	NONE
T26	42	25	19.10	79	8	21.79	NONE
T27	42	25	8.01	79	8	12.94	SFRL
T29	42	24	44.03	79	7	55.27	SFRL
T30	42	24	29.38	79	7	35.46	NONE
T31	42	24	20.78	79	7	29.83	SFRL
T32	42	24	13.46	79	7	19.91	NONE
T33	42	24	9.31	79	7	7.70	NONE
T34	42	23	57.26	79	7	14.66	SFRL
T35	42	23	50.77	79	6	58.87	NONE
T36	42	23	41.32	79	6	49.26	SFRL
T38	42	23	39.38	79	6	11.38	SFRL
T39	42	23	49.64	79	6	15.32	NONE
T40	42	23	59.74	79	6	20.47	SFRL
T41	42	24	7.76	79	6	32.83	NONE
T42	42	24	17.16	79	6	41.00	SFRL
T43	42	24	27.67	79	6	45.24	NONE
T45	42	24	39.18	79	6	38.78	SFRL
T46	42	25	1.71	79	7	13.93	SFRL
T47	42	25	13.16	79	7	18.71	NONE
T48	42	25	16.85	79	7	35.13	SFRL
T50	42	25	29.77	79	7	45.70	NONE
T51	42	25	35.60	79	7	29.64	SFRL
T52	42	25	34.39	79	6	50.33	SFRL
T53	42	25	42.47	79	7	1.97	NONE
T55	42	25	49.81	79	6	34.32	SFRL
T56	42	26	16.57	79	6	40.15	SFRL
T57	42	26	24.49	79	6	55.21	NONE

NOBLE ENVIRONMENTAL POWER
Noble Ball Hill Windpark Lighting Plan
08-N-0391.008

Turbine	Latitude (N)			Longitude (W)			Recommended
ID	Deg	Min	Sec	Deg	Min	Sec	Marking/Lighting
T58	42	26	30.77	79	7	15.75	SFRL
T59	42	26	35.65	79	6	56.25	NONE
T60	42	26	34.78	79	6	38.34	SFRL
T61	42	26	54.63	79	6	17.63	SFRL
T62	42	27	0.93	79	6	42.47	NONE
T64	42	27	8.00	79	7	2.77	SFRL
T65	42	27	17.31	79	6	48.88	NONE
T66	42	27	22.17	79	6	30.62	SFRL
T67	42	26	48.19	79	7	13.60	SFRL
T68	42	23	19.75	79	7	54.24	SFRL

All Turbine Structures are White.
SFRL - Simultaneously Flashing Red Lights
NONE - Unlit, White Paint Only

O Local Laws and Ordinances

Villenova Wind Law

Local Law No. 1 of 2007

A LOCAL LAW GOVERNING WIND ENERGY FACILITIES IN THE TOWN OF VILLENOVA

Be it hereby enacted by the Town Board of the Town of Villenova as follows:

Section 1: Title

This Local Law shall be known as the "Wind Energy Facilities Law of the Town of Villenova."

Section 2: Section 401(C) of the Town of Villenova Zoning Law - Uses by Special Use Permit in the Agricultural - Residential (AR1) District, is amended to replace

Windmills - private in accordance with Section 617

to read
Wind Energy Facilities in accordance with Article VI-A

Section 3: Section 402(C) of the Town of Villenova Zoning Law - Uses by Special Use Permit in the Transition (T) District, is amended to replace

Windmills - private in accordance with Section 617

to read

Wind Energy Facilities in accordance with Article VI-A.

Section 4: Section 403(C) of the Town of Villenova Zoning Law - Uses by Special Use Permit in the Industrial Park (IP) District, is amended to replace

Windmills - private in accordance with Section 617

to read

Wind Energy Facilities in accordance with Article VI-A

Section 5: Sections 617.00 through and including Section 617.13 of the Town of Villenova Zoning Law are hereby repealed.

Section 6: Section 617, "Commercial Towers/Windmills" of the Town of Villenova Zoning Law is hereby amended as follows:

a. The Title of Section 617 shall be “Commercial Towers.”

b. The first sentence of Section 617 shall read in its entirety as follows “Commercial Towers in districts where allowed shall be subject to the following conditions:”

c. The first sentence of Section 617(A) shall read in its entirety as follows “Towers shall be removed from surrounding residential structures sufficiently so as to not cause a nuisance due to appearance or other factors.”

Section 7: Article VI-A is hereby added to the Town of Villenova Zoning Law to read in its entirety as follows:

Article VI-A

WIND ENERGY FACILITIES

§ 690.00. Purpose.

The Town Board of the Town of Villenova adopts this Article to promote the effective and efficient use of the Town’s wind energy resource through wind energy conversion systems (WECS), and to regulate the placement of such systems so that the public health, safety, and welfare will not be jeopardized.

§ 690.01. Authority.

A. The Town Board of the Town of Villenova adopts this Article under the authority granted by:

Article IX of the New York State Constitution, § 2(c)(6) and (10).

New York Statute of Local Governments, § 10 (1), (6), and (7).

New York Municipal Home Rule Law, § 10 (1)(i) and (ii) and § 10 (1)(a)(6), (11), (12), and (14).

The supersession authority of New York Municipal Home Rule Law, § 10 (2)(d)(3).

New York Town Law, Article 16 (Zoning).

New York Town Law § 130(1)(Building Code), (3)(Electrical Code), (5)(Fire Prevention), (7)(Use of streets and highways), (7-a)(Location of Driveways), (11)(Peace, good order and safety), (15)(Promotion of public welfare), (15-a)(Excavated Lands), (16)(Unsafe buildings), (19)(Trespass), and (25)(Building lines).

New York Town Law § 64(17-a)(protection of aesthetic interests) and (23)(General powers).

§ 690.02. Findings.

A. The Town Board of the Town of Villenova finds and declares that

1. Wind energy is an abundant, renewable, and nonpolluting energy resource of the Town and its conversion to electricity may reduce dependence on nonrenewable energy sources and decrease the air and water pollution that results from the use of conventional energy sources.

2. The generation of electricity from properly sited wind turbines, including small systems, can be cost effective, and in many cases existing power distribution systems can be used to transmit electricity from wind-generating stations to utilities or other users, or on-site consumption can be reduced.

3. Regulation of the siting and installation of wind turbines is necessary for the purpose of protecting the health, safety, and welfare of neighboring property owners and the general public.

4. Wind Energy Facilities represent significant potential aesthetic impacts because of their large size, lighting, and shadow flicker effects.

5. If not properly regulated, installation of Wind Energy Facilities can create drainage problems through erosion and lack of sediment control for facility sites and access roads, and harm farmlands through improper construction methods.

6. Wind Energy Facilities may present a risk to bird and bat populations if not properly sited.

7. If not properly sited, Wind Energy Facilities may present risks to the property values of adjoining property owners.

8. Wind Energy Facilities are significant sources of noise, which, if unregulated, can negatively impact adjoining properties.

9. Construction of Wind Energy Facilities can create traffic problems and damage local roads.

10. Wind Energy Facilities can cause electromagnetic interference issues with various types of communications.

§ 690.03. Definitions.

A. As used in this Article, the following terms shall have the meanings indicated:

1. AGRICULTURAL OR FARM OPERATIONS — means the land and on-farm buildings, equipment, manure processing and handling facilities, and practices which contribute to the

production, preparation, and marketing of crops, livestock, and livestock products as a commercial enterprise, including a commercial horse boarding operation," as defined in New York Agriculture and Markets Law § 301 and "timber processing," as defined in subdivision fourteen of New York Agriculture and Markets Law § 301. Such farm operation may consist of one or more parcels of owned or rented land, which parcels may be contiguous or noncontiguous to each other.

2. EAF — Environmental Assessment Form used in the implementation of the SEQRA as that term is defined in Part 617 of Title 6 of the New York Codes, Rules and Regulations.

3. RESIDENCE — means any dwelling suitable for habitation existing in the Town of Villenova on the date SEQRA for the specific application is completed, including seasonal homes, hotels, hospitals, motels, dormitories, sanitariums, nursing homes, senior housing, schools or other buildings used for educational purposes. A residence may be part of a multi-dwelling or multipurpose building, but shall not include correctional institutions or a hunting cabin.

4. SEQRA — the New York State Environmental Quality Review Act and its implementing regulations in Title 6 of the New York Codes, Rules and Regulations, Part 617.

5. SOUND PRESSURE LEVEL — means the level which is equaled or exceeded a stated percentage of time. An L_{10} - 50 dBA indicates that in any hour of the day 50 dBA can be equaled or exceeded only 10% of the time, or for 6 minutes. The measurement of the sound pressure level can be done according to the International Standard for Acoustic Noise Measurement Techniques for Wind Generators (IEC 61400-11), or other accepted procedures.

6. SMALL WIND ENERGY CONVERSION SYSTEM ("Small WECS") — A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than 100 kW and which is intended to primarily reduce on-Site consumption of utility power.

7. SITE — The parcel(s) of land where the Wind Energy Facility is to be placed. The Site could be publicly or privately owned by an individual or a group of individuals controlling single or adjacent properties. Where multiple lots are in joint ownership, the combined lots shall be considered as one for purposes of applying setback requirements. Any property which has a Wind Energy Facility or has entered an agreement for said Facility or a setback agreement and received the required variance shall not be considered off-site.

8. TOTAL HEIGHT — The height of the tower and the furthest vertical extension of the WECS.

9. WIND ENERGY CONVERSION SYSTEM ("WECS") — A machine that converts the kinetic energy in the wind into a usable form (commonly known as a "wind turbine" or "windmill").

10. WIND ENERGY FACILITY — Any Wind Energy Conversion System, including Small Wind Energy Conversion Systems, or Wind Measurement Tower, including all related infrastructure, electrical lines and substations, access roads, and accessory structures.

11. WIND MEASUREMENT TOWER — a tower used for the measurement of meteorological data such as temperature, wind speed, and wind direction.

12. WIND OVERLAY DISTRICT — a district which encompasses part or parts of one or more underlying districts and that establishes requirements for Wind Energy Facilities.

§ 690.04. Permits and Rezoning Required.

A. No Wind Energy Facility shall be constructed, reconstructed, modified, or operated in the Town of Villenova except in compliance with this Article.

B. No WECS including Small WECS shall be constructed, reconstructed, modified, or operated in the Town of Villenova except in a Wind Overlay District, pursuant to an application for rezoning and for special use permit approved pursuant to this Article.

C. No Wind Measurement Tower shall be constructed, reconstructed, modified, or operated in the Town of Villenova except pursuant to a Special Use Permit issued pursuant to this Article, except as allowed by subdivision H of this Section.

D. Notwithstanding any other provision of this Zoning Local Law, Special Use Permits for Wind Energy Facilities shall be issued by the Town Board.

E. Exemptions. No permit or other approval shall be required under this Article for WECS utilized solely for agricultural operations in a state or county agricultural district, as long as the facility is set back at least one and a half times its Total Height from a property line, and does not exceed 120 feet in height. Towers over 120 feet in Total Height utilized solely for agricultural operations in a state or county agricultural district shall apply for a special use permit in accordance with this Local Law, but shall not require a height variance. Prior to the construction of a WECS under this exemption, the property owner or a designated agent shall submit a sketch plan or building permit application to the Town to demonstrate compliance with the setback requirements.

F. This Article shall apply to all areas of the Town of Villenova.

G. Transfer. No transfer of any Wind Energy Facility or Special Use Permit, nor sale of the entity owning such facility including the sale of more than 30% of the stock of such entity (not counting sales of shares on a public exchange), will occur without prior approval of the Town, which approval shall be granted upon written acceptance of the transferee of the obligations of the transferor under this Article, and the transferee's demonstration, in the sole discretion of the Town Board, that it can meet the technical and financial obligations of the transferor. No transfer shall eliminate the liability of the transferor nor of any other party under this Article

unless the entire interest of the transferor in all facilities in the Town is transferred and there no outstanding obligations or violations.

H. Notwithstanding the requirements of this Article, replacement in kind or modification of a Wind Energy Facility may occur without Town Board approval when (1) there will be no increase in Total Height; (2) no change in the location of the WECS; (3) no additional lighting or change in facility color; and (4) no increase in noise produced by the WECS.

§ 690.05. Applicability.

A. The requirements of this Article shall apply to all Wind Energy Facilities proposed, operated, modified, or constructed after the effective date of this Article.

B. Wind Energy Facilities for which a required permit has been properly issued and upon which construction has commenced prior to the effective date of this Article, shall not be required to meet the requirements of this Article; provided, however, that

1. Any such preexisting Wind Energy Facility which does not provide energy for a continuous period of twelve (12) months shall meet the requirements of this Article prior to recommencing production of energy.

2. No modification or alteration to an existing Wind Energy Facility shall be allowed without full compliance with this Article.

3. Any Wind Measurement Tower existing on the effective date of this Article shall be removed no later than twenty-four (24) months after said effective date, unless a Special Use Permit for said Wind Energy Facility is obtained.

C. Wind Energy Facilities may be either principal or accessory uses. A different existing use or an existing structure on the same Site shall not preclude the installation of a Wind Energy Facility or a part of such facility on such Site. Wind Energy Facilities constructed and installed in accordance with this Article shall not be deemed expansions of a nonconforming use or structure.

§ 690.06. Wind Overlay District Rules.

A. Wind Overlay District may be created in the Agricultural-Residential (AR1) District, the T-Transitional Use District, and the Industrial Park (IP) District only.

B. Initial requests for Wind Overlay Districts shall be submitted with applications for WECS Special Use Permits. No Wind Overlay District may be initially created without specific requests for WECSs.

C. Once a Wind Overlay District has been created, new WECSs or accessory structures or facilities may be added in that District by grant of a Special Use Permit pursuant to the requirements of this Article.

§ 690.07. Applications for Wind Energy Conversion Systems and Wind Overlay District.

A. A joint application for creation of a Wind Overlay District and Special Use Permit for individual WECS shall include the following:

1. Name, address, and telephone number of the applicant. If the applicant is represented by an agent, the application shall include the name, address, and telephone number of the agent as well as an original signature of the applicant authorizing the representation.

2. Name and address of the property owner. If the property owner is not the applicant, the application shall include a letter or other written permission signed by the property owner (i) confirming that the property owner is familiar with the proposed applications and (ii) authorizing the submission of the application.

3. Address, or other property identification, of each proposed tower location, including Tax Map section, block, and lot number.

4. A description of the project, including the number and maximum rated capacity of each WECS.

5. A plot plan prepared by a licensed surveyor or engineer drawn in sufficient detail to clearly describe the following.

(a) Property lines and physical dimensions of the Site.

(b) Location, approximate dimensions, and types of major existing structures, including all residences, and uses on Site, public roads, and adjoining properties within five hundred (500) feet of the boundaries of the proposed Wind Overlay District.

(c) Location and elevation of each proposed WECS.

(d) Location of all above ground utility lines on the Site or within one radius of the Total Height of the WECS, transformers, power lines, interconnection point with transmission lines, and other ancillary facilities or structures.

(e) Location and size of structures above 35 feet within a five-hundred-foot radius of the proposed WECS. For purposes of this requirement, electrical transmission and distribution lines, antennas, and slender or open lattice towers are not considered structures.

(f) The zoning designation of the subject and adjacent properties as set forth on the official Town Zoning Map.

(g) Proposed boundaries of the Wind Overlay District.

(h) To demonstrate compliance with the setback requirements of this Article, circles drawn around each proposed tower location equal to:

(i) One and a half times the tower height radius.

(ii) Five-hundred foot radius.

(iii) One-thousand two-hundred foot radius.

(i) Location of residential structures within one thousand two hundred feet of each proposed tower. The distance from the center of the tower to any off-site residence within one thousand feet shall be noted.

(j) All proposed facilities, including access roads, electrical lines, substations, storage or maintenance units, and fencing.

6. Vertical drawing of the WECS showing Total Height, turbine dimensions, tower and turbine colors, ladders, distance between ground and lowest point of any blade, location of climbing pegs, and access doors. One drawing may be submitted for each WECS of the same type and Total Height.

7. Landscaping Plan depicting vegetation describing the area to be cleared and the specimens proposed to be added, identified by species and size of specimen at installation and their locations.

8. Lighting Plan showing any FAA-required lighting and other proposed lighting. The application should include a copy of the determination by the Federal Aviation Administration to establish required markings and/or lights for the structure, but if such determination is not available at the time of the application, no building permit for any lighted facility may be issued until such determination is submitted.

9. List of property owners, with their mailing addresses, within 500 feet of the boundaries of the proposed Wind Overlay District. The applicant may delay submitting this list until the Town Board calls for a public hearing on the application.

10. Decommissioning Plan: The applicant shall submit a decommissioning plan, which shall include: 1) the anticipated life of the WECS; 2) the estimated decommissioning costs in current dollars; 3) how said estimate was determined; 4) the method of ensuring that funds will be available for decommissioning and restoration; 5) the method, such by annual re-estimate by a licensed engineer, that the decommissioning cost will be kept current; and 6) the

manner in which the WECS will be decommissioned and the Site restored, which shall include removal of all structures and debris to a depth of three feet, restoration of the soil, and restoration of vegetation (consistent and compatible with surrounding vegetation), less any fencing or residual minor improvements requested by the landowner. The Plan shall include the Decommissioning Bond required by this Article.

11. Complaint Resolution: The application will include a complaint resolution process to address complaints from nearby residents. The process may use an independent mediator or arbitrator and include a time limit for acting on a complaint.

12. An application shall include information relating to the construction/installation of the wind energy conversion facility as follows:

(a) A construction schedule describing commencement and completion dates; and

(b) A description of the routes to be used by construction and delivery vehicles, the gross weights and heights of those loaded vehicles.

13. Completed Part 1 of the Full EAF.

14. Applications for Special Use Permits for Wind Measurement Towers subject to this Article may be jointly submitted with the WECS.

15. For each proposed WECS, include make, model, picture, and manufacturer's specifications, including noise decibels data. Include Manufacturers' Material Safety Data Sheet documentation for the type and quantity of all materials used in the operation of all equipment including, but not limited to, all lubricants, and coolants.

16. If the applicant agrees in writing in the application that the proposed WECS may have a significant adverse impact on the environment, the Town Board shall issue a positive declaration of environmental significance.

17. If a positive declaration of environmental significance is determined by the SEQRA lead agency, the following information shall be included in the Draft Environmental Impact Statement ("DEIS") prepared for a Wind Energy Facility. Otherwise, the following studies shall be submitted with the application:

(a) Shadow Flicker: The applicant shall conduct a study on potential shadow flicker. The study shall identify locations where shadow flicker may be caused by the WECSs and the expected durations of the flicker at these locations. The study shall identify areas where shadow flicker may interfere with residences and describe measures that shall be taken to eliminate or mitigate the problems.

(b) Visual Impact: Applications shall include a visual impact study of the proposed WECS as installed, which may include a computerized photographic simulation, demonstrating any visual impacts from strategic vantage points. Color photographs of the proposed Site from at least two locations accurately depicting the existing conditions shall be included. The visual analysis shall also indicate the color treatment of the system's components and any visual screening incorporated into the project that is intended to lessen the system's visual prominence.

(c) A fire protection and emergency response plan, created in consultation with the fire department(s) having jurisdiction over the proposed Wind Overlay District.

(d) Noise Analysis: a noise analysis by a competent acoustical consultant documenting the noise levels associated with the proposed WECS. The study shall document noise levels at property lines and at the nearest residence not on the Site (if access to the nearest residence is not available, the Town Board may modify this requirement). The noise analysis shall provide pre-existing ambient noise levels and include low frequency noise.

(e) Property value analysis prepared by a licensed appraiser in accordance with industry standards, regarding the potential impact of values of properties adjoining WECS Sites, including properties across public roads from the Site.

(f) An assessment of potential electromagnetic interference with microwave, radio, television, personal communication systems, and other wireless communication.

18. Tower design information sufficient to demonstrate compliance with wind-loading requirements.

19. Analysis of potential ice-throwing and damage from blade throw impacts.

20. A statement, signed under penalty of perjury, that the information contained in the application is true and accurate.

§ 690.08. Application Review Process.

A. Applicants may request a pre-application meeting with the Town Board, or with any consultants retained by the Town Board for application review

B. Six copies of the application shall be submitted to the Town Clerk. Payment of all application fees shall be made at the time of application submission. If any variances are requested, variance application fees shall be paid at the time of the receipt of the application.

C. Town staff or Town-designated consultants shall, within 30 days of receipt, or such longer time if agreed to by the applicant, determine if all information required under this Article is included in the application.

D. If the application is deemed incomplete, the Town Board or its designated reviewer shall provide the applicant with a written statement listing the missing information. No refund of application fees shall be made, but no additional fees shall be required upon submittal of the additional information unless the number of WECSs proposed is increased.

E. Upon submission of a complete application, including the grant of any application waiver by the Town Board, the Town Clerk shall transmit the application to the Town Board. The applicant shall post the completed application and any accepted environmental impact statements on the Internet. The application shall be referred to the Planning Board in accordance with this Local Law.

F. The Town Board shall hold at least one public hearing on the application. Notice shall be given by first class mail to property owners within 500 feet of the boundaries of the proposed Wind Overlay District, and published in the Town's official newspaper, no less than ten nor more than twenty days before any hearing, but, where any hearing is adjourned by the Town Board to hear additional comments, no further publication or mailing shall be required. The applicant shall prepare and mail the Notice of Public Hearing prepared by the Town, and shall submit an affidavit of service. The assessment roll of the Town shall be used to determine mailing addresses.

G. The public hearing may be combined with public hearings on any Environmental Impact Statement or requested variances.

H. Notice of the project shall also be given, when applicable, to (1) the Chautauqua County Planning Board, if required by General Municipal Law §§ 239-l and 239-m, and (2) to adjoining Towns under Town Law § 264.

I. SEQRA Review. Applications for WECS are deemed Type I projects under SEQRA. The Town shall conduct its SEQRA review in conjunction with other agencies, and the record of review by said agencies shall be part of the record of the Town's proceedings. The Town may require an escrow agreement for the engineering and legal review of the applications and any environmental impact statements before commencing its review. At the completion of the SEQRA review process, if a positive declaration of environmental significance has been issued and an environmental impact statement prepared, the Town shall issue a Statement of Findings, which Statement may also serve as the Town's decision on the applications.

J. Upon receipt of the report of the recommendation of the County Planning Board (where applicable), and the report of the recommendation of the Town Planning Board (where applicable), the holding of the public hearing, and the completion of the SEQRA process, the Town Board may approve, approve with conditions, or deny the applications, in accordance with the standards in this Article.

§ 690.09. Standards for WECS.

A. The following standards shall apply to all WECS and related infrastructure, unless specifically waived by the Town Board as part of a permit.

1. All power transmission lines from the tower to any building or other structure shall be located underground to the maximum extent practicable.

2. No television, radio, or other communication antennas may be affixed or otherwise made part of any WECS, except pursuant to the telecommunications provisions of the Town Zoning Code. Applications may be jointly submitted for WECS and telecommunications facilities.

3. No advertising signs are allowed on any part of the Wind Energy Facility, including fencing and support structures.

4. Lighting of tower. No tower shall be lit except to comply with FAA requirements. Minimum security lighting for ground level facilities shall be allowed as approved on the Site plan. Security lighting shall be designed to minimize light pollution, including the use of light hoods, low glare fixtures, and directing lights at the ground.

5. All applicants shall use measures to reduce the visual impact of WECSs to the extent possible. WECSs shall use tubular towers. All structures in a project shall be finished in a single, non-reflective matte finished color or a camouflage scheme. Individual WECSs within a Wind Overlay District shall be constructed using wind turbines whose appearance, with respect to one another, is similar within and throughout the District, to provide reasonable uniformity in overall size, geometry, and rotational speeds. No lettering, company insignia, advertising, or graphics shall be on any part of the tower, hub, or blades.

6. The use of guy wires is prohibited.

7. No WECS shall be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antenna for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception. No WECS shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the link's operation. If it is determined that a WECS is causing electromagnetic interference, the operator shall take the necessary corrective action to eliminate this interference including relocation or removal of the facilities, or resolution of the issue with the impacted parties. Failure to remedy electromagnetic interference is grounds for revocation of the Special Use Permit for the specific WECS or WECSs causing the interference.

8. All solid waste and hazardous waste and construction debris shall be removed from the Site and managed in a manner consistent with all appropriate rules and regulations.

9. WECSs shall be designed to minimize the impacts of land clearing and the loss of open space areas. Land protected by conservation easements shall be avoided when feasible. The use of previously developed areas will be given priority wherever possible.

10. WECSs shall be located in a manner that minimizes significant negative impacts on rare animal species in the vicinity, particularly bird and bat species.

11. WECS and related infrastructure shall be located in a manner consistent with all applicable state and Federal wetlands laws and regulations.

12. Storm-water run-off and erosion control shall be managed in a manner consistent with all applicable state and Federal laws and regulations.

13. The maximum Total Height of any WECS shall be 420 feet.

14. Construction of the WECS shall be limited to the hours of 7 a.m. to 8 p.m. except for certain activities that require cooler temperatures than possible during the day, subject to approval from the Town.

15. Substations required to serve WECS are an Essential Public Service under this Zoning Code. Substations shall be screened from public view to the extent possible.

16. The Town of Villenova shall be named as an additional insured under the general liability policy of the applicant, the amount of which insurance shall be no less than an amount to be determined by the Town Board given the nature and scope of the project proposed by the applicant.

17. Any construction or ground disturbance involving agricultural land shall be done in according to the NYS Department of Agriculture and Markets' publication titled Guidelines for Agricultural Mitigation for Wind Power Projects.

§ 690.10. Required Safety Measures.

A. Each WECS shall be equipped with both manual and automatic controls to limit the rotational speed of the rotor blade so it does not exceed the design limits of the rotor.

B. If the property owner submits a written request that fencing be required, a six-foot-high fence with a locking portal shall be required to enclose each tower or group of towers. The color and type of fencing for each WECS installation shall be determined on the basis of individual applications as safety needs dictate.

C. Appropriate warning signs shall be posted. At least one sign shall be posted at the base of the tower warning of electrical shock or high voltage. A sign shall be posted on the entry area of fence around each tower or group of towers and any building (or on the tower or building if there is no fence), containing emergency contact information, including a local telephone number

with 24 hour, 7 day a week coverage. The Town Board may require additional signs based on safety needs.

D. No climbing pegs or tower ladders shall be located closer than twelve (12) feet to the ground level at the base of the structure for freestanding single pole.

E. The minimum distance between the ground and any part of the rotor or blade system shall be twenty (20) feet.

F. WECSs shall be designed to prevent unauthorized external access to electrical and mechanical components and shall have access doors that are kept securely locked.

G. Accurate maps of the underground facilities shall be filed with the town and with "Dig Safely New York (1-800-962-7962)" or its successor.

§ 690.11. Traffic Routes.

A. Construction of WECS poses potential risks because of the large size construction vehicles and their impact on traffic safety and their physical impact on local roads. Construction and delivery vehicles for WECS and/or associated facilities shall use traffic routes established as part of the application review process. Factors in establishing such corridors shall include (1) minimizing traffic impacts from construction and delivery vehicles; (2) minimizing WECS related traffic during times of school bus activity; (3) minimizing wear and tear on local roads; and (4) minimizing impacts on local business operations. Permit conditions may require remediation during construction, limit WECS-related traffic to specified routes, and include a plan for disseminating traffic route information to the public, and all applicable state, county, and municipal highway authorities and superintendents whose roads are included in the WECS traffic routes plan. Notification to all applicable highway authorities and superintendents will include the number and type of vehicles and their size, their maximum gross weight, the number of round trips, and the dates and time periods of expected use of designated traffic routes.

B. The applicant is responsible for remediation of damaged roads upon completion of the installation or maintenance of a WECS. A public improvement bond shall be posted prior to the issuance of any building permit in an amount, determined by the Town Board, sufficient to compensate the Town for any damage to local roads.

C. If the applicant uses any seasonal use highway in the off-season, it shall be solely responsible for the maintenance of said highway including but not limited to snow plowing. No act of maintenance on a seasonal use highway by an applicant shall be considered as Town maintenance of that highway for purposes of determining the seasonal use status of the highway.

§ 690.12. Setbacks for Wind Energy Conversion Systems.

A. The statistical sound pressure level generated by a WECS shall not exceed L_{10} - 50 dBA measured at the closest exterior wall of any residence existing at the time of completing the

SEQRA review of the application. If the ambient sound pressure level exceeds 50 dBA, the standard shall be ambient dBA plus 5 dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement.

B. In the event audible noise due to WECS operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in subparagraph 1) of this subsection shall be reduced by five (5) dBA. A pure tone is defined to exist if the one-third (1/3) octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two (2) contiguous one third (1/3) octave bands by five (5) dBA for center frequencies of five hundred (500) Hz and above, by eight (8) dBA for center frequencies between one hundred and sixty (160) Hz and four hundred (400) Hz, or by fifteen (15) dBA for center frequencies less than or equal to one hundred and twenty-five (125) Hz.

C. In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is exceeded for more than five (5) minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project Site are sufficient to allow Wind Turbine operation, provided that the wind velocity does not exceed thirty (30) mph at the ambient noise measurement location.

D. Any noise level falling between two whole decibels shall be the lower of the two.

E. Each WECS shall be setback from Site boundaries, measured from the center of the WECS, a minimum distance of:

1. 500 feet from the nearest Site boundary property line, except the setback shall be 500 feet where the boundary is with state, county, town, or village-owned property.

2. 500 feet from the nearest public road.

3. 1,000 feet from the nearest off-Site residence existing at the time of application, measured from the exterior of such residence.

4. 100 feet from state-identified wetlands. This distance may be adjusted to be greater or lesser at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence the flight patterns of resident birds.

5. 500 feet from gas wells, unless waived in writing by the property owner.

F. Other Wind Energy Facility structures and improvements shall comply with the underlying zoning district regulations.

§ 690.13. Noise and Setback Easements; Variances

A. In the event the noise levels resulting from a WECS exceed the criteria established in this Article, or a setback requirement is not met, a waiver be granted from such requirement by the Town Board in the following circumstances:

1. Written consent from the affected property owners has been obtained stating that they are aware of the WECS and the noise and/or setback limitations imposed by this Article, and that they wish to be part of the Site as defined herein, and that consent is granted to (1) allow noise levels to exceed the maximum limits otherwise allowed or (2) allow setbacks less than required; and

2. In order to advise all subsequent owners of the burdened property, the consent, in the form required for an easement, shall be recorded in the County Clerk's Office describing the benefited and burdened properties. Such easements shall be permanent and may not be revoked without the consent of the Town Board, which consent shall be granted upon either the completion of the decommissioning of the benefited WECS in accordance with this Article, or the acquisition of the burdened parcel by the owner of the benefited parcel or the WECS.

3. In any case where written consent is not obtained, a variance from the Zoning Board of Appeals shall be required.

§ 690.14. Creation of Wind Overlay Districts and Issuance of Special Use Permits.

A. Upon completion of the review process, the Town Board shall, upon consideration of the standards in this Article and the record of the SEQRA review, issue a written decision setting forth the reasons for approval, conditions of approval, or disapproval.

B. If approved, the Town Board will direct the Town Clerk to modify the Official Map to reflect the creation of the Wind Overlay Districts, and authorize Town staff to issue a Special Use Permit for each WECSs upon satisfaction of all conditions for said Permit, and direct the building inspector to issue a building permit, upon compliance with the Uniform Fire Prevention and Building Code and the other conditions of this Article.

C. The decision of the Town Board shall be filed within five days in the office of the Town Clerk and a copy mailed to the applicant by first class mail.

D. If any approved WECS is not substantially commenced within two years of issuance of the permit, the special use permit shall expire.

§ 690.15 Abatement.

A. If any WECS remains non-functional or inoperative for a continuous period of 1 year, the applicant agrees that, without any further action by the Town Board, it shall remove said system at its own expense. Removal of the system shall include at least the entire above ground structure, including transmission equipment and fencing, from the property. This provision shall not apply if the applicant demonstrates to the Town that it has been making good faith efforts to restore the WECS to an operable condition, but nothing in this provision shall limit the Town's ability to order a remedial action plan after public hearing.

B. Non-function or lack of operation may be proven by reports to the Public Service Commission, NYSERDA, or by lack of income generation. The applicant shall make available (subject to a non-disclosure agreement) to the Town Board all reports to and from the purchaser of energy from individual Wind Energy Conversion Systems, if requested necessary to prove the WECS is functioning, which reports may be redacted as necessary to protect proprietary information.

C. Decommissioning Bond or Fund. The applicant, or successors, shall continuously maintain a fund or bond payable to the Town for the removal of non-functional towers and appurtenant facilities in an amount to be determined by the Town for the period of the life of the facility. This fund may consist of a letter of credit from a State of New York-licensed financial institution. All costs of the financial security shall be borne by the applicant.

§ 690.16. Limitations on Approvals; Easements on Town Property.

A. Nothing in this Article shall be deemed to give any applicant the right to cut down surrounding trees and vegetation on any property to reduce turbulence and increase wind flow to the Wind Energy Facility. Nothing in this Article shall be deemed a guarantee against any future construction or Town approvals of future construction that may in any way impact the wind flow to any Wind Energy Facility. It shall be the sole responsibility of the Facility operator or owner to acquire any necessary wind flow or turbulence easements, or rights to remove vegetation.

B. Pursuant to the powers granted to the Town to manage its own property, the Town may enter into noise, setback, or wind flow easements on such terms as the Town Board deems appropriate, as long as said agreements are not otherwise prohibited by state law or this Article.

§ 690.17. Permit Revocation.

A. Testing fund. A Special Use Permit shall contain a requirement that the applicant fund periodic noise testing by a qualified independent third-party acoustical measurement consultant, which may be required as often as every two years, or more frequently upon request of the Town Board in response to complaints by neighbors. The scope of the noise testing shall be to demonstrate compliance with the terms and conditions of the Special Use Permit and this Article and shall also include an evaluation of any complaints received by the Town. The applicant shall have 90 days after written notice from the Town Board, to cure any deficiency. An extension of the 90 day period may be considered by the Town Board, but the total period may not exceed 180 days.

B. Operation. A WECS shall be maintained in operational condition at all times, subject to reasonable maintenance and repair outages. Operational condition includes meeting all noise requirements and other permit conditions. Should a WECS become inoperable, or should any part of the WECS be damaged, or should a WECS violate a permit condition, the owner or operator shall remedy the situation within 90 days after written notice from the Town Board. The applicant shall have 90 days after written notice from the Town Board, to cure any deficiency. An extension of the 90 day period may be considered by the Town Board, but the total period may not exceed 180 days.

C. Notwithstanding any other abatement provision under this Article, and consistent with § 690.15(A) and §690.17(B), if the WECS is not repaired or made operational or brought into permit compliance after said notice, the Town may, after a public meeting at which the operator or owner shall be given opportunity to be heard and present evidence, including a plan to come into compliance, (1) order either remedial action within a particular timeframe, or (2) order revocation of the Special Use Permit for the WECS and require the removal of the WECS within 90 days. If the WECS is not removed, the Town Board shall have the right to use the security posted as part of the Decommission Plan to remove the WECS.

Wind Measurement Towers

§ 690.20. Wind Site Assessment.

The Town Board acknowledges that prior to construction of a WECS, a wind Site assessment is conducted to determine the wind speeds and the feasibility of using particular Sites. Installation of Wind Measurement Towers, also known as anemometer ("Met") towers, shall be permitted as Special Use in the Agricultural-Residential (AR1) Use District and the Transitional Use District.

§ 690.21. Applications for Wind Measurement Towers.

A. An application for a Wind Measurement Tower shall include

1. Name, address, and telephone number of the applicant. If the applicant is represented by an agent, the application shall include the name, address, and telephone number of the agent as well as an original signature of the applicant authorizing the representation.

2. Name, address, and telephone number of the property owner. If the property owner is not the applicant, the application shall include a letter or other written permission signed by the property owner (i) confirming that the property owner is familiar with the proposed applications and (ii) authorizing the submission of the application.

3. Address of each proposed tower Site, including Tax Map section, block, and lot number.

4. Site plan

5. Decommissioning Plan, based on the criteria in this Article for WECS, including a security bond or cash for removal.

§ 690.22. Standards for Wind Measurement Towers.

A. The distance between a Wind Measurement Tower and the property line shall be at least the Total Height of the tower. Sites can include more than one piece of property and the requirement shall apply to the combined properties. Exceptions for neighboring property are also allowed with the consent of those property owners.

B. Special Use permits for Wind Measurement Towers may be issued by the Town Board for a period of up to two years. Permits may be renewed if the Facility is in compliance with the conditions of the Special Use Permit.

Small Wind Energy Conversion Systems

§ 690.30. Purpose and Intent.

The purpose of this Article is to provide standards for small wind energy conversion systems designed for on-site home, farm, and small commercial use, and that are primarily used to reduce on-site consumption of utility power. The intent of this Article is to encourage the development of small wind energy systems and to protect the public health, safety, and community welfare.

§ 690.31. Permitted Areas.

Small Wind energy systems may be permitted in any zoning district upon issuance of a Special Use Permit.

§ 690.32. Applications.

A. Applications for Small WECS special use permits shall include:

1. Name, address, and telephone number of the applicant. If the applicant will be represented by an agent, the name, address, and telephone number of the agent as well as an original signature of the applicant authorizing the agent to represent the applicant.

2. Name and address of the property owner. If the property owner is not the applicant, the application shall include a letter or other written permission signed by the property owner (i) confirming that the property owner is familiar with the proposed applications and (ii) authorizing the submission of the application.

3. Address of each proposed tower Site, including Tax Map section, block, and lot number.

4. Evidence that the proposed tower height does not exceed the height recommended by the manufacturer or distributor of the system.

5. A line drawing of the electrical components of the system in sufficient detail to allow for a determination that the manner of installation conforms to the Electric Code**.**

6. Sufficient information demonstrating that the system will be used primarily to reduce on-site consumption of electricity.

7. Written evidence that the electric utility service provider that serves the proposed Site has been informed of the applicant's intent to install an interconnected customer-owned electricity generator, unless the applicant does not plan, and so states in the application, to connect the system to the electricity grid.

8. A visual analysis of the Small WECS as installed, which may include a computerized photographic simulation, demonstrating the visual impacts from nearby strategic vantage points. The visual analysis shall also indicate the color treatment of the system's components and any visual screening incorporated into the project that is intended to lessen the system's visual prominence.

§ 690.33. Development Standards.

All small wind energy systems shall comply with the following standards. Additionally, such systems shall also comply with all the requirements established by other sections of this Article that are not in conflict with the requirements contained in this section.

1. A system shall be located on a lot a minimum of one acre in size, however, this requirement can be met by multiple owners submitting a joint application.

2. Only one small wind energy system tower per legal lot shall be allowed, unless there are multiple applicants, in which their joint lots shall be treated as one lot for purposes of this Article.

3. Small Wind energy systems may be used primarily to reduce the on-Site consumption of electricity.

4. Tower heights may be allowed as follows:

(a) 65 feet or less on parcels between one and five acres.
(b) 120 feet or less on parcels of five or more acres.
(c) The allowed height shall be reduced if necessary to comply with all applicable Federal Aviation Requirements, including Subpart B (commencing with Section

77.11) of Part 77 of Title 14 of the Code of Federal Regulations regarding installations close to airports.

5. The maximum turbine power output is limited to 100 kW.

6. The system's tower and blades shall be painted a non-reflective, unobtrusive color that blends the system and its components into the surrounding landscape to the greatest extent possible and incorporate non-reflective surfaces to minimize any visual disruption.

7. The system shall be designed and located in such a manner to minimize adverse visual impacts from public viewing areas (e.g., public parks, roads, trails). To the greatest extent feasible a small wind energy system:

(a) Shall not project above the top of ridgelines.

(b) If visible from public viewing areas, shall use natural landforms and existing vegetation for screening.

(c) Shall be screened to the maximum extent feasible by natural vegetation or other means to minimize potentially significant adverse visual impacts on neighboring residential areas.

8. Exterior lighting on any structure associated with the system shall not be allowed except that which is specifically required by the Federal Aviation Administration.

9. All on-site electrical wires associated with the system shall be installed underground except for "tie- ins" to a public utility company and public utility company transmission poles, towers and lines. This standard may be modified by the decision-maker if the project terrain is determined to be unsuitable due to reasons of excessive grading, biological impacts, or similar factors.

10. The system shall be operated such that no disruptive electromagnetic interference is caused. If it has been demonstrated that a system is causing harmful interference, the system operator shall promptly mitigate the harmful interference or cease operation of the system.

11. At least one sign shall be posted on the tower at a height of five feet warning of electrical shock or high voltage and harm from revolving machinery. No brand names, logo, or advertising shall be placed or painted on the tower, rotor, generator, or tail vane where it would be visible from the ground, except that a system or tower's manufacturer's logo may be displayed on a system generator housing in an unobtrusive manner

12. Towers shall be constructed to provide one of the following means of access control, or other appropriate method of access:

(a) Tower-climbing apparatus located no closer than 12 feet from the ground.

(b) A locked anti-climb device installed on the tower.

(c) A locked, protective fence at least six feet in height that encloses the tower.

13. Anchor points for any guy wires for a system tower shall be located within the property that the system is located on and not on or across any above-ground electric transmission or distribution lines. The point of attachment for the guy wires shall be enclosed by a fence six feet high or sheathed in bright orange or yellow covering from three to eight feet above the ground.

14. Construction of on-site access roadways shall be minimized. Temporary access roads utilized for initial installation shall be re-graded and re-vegetated to the pre-existing natural condition after completion of installation.

15. To prevent harmful wind turbulence from existing structures, the minimum height of the lowest part of any horizontal axis wind turbine blade shall be at least 30 feet above the highest structure or tree within a 250 foot radius. Modification of this standard may be made when the applicant demonstrates that a lower height will not jeopardize the safety of the wind turbine structure.

16. All small wind energy system tower structures shall be designed and constructed to be in compliance with pertinent provisions of the Uniform Building Code and National Electric Code.

17. All small wind energy systems shall be equipped with manual and automatic over-speed controls. The conformance of rotor and over-speed control design and fabrication with good engineering practices shall be certified by the manufacturer.

§ 690.34. Standards.

A Small Wind Energy System shall comply with the following standards:

1. Setback requirements. A Small WECS shall not be located closer to a property line than one and a half times the Total Height of the facility.

2. Noise. Except during short-term events including utility outages and severe wind storms, a Small WECS shall be designed, installed, and operated so that noise generated by the system shall not exceed the 50 decibels (dBA), as measured at the closest neighboring inhabited dwelling.

§ 690.35. Abandonment of Use.

A. Small WECS which is not used for twelve (12) successive months shall be deemed abandoned and shall be dismantled and removed from the property at the expense of the property owner. Failure to abide by and faithfully comply with this section or with any and all conditions that may be attached to the granting of any building permit shall constitute grounds for the revocation of the permit by the Town.

B. All Small WECS shall be maintained in good condition and in accordance with all requirements of this section.

Miscellaneous

§ 690.40. Fees.

A. There shall be non-refundable Application fees as follows:

1. Wind Overlay Zone rezoning: $500 per zone.

2. WECS Special Use Permit: $50 per megawatt of rated maximum capacity.

3. Wind Measurement Towers: $20 per vertical foot per tower.

4. Wind Measurement Tower Special Use Permit renewals: $200 per Wind Measurement Tower.

5. The cost of all legal notices and mailings shall be assessed to the applicant.

B. Building Permits.

1. The Town believes the review of building and electrical permits for Wind Energy Facilities requires specific expertise for those facilities. Accordingly, the permit fees for such facilities shall be increased by administrative costs which shall be $100 per permit request, plus the amount charged to the Town by the outside consultant hired by the Town to review the plans and inspect the work. In the alternative, the Town and the applicant may enter into an agreement for an inspection and/or certification procedure for these unique facilities. In such case, the Town and the applicant will agree to a fee arrangement and escrow agreement to pay for the costs of the review of the plans or certifications, or to conduct inspections as agreed by the parties.

2. The applicant shall, prior to the receipt of a building permit, demonstrate that the proposed facility meets the system reliability requirements of the New York Independent System Operator, or provide proof that it has executed an Interconnection Agreement with the New York Independent System Operator and/or the applicable Transmission Owner.

C. Nothing in this Article shall be read as limiting the ability of the Town to enter into Host Community agreements with any applicant to compensate the Town for expenses or impacts on the community. The Town shall require any applicant to enter into an escrow agreement to pay the engineering and legal costs of any application review, including the review required by SEQRA.

D. The Town Board may amend these fees, by resolution after a properly noticed public hearing.

§ 690.41. Tax Exemption.

The Town hereby exercises its right to opt out of the Tax Exemption provisions of Real Property Tax Law §487, pursuant to the authority granted by paragraph 8 of that law.

§ 690.42. Enforcement; Penalties and remedies for violations.

A. In addition to the Code Enforcement Officer under §701, the Town Board may appoint such Town staff or outside consultants as it sees fit to enforce this Article.

B. Any person owning, controlling, or managing any building, structure, or land who shall undertake a wind energy conversion facility or wind monitoring tower in violation of this Article or in noncompliance with the terms and conditions of any permit issued pursuant to this Article, or any order of the enforcement officer, and any person who shall assist in so doing, shall be guilty of an offense and subject to a fine of not more than $350 or to imprisonment for a period of not more than fifteen days, or subject to both such fine and imprisonment for a first offense, for a Second offense (both within a period of five years), a fine not less than $350 nor more than $700, or imprisonment not to exceed six months, or both, and for a Third or more offense (all of which occurred within five years), a fine not less than $700 nor more than $1,000, or imprisonment not to exceed six months, or both. Every such person shall be deemed guilty of a separate offense for each week such violation shall continue. The Town may institute a civil proceeding to collect civil penalties in the amounts set forth herein for each violation and each week said violation continues shall be deemed a separate violation.

C. In case of any violation or threatened violation of any of the provisions of this Article, including the terms and conditions imposed by any permit issued pursuant to this Article, in addition to other remedies and penalties herein provided, the Town may institute any appropriate action or proceeding to prevent such unlawful erection, structural alteration, reconstruction, moving, and/or use, and to restrain, correct, or abate such violation, to prevent the illegal act.

Section 8: **Severability**

Should any provision of this Local Law be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of this Local Law as a whole or any part thereof other than the part so decided to be unconstitutional or invalid.

Section 9: Effective Date

This Local Law shall be effective upon its filing with the Secretary of State in accordance with the Municipal Home Rule Law.

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Villenova Zoning Law

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ARTICLE I

TITLE, ENACTING CLAUSE, PURPOSE

SECTION 101 TITLE

A Local Law regulating the location, construction and use of buildings, structures, and the use of land in the Town of Villenova, County of Chautauqua, State of New York, and for said purposes dividing the Township into districts. This Local Law shall be known and cited as the Zoning Law of the Town of Villenova.

SECTION 102 Enacting Clause

Pursuant to the authority conferred by the Laws of the State of New York and for each of the purposes specified therein, the Board of the Town of Villenova, County of Chautauqua and the State of New York, has ordained and does hereby enact the following Local Law regulating and restricting the location, size, and use of buildings and other structures, and the use of land in the municipality.

SECTION 103 Purpose

A. Comprehensive Plan - The zoning regulations and districts set forth and outlined upon the zoning map are made in accordance with a comprehensive plan for the municipality. The enactment of the Zoning Law brings benefits to the municipality which may not be highly or immediately visible. However, the resulting conditions will enhance and preserve the quality of living, health and safety for the municipality. To prepare a plan, public involvement is a basic ingredient. The community has been analyzed and surveyed to define assets and strengths as well as liability and problem areas. The next step was the formulation of goals and objectives. A plan was then developed and implementation techniques spelled out. A community identity has been fostered.

B. General - General benefits derived from Zoning Laws include the following:

1. Promotes health, convenience, economics and general welfare of the community;
2. Balances the rights of the public-at-large, private landowners and other various interest groups;
3. Encourages the positive shaping of the future and the long-range benefits associated with Zoning Laws;
4. Allows for the maintenance of a equitable assessment role;
5. Imposes some reasonable restraints on opportunists and balances economic growth with environmental protection,
6. Zoning is controlled locally, may be amended to meet changing needs and has built-in flexibilities for unique situations;
7. Promotes uniform rules throughout the community;
8. Compatible with state, regional, county plans as well as those of adjacent communities;

9. Promotes community values to include fundamental cultural concerns;
10. Maintains the character of the community;
11. Recognize and implement environmental restraints placed on natural features;
12. Strengthen the economic base so as to support the resident population well above subsistence levels;
13. Improve efficiency in the administration of public services; and
14. Meet basic needs for housing and human services.

C. Safety - From a safety viewpoint, Zoning Laws can assist in the following:

1. Promotes fire safety by controlling building heights, separation of structures, etc.;
2. Promotes traffic safety by protecting the traffic carrying capabilities of highways through setbacks, etc.;
3. Insures that floodplains are reasonably controlled with respect to types of uses, densities, etc., and;
4. Protects residents from other conditions which could cause injury or death.

D. Land Uses and Intensity-Zoning laws promote favorable land uses in proper locations at reasonable densities:

1. Insure there is a desirable blend of uses allowed that are compatible;
2. Promote reasonable districting to separate conflicting types of uses;
3. Maintain a rural atmosphere in select areas;
4. Maintain the character of residential neighborhoods by limiting the type and intensity of uses;
5. Provide a reasonable mix of land use intensities with consideration given to carrying capacity;
6. Insure that agricultural uses are encouraged and protected from other incompatible uses; and
7. Development in centralized locations should be promoted to strengthen continuity and discourage sprawl.

E. Quality - Perpetuate the highest possible quality of life by:

1. Promoting the retention of an aesthetically pleasing community by minimizing nuisances and visually unattractive developments. Design criteria should be encouraged;
2. Insuring adequate light, air and open space;
3. Encourage the visual and performing arts as an essential element;
4. Promote educational and cultural facilities;
5. Historic sites and facilities should be protected at a reasonable degree;
6. Encourage buffers between unlike uses in order to create visual distinctions and provide transitions to neighboring land uses;
7. Landscaping should be encouraged as appropriate;
8. Signage regulations should provide incentives for design excellence;

9. Recreational facilities and parklands must be promoted to meet both resident and visitor needs. Both active and passive facilities must be provided;
10. Sufficient entertainment and social opportunities should be provided for the young, elderly, handicapped and all other groups on a year-round basis;
11. Community centers should be promoted as a focal point for each municipality;
12. Private recreational facilities should be encouraged in proper locations with reasonable conditions imposed;
13. Municipalities should encourage recreational areas such that they also preserve open space, historic sites, and unique natural features; and
14. Child care facilities should be encouraged.

F. Economics - Zoning laws based upon comprehensive plans contribute a great deal to neighborhood stability by:

1. Utilizing existing roadways optimally while discouraging the creation of new roads, except as needed;
2. Encouraging the retention of prime agricultural, commercial and industrial properties for those uses for which they are best suited;
3. Encouraging the largest tax base possible through controlled development;
4. Tourism should be encouraged in ways that promote the community as it is;
5. Stimulate small scale economic development which maintains the community;
6. Industrial growth should be encouraged in areas where utilities exist or could most readily be made available;
7. Encourage home business operations that are compatible with existing residential neighborhoods;
8. Business diversity should be sought in order to reduce the chance of extreme economic fluctuations;
9. Support neighborhood shopping areas that are functionally and aesthetically acceptable to surrounding residential areas;
10. Promote conditional industrial zones that are properly controlled and located;
11. "Clean" types of industrial development are most desired and should be promoted;
12. The inclusion of residential uses in commercial and industrial areas must be addressed; and
13. The use of "performance standards" in controlling commercial and industrial uses should be encouraged.

G. Stability - Zoning Laws based upon comprehensive plans also contribute a great deal to neighborhood stability by:

1. Keeping rural municipalities from being a dumping ground;
2. Protecting property values and individual investments by encouraging proper development for each type of district;
3. Maintaining the character of a neighborhood by providing a stable and orderly living environment;
4. Keeping nuisances to a minimum, especially in residentially oriented neighborhoods; and
5. Allowing for the creation of a fair tax base by keeping

informed of both new construction and demolition.

H. Health - Zoning Laws based upon comprehensive plans protect public health through establishment of standards which address these issues. Such a Zoning Law:

1. Reinforces health standards, particularly with respect to sewage and water-related problems;
2. Keeps unhealthy situations from arising which could cause disease or injury; and
3. Encourages the creation of health and emergency facilities at appropriate locations.

I. Environment-Zoning laws based upon comprehensive plans protect and enhance the environment in various ways:

1. Insures that appropriate amounts of light, air and open space are available for all residents;
2. Promotes proper use of unique or sensitive environmental areas and natural resources;
3. Encourages the use of vegetative buffers to moderate development affects;
4. Promote energy conservation by insuring that alternate fuel systems are encouraged and innovative construction techniques are allowed;
5. Tree maintenance, plantings and other forest management practices should be promoted during the review process that preferably includes Site Plan Review;
6. Vegetation should be encouraged to moderate the influence of wind, sun, precipitation, and noise;
7. Promote best management practices within each watershed such that erosion is minimized during and after construction. Site restoration is essential;
8. Insure that noise pollution is considered in the review of industrial and other appropriate projects;
9. Development should take groundwater protection into consideration;
10. Wetlands should be considered when reviewing development projects;
11. Light pollution should be a consideration in reviewing large development; and
12. Steep slope development should receive special attention during the review of a project.

J. Housing-Zoning laws based upon comprehensive plans encourage quality housing and more specifically should:

1. Insure that a wide range of affordable housing opportunities exist to meet various income needs, e.g., mobile homes and multiple family units;
2. Allow for special housing needs for various groups such as handicapped, single parents, elderly, mentally disabled, etc.;
3. Encourage "infill" development to promote better utilization of existing neighborhoods;
4. Deal with problem of dilapidated housing and encourage the rehabilitation of housing;
5. Promote reasonably located seasonal housing; and
6. Encourage "clustering" of housing units based on benefits to the developer, owner, and environment.

K. Transportation-Zoning laws based upon comprehensive plans encourage the creation and maintenance of adequate transportation systems:

1. Support road design that protects visual resources of community;
2. Promote transportation that strengthens existing community centers and fosters an orderly pattern of growth;
3. Encourage the full utilization of existing highways and bridges and discourage the need for new highways and bridges;
4. Promote highway safety by utilizing setbacks and other visibility tools;
5. Promote adequate commercial loading and unloading so as to avoid unsafe conditions;
6. Require adequate offstreet and street parking to meet needs of various uses;
7. Encourage the use of air, rail and bus service;
8. Insure that snow removal can be accomplished adequately;
9. Encourage development in a manner that encourages the use of major transportation;
10. Promote alternate transportation means such as bike routes and walking paths; and
11. Insure that uses involving large numbers of vehicles (e.g. drive-ins, concerts, etc.) provide for parking and safety.

L. Utilities and Infrastructure-Zoning laws based upon comprehensive plans encourage reasonable land use such that existing infrastructure is fully utilized and the need for new infrastructure is minimized:

1. Large lot development is promoted in areas where soils are not conducive to septic operation;
2. More intense development is encouraged through various means (e.g. smaller lots) in areas where municipal or community utility systems exist; and
3. Optimize the use of existing infrastructure.

M. Regional Needs-Zoning laws based upon comprehensive plans should look beyond municipal boundaries:

1. Consolidation of services should always be an option that is considered. Sharing equipment, services, facilities, etc., must be reviewed periodically in order to promote efficiency and avoid duplication;
2. Zoning laws should be consistent or compatible with state, region, county and other municipal plans; and
3. Landfills, hospitals and other uses not required in each municipality should be addressed regionally.

N. Implementation-Zoning laws based upon comprehensive plans can be implemented in a multitude of ways and should be relatively consistent with the plan:

1. A comprehensive capital budgeting program should be encouraged as a primary means of implementing goals and objectives;

2. Progress in implementing a comprehensive plan should be monitored;
3. Zoning and subdivision laws should be adopted as the major implementation tools for a comprehensive plan;
4. Other related rules and regulations (e.g. flood plains, sewer and water, etc.) should be coordinated with implementation tools;
5. The training of all individuals associated with implemented land use laws should be encouraged;
6. Insure that laws are understandable and usable by officials, developers, and the general public;
7. Protect preexisting uses from laws that were written for new development only; and
8. Promote flexible laws that provide latitude for developers to be in compliance.

SECTION 104 Application of Regulations

A. Compliance Responsibility - It shall be the responsibility of all property owners, developers, lessors or others involved with the temporary or permanent use of land or structures to comply with the regulations of this Zoning Law.

B. Regulation Applicability - The regulations of this Law shall apply and shall require a Zoning Permit (Except as specifically exempted. See section on Zoning Permits) for the following situations:

1. To occupy a structure or land;
2. To erect, alter, enlarge, move or demolish a structure;
3. To change one use to another use to include the increasing of families utilizing land or structures.

C. Other Related Regulations - The following regulations shall, as applicable, be complied with prior to occupancy or where specifically stated prior to issuance of a Zoning Permit:

1. Subdivision Laws - State and existing local subdivision laws must be complied with in addition to this Zoning Law.
2. National Flood Insurance Program - It shall be the responsibility of the applicant for a Zoning Permit to insure that the National Flood Insurance Regulations shall be complied with for those parcels located within the flood plain as shown on official Flood Insurance Administration maps.
3. Health Department Rules - The regulations of the State and County Health Departments with respect to water supply and sewage disposal facilities will apply. The applicant for a Zoning Permit must obtain a copy of the required health department permits for attachment to his application before the issuance of local approval by the Zoning Officer.
4. Multiple Residence Law - For all dwellings with 3 or more dwelling units or any dwelling two or more stories in height with 5 or more roomers, the "Multiple Residence Law," Chapter 61B of the Consolidated Laws sets forth certain requirements with regard to fire safety, size of rooms and other minimum health and safety

specifications.

5. Uniform Fire and Building Code - As required by the New York State Uniform Fire and Building Code. All new construction must comply.

D. County Environmental Health Department-Before a final decision is made on applications for Zoning Permits, Special Use Permits or Variances, written proof must be provided documenting that the applicant has notified the County Environmental Health Department of the zoning request and that the applicant has applied for and received the appropriate sewerage permit.

ARTICLE II

DEFINITIONS

SECTION 201 Language and Interpretations

For the purpose of this Local Law, certain terms or words herein shall be interpreted or defined as follows: Words used in the present tense include the future tense. The singular includes the plural. The word "person" includes a corporation as well as an individual. The word "lot" includes the word "plot" or "parcel". The term "shall" is always mandatory. The word "used" or "occupied" as applied to any land or building shall be construed to include the words "intended, arranged or deigned to be used or occupied."

SECTION 202 Definitions

Certain words and terms used in this Local Law are defined as follows:

ACCESSORY APARTMENT - A secondary apartment developed in an existing single family dwelling which meets the following conditions: No more than 1 unit shall be created per dwelling unit in districts where multiple units are allowed; the apartment shall be between 600 and 800 square feet in floor space with the resultant primary dwelling meeting all area requirements such as minimum floor space; sufficient off street parking shall be provided; no visible signs of an apartment shall be present; and finally, accessory buildings existing at the time of enactment of this Law may be utilized.

ACCESSORY BUILDING OR USE - An accessory building or use is one which:

A. Is subordinate to and serves a principal building or principal use.

B. Is subordinate in area, extent or purpose to the principal building or principal use served.

C. Contributes to the comfort, convenience, or necessity of occupants of the principal or principal use served.

D. Is located on the same lot as the principal building or principal use served.

ACCESSORY DWELLING UNIT - Includes but is not limited to a travel trailer, motor home, truck camper, or tent occupied by persons other than those generally residing in the primary dwelling unit and located on the same parcel as the primary unit.

AGRICULTURE - Land, including necessary buildings and structures that has as its principal use the raising or keeping of livestock or the growing of crops in the open.

AGRICULTURE (LIMITED) - The commercial production of crops, plants, vines and trees.

AGRICULTURAL (STRUCTURE) - Any structure used primarily and directly for agricultural activities and including but not limited to: barns, silos, storage sheds, corn cribs, milk houses and similar structures.

AIRPORT - Any land or water space frequently used for the landing and take-off of any aircraft including helicopters. All airports must comply with Federal and State Regulations and be approved by the Commissioner of Transportation for New York State.

ALTERATION - Is, as applied to a building or structure, a charge or rearrangement in the structural parts, or in the exit facilities, or an enlargement, whether by extending on a side or increasing in height, or moving from one location or position to another; the term "alter" in its various modes and tenses and its particular form refers to the making of an alteration.

ANIMAL FARM - See Farm Animal.

APARTMENT HOUSE - A building arrangement intended or designed to be occupied by 3 or more families living independently of each other. Condominiums and apartments shall be considered to be apartments.

AREA OF SPECIAL FLOOD HAZARD - Means the land in the flood plain within a community subject to a 1% or greater chance of flooding in any given year.

BASE FLOOD - Means the flood having a 1% chance of being equaled or exceeded in any given year.

BOARDING HOUSE - Any single family dwelling unit lived in by a family where, for compensation, guest room lodging is provided with or without meals for up to 2 individuals. The term "Boarding Home" shall include: "Rooming House," "Lodging House" and other similar terms.

BUFFER - A strip of land, fence or border of trees, etc., between one use and another which may or may not have trees and shrubs planted for screening purposes designed to set apart one use area from another. An appropriate buffer may vary depending on: uses, districts, size, etc., and shall be determined by the Zoning Board of Appeals where a buffer is a necessary condition to a special use permit or variance.

BUILDING - Any structure having a roof supported by columns or by 4 independent, non-party walls and intended for the shelter, housing or enclosure of persons, animals or chattel.

BUILDING AREA - The total of areas taken on a horizontal plane at the main grade level of the principal building and all accessory buildings exclusive of uncovered porches, terraces and steps. All dimensions shall be measured between the exterior faces of walls.

BUILDING LINE - A line formed by the intersection of a horizontal plane of average grade level and a vertical plane that coincides with the exterior surface of the building on any side. In case of a cantilevered section of a building or projected roof or porch the vertical plan will coincide with the most projected surface. All yard requirements are measured to the building line.

BUILDING PERMIT - See Zoning Permit.

BUILDING SETBACK LINE - An established line within a property defining the minimum required distance between the face of any structure to be erected and the edge of the road of an adjacent highway.

BUSINESS/INDUSTRY LIMITED - Any commercial operations dealing in retail sales or services in which the following conditions are met: Maximum of 200 square feet floor space utilized, no nuisance created, a maximum of 1 employee and a maximum of 3 clients at any one time.

BY RIGHT - Refers to uses requiring a permit but with no public hearing required.

CLUB - An organization catering exclusively to members and their guests including premises and buildings for recreational or athletic purposes which are not conducted primarily for gain, providing there are not conducted any vending stands, merchandising, or commercial activities except as required generally for the membership and purposes of such club.

CLUSTER DEVELOPMENT - A development of 5 acres or more where a developer may elect after Board approval to cluster or group his development in return for the permanent creation of common areas. Overall, the density of development remains approximately the same as required by the district area requirements.

CONVENTIONAL DWELLING UNIT - See Dwelling Unit.

CUSTOMARY ACCESSORY BUILDING - See Accessory Building.

DAY CARE CENTER - A structure, together with its lot operated on a regular basis for the purpose of providing daytime care and instruction for 5 or more children up to 5 years in age. Similar uses going under names such as Day Nurseries shall for the purpose of this Law be considered to be Day Care Centers.

DECK - An unroofed open structure projecting from an outside wall of a structure without any form of enclosure.

DEVELOPMENT - Means any man made change to improved or unimproved real estate, including but not limited to: buildings or other

structures, mining, dredged, filling, paving, excavation or drilling operations.

DOMESTIC ANIMAL - For the purposes of this Law a domestic animal shall include dogs and cats only.

DRIVE-IN - Businesses designed to either wholly or partially provide services or products to customers while in their automobiles parked on the premises. Examples include but are not limited to: film shops, drive-in theaters and fast food restaurants.

DUPLEX - A dwelling arranged, intended, or designed to be occupied by 2 families living independently of each other.

DWELLING UNIT - One or more rooms providing living facilities, including equipment and provisions for cooking for a single household including one or more person(s) living as a family. Dwelling units shall be categorized by 4 construction types:

A. Conventional - A permanent single or multiple family dwelling unit which is built on site using conventional "stick" construction techniques among others.

B. Modular - A permanent single or multiple family dwelling unit which is brought to the building site as one or more units on a transport trailer. Modular dwelling units have no support frames but instead are placed on a separate foundation. Modular dwelling units contain the same utility systems as conventional dwelling units. Modular dwelling units are not designed to be moved after they have been lifted onto a foundation.

C. Prefabricated - A permanent single or multiple family dwelling unit which is built on site from pre-cut and partially constructed building members. Prefabricated dwelling units are usually based on the same construction techniques as conventional dwelling units but are generally purchased as a pre-designed and pre-cut package for assembly on site.

D. Mobile Home - A transportable, fully assembled single family dwelling unit suitable for year round occupancy. Mobile dwelling units contain the same utility systems (water, waste, electricity) as found in conventional dwelling units. Mobile dwelling units are supported by a chassis which is an integral part of the unit. Mobile dwelling units are not designed to be lived in except when set up on a lot with proper utilities. This includes double wide mobile dwelling units but does not include travel trailers which are self-contained.

EATING AND DRINKING ESTABLISHMENTS - Places where food and/or beverages are prepared and/or sold for consumption on the premises or for take-out, including restaurants, tea rooms, cafeterias, bars, taverns and lunchrooms.

ENFORCEMENT OFFICER - Shall mean the Zoning Officer of the municipality.

ESSENTIAL SERVICES - The erection, construction, alteration or maintenance by public utilities, or municipal or other governmental agencies of gas, electrical, steam, water, sewage, communication systems and facilities. Railroad trackage and facilities and bus shelters shall also be considered as providing an essential service.

FAMILY - A householder (individual residing in and in legal possession of a dwelling unit) plus 1 or more persons related by blood, marriage or adoption and limited to the spouse, parents, grandparents, children, grandchildren, brothers or sisters of the householder, or of the householder's spouse living together as a single, not-for-profit housekeeping unit sharing kitchen facilities of a group of persons headed by a householder caring for a reasonable number of children in a family-like living arrangement, which to all outward appearances is the functional and factual equivalent of a family of related persons or a maximum of 2 persons not sharing a relationship as described above.

FAMILY DAY CARE HOME - In accordance with Sections 390 of the Social Security Law, an individual's home used to care for 3 to 6 children away from their homes for less than 24 hours per day for compensation for more than 5 hours per week. The provider's own children under 6 years old shall be counted toward the maximum number allowed. An annual permit from the Social Services Department is required with the applicant required to verify fitness to care for children, sound health, sufficient finances, an adequate physical plant, etc.

FARM - Any parcel of land containing at least 10 acres which is used for gain in the raising of agricultural products, livestock, poultry, and/or dairy products. It includes necessary farm structures and the storage of equipment used.

FARM ANIMAL - Any domestic animal customarily found on a farm which if not adequately controlled may cause nuisances.

FENCE - Any artificially constructed barrier or vegetation barrier such as a hedge with the purpose or intent of preventing passage or view thus providing privacy.

FENCE (AGRICULTURAL) - A fence used for agricultural purposes such as the retention of livestock. Such a fence shall be constructed in such a manner and from materials which have traditionally been used for farm fencing in the past; e.g., barbed wire or rail fence.

FENCE (BARRIER) - Any fence which is located near the perimeter of the property for which it is intended to provide privacy.

FENCE (NON-BARRIER) - Any fence located a distance from the property line which provides privacy to a portion of land such as a patio or swimming pool.

FIRE RESISTANT - Any materials which possess the properties, construction or assembly qualities which under fire conditions prevents or retards the passage of excessive heat, gases or flames and thus is not easily ignited.

FLAMMABLE - Capable of igniting within 5 seconds when exposed to

flame and continuing to burn.

FLOATING DISTRICT - Any zoning district for which district regulations are included in this Law and yet for which no land has initially been designated on the zoning map to be included in said district. Such a district may become a reality through the amendment of the zoning map of the municipality in accordance with the amendment procedures of this Law. The initiation of the creation of such a district may come from residents, the Planning Board, a developer or the Municipal Board itself while the decision whether to activate such a district shall be made based upon the need for such a district.

FLOOD OR FLOODING - Means a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters and/or the unusual and rapid accumulation or run-off of surface waters from any source.

FLOOD HAZARD BOUNDARY MAP (FHBM) - Means the official map issued by the Federal Insurance Administration where the areas of special flood hazard have been designated Zone A.

FLOOD PLAIN - A relatively flat or low land area adjoining a river, stream or watercourse which is subject to partial or complete inundation or any area subject to the unusual and rapid accumulation or run-off of surface waters from any source.

FLOOD PROTECTION ELEVATION - Means the level and elevation above which a particular use will be considered safe from flooding. Such estimates are updated with the 100 year flood evaluation. Such elevations will be designated at various points on the official map.

FLOODWAY - The designated area of a flood plain required to carry and discharge waters of a given magnitude.

FLOODWAY FRINGE AREA - The designated area of a flood plain adjacent to the floodway and within the 100 year special flood area.

FLOOR SPACE - The sum of the gross horizontal areas of the floor or floors of a building which are enclosed and usable for human occupancy or the conducting of business. Said areas shall be measured between the outside face of exterior walls or from the center line of walls separating 2 uses. Said areas shall not include areas below the average level of the adjoining ground, garage space, or accessory building space.

FROST-FREE FOUNDATION--either:

a. a continuous masonry substructure consisting of stone, poured concrete, or concrete block, eight inches (8") thick placed on a concrete footer, such footer being equal to the thickness of the wall in depth by twice the width of the wall in width, a minimum of thirty-six inches (36") below grade or below frost line, whichever is deeper: or

b. cast-in-place piers, with minimum dimensions of twenty-four inches by twenty-four inches by twelve inches (24"x 24"x 12"), placed a minimum of thirty-six inches (36") below grade or

below frost line, whichever is greater, with New York State Building Code complying tie-downs and a poured, pre-cast or Masonry curtain wall which is a minimum of six inches (6") thick and thirty-six inches (36") below grade or frost line, whichever is deeper.

GARAGES (PRIVATE) - A secondary building used in conjunction with a primary building which provides for the storage of motor vehicles and in which no occupation, business or services for profit are carried on.

GARAGES (PUBLIC) - Any garage other than a private garage, operated for gain, available on a rental basis for the storage of motor vehicles, including the supply of gasoline and oil.

GAS COMPRESSOR - Any mechanical equipment utilized to cause the movement of natural gas through a transmission line system.

GENERAL INDUSTRIAL BUSINESS - See Industry, General.

GENERAL RETAIL BUSINESS - See Retail Business.

GENERAL SERVICE BUSINESS - See Service Business.

GENERAL WHOLESALE BUSINESS - See Wholesale Business.

GRAVEL PIT (Quarry, Sand Pit) - A lot or land or part thereof used for the purpose of extracting stone, sand, gravel or top soil for sale as an industrial operation and exclusive of the process of grading a lot preparatory to the construction of a building for which application for a building permit has been made.

HEAVY VEHICLE - See Supplemental Section on Heavy Vehicles.

HEIGHT - The vertical distance from the highest point on a structure (except chimneys and other items listed in Article V, section on "Height") to the average ground level of the grade where the wall or other structural elements intersect the ground.

HOME FOR AGED - A structure principally used to house senior citizens in which a separate household is established for each family. Nursing homes are not considered to be home for the aged.

HOME OCCUPATION - A use conducted within a dwelling and carried on principally by the inhabitants thereof which is clearly secondary to the use of the dwelling for dwelling purposes and does not substantially change the character thereof.

HORTICULTURE (PRIVATE) - The growing of fruits, vegetables, flowers or ornamental plants for ones own pleasure and use. Also referred to as a private garden.

HOUSEHOLD SALE - Household sale for the purpose of this Law shall include: lawn sales, patio sales, garage sales, basement sales, flea markets, bazaar or other similar types of sales. A household sale shall be distinguished from a business in that it involves the infrequent sale of used merchandise which for profit sales was NOT obtained from outside the household. Non-profit or fraternal organizations on the other hand may obtain their sale items from donations received from members or other sources.

INDUSTRY (GENERAL) - The manufacture, preparation, processing, milling or repair of any article, substance or commodity and which involves no dangerous or toxic product or emissions. Additionally, noise, odors or other nuisances incidental to productions and processing shall be limited to a level which does not affect the use or enjoyment of property.

INDUSTRY (HEAVY) - A heavy industry is defined as any processing of goods or articles by hand or machine in such a manner that 1 or more of the following may carry beyond the boundary of the property upon which the industry is located: fire hazard, radioactivity, electrical disturbance, noise, vibration, dust, smoke, odor, air pollution or glare may be detected beyond the boundary lines of the property upon which a light industrial plant is located. The storage of raw material, component parts, finished products and waste material is within an enclosed building.

JUNK CAR - A motor vehicle (excluding farm equipment on a farm) which is not intended for, or in condition for legal use on public highways or which is in the process of being dismantled.

JUNK YARD - See Definitions of Scrap Yards and Vehicle Dismantling Yards.

LOT - A parcel of land occupied or designed to be occupied by 1 building and the accessory buildings or uses customarily incidental to it, including such open space as required by this Zoning Law.

LOT (COVERAGE) - That percentage of the lot which is devoted to building area. District regulations refer to the maximum percentage of the lot area devoted to building area.

LOT (SIZE) - An area of land which is determined by the limits of the lot lines bounding that area and expressed in terms of square feet or acres.

LOT (LINE) - Any line dividing one lot from another.

LOT (WIDTH) - The horizontal distance between the side lot lines measured at right angles to its depth at the building line.

MOBILE DWELLING UNIT - See Dwelling Unit (same as Mobile Home).

MOBILE HOME PARK - A plot or parcel of ground which is manifestly arranged and furnished to provide the space, facilities and access for mobile homes as required herein.

MODULAR DWELLING UNIT - See Dwelling Unit.

MOTOR HOMES - A self-propelled, relatively small temporary living quarter generally used as mobile vacation homes. Motor homes generally have self-contained, independent utility systems.

MOTOR VEHICLE SERVICE STATION - Any area of land including structures therein that is used for the sale of gasoline or any other motor vehicle fuel and oil and other lubricating substances, including any sale of motor vehicle accessories and which may or

may not include facilities for lubricating, washing or otherwise servicing motor vehicles but not including the painting thereof by any means, body and fender work or the dismantling or replacing of engines.

MULTIPLE DWELLING - See Residence.

MUNICIPALITY - Shall mean the Village or Town for which this Law applies.

NON-CONFORMING USE - That use of a building, structure or land legally existing at the time of enactment of this Zoning Law and which is not one of those permitted in the district in which it is situated.

NUISANCE - A violation of this Law caused by an offensive, annoying, unpleasant or obnoxious use or characteristics of said use which produces effects of such a nature or degree that they are detrimental to the health, safety, general welfare, property values, etc., thus resulting in harm or injury to adjacent or nearby properties. Common examples include: excessive odors, noise, smoke, vibration, light, runoff, traffic, development density, etc.

NURSERY (FOR CHILDREN) - See Day Care Center.

NURSING OR CONVALESCENT HOME - Nursing Home means a structure designed or used for residential occupancy and providing limited medical or nursing care on the premises for occupants but not including a hospital or mental health center.

OFFICE - A place which is used to conduct a business or profession and is occupied by a physician, surgeon, dentist, lawyer or person providing similar services or in whose office the functions of consulting, record keeping and clerical work are performed.

ONE HUNDRED YEAR FLOOD - The waters of a flood that on the average is likely to occur once every 100 years.

OPEN SPACE - Common, public or private greens, parks or recreation areas, including playgrounds, woodland conservation areas, walkways, trails, stream crossings and drainage control areas, golf courses, swimming pools, tennis courts, ice skating rinks and other similar recreational uses but which may not include any such uses or activities which produce noise, glare, odor, air pollution, fire hazards or other safety hazards, smoke fumes or any use or activity which is operated for a profit or other things detrimental to existing or prospective adjacent structures or to existing or prospective development of the neighborhood.

PARKING SPACE - A required off street parking space (see Supplemental Section).

PERCOLATION RATE - The number of minutes it takes for water to drop 1 inch for 2 successive percolation tests giving approximately equal results.

PLANNING BOARD - Refers to the Municipal Planning Board unless otherwise indicated.

PORCH - A roofed open structure projecting from an outside wall of a structure without any form of enclosure.

PRE-EXISTING USE - Any use, either conforming or non-conforming with this Law that is legally existing at the enactment of this Law.

PRE-FABRICATED DWELLING UNIT - See Dwelling Unit.

PRINCIPAL USE - The main use of land or buildings as distinguished from a subordinate or accessory use.

PRIVATE CAMP - A parcel of land on which a travel trailer, tent, cabin or other structure is present for use on a seasonal basis for leisure or recreation purposes.

PROFESSIONAL - Any person with an advanced college degree who possesses a license to practice. This includes but is not limited to: doctors, lawyers, CPA's, engineers, etc.

PUBLIC - Owned, operated or controlled by a governmental agency, (Federal, State or Local) including a corporation created by Law for the performance of certain specialized governmental functions, a public school district or service district.

PUBLIC (QUASI) - An organization which serves a governmental function but is not a governmental use per se. A volunteer fire department is an example.

PUBLIC UTILITY - Any person, firm, corporation or municipal department, duly authorized to furnish under public regulation to the public electricity, gas, steam, telephone, transportation or water.

RECREATIONAL VEHICLE - A vehicle primarily designed as temporary living quarters for recreational, travel or camping use, which either has its own mode of power or is drawn by another vehicle.

REFORESTATION - Conservation activities aimed at the management of large tracts of land with the express purpose of optimally utilizing timber.

REGULAR FLOOD INSURANCE OR REGULAR PROGRAM - The permanent program which is entered only after detailed flood information is provided by the Federal Insurance Administration; e.g., Floodway/Floodway Fringe Area, Flood Insurance Rate Map.

RESIDENCE (SINGLE-FAMILY DETACHED) - A detached building designed to contain 1 dwelling unit.

RESIDENCE (TWO-FAMILY) - Either of the following:

A. A building having 2 side yards and accommodating but 2 dwelling units;
B. A detached building containing 2 dwelling units separated by a party wall, each having 1 side yard.

RESIDENCE (MULTI-FAMILY) - A building used or designed for 3 or

more dwelling units, including apartment houses, townhouses and condominiums.

RESIDENTIAL CONVERSIONS - The creation of one or more additional dwelling units within existing residential structure in accordance with conditions set forth in this Law.

REST HOME - Commonly referred to as homes for the aged. These facilities provide sleeping rooms for ambulatory (able to walk) residents. Generally, rest homes have common eating areas and provide minimal medical aid to residents. Only incidental convalescent care is provided which does not involve either trained nurses, physical therapy or other activities provided in a hospital or nursing home.

RETAIL BUSINESS (GENERAL) - For the purposes of this Law, whenever a general retail business is listed as an allowed use, it shall signify that any retail business which has a minimal negative impact and can meet the conditions specified in this Law shall be allowed in addition to the specific retail uses as being allowed.

RIDING ACADEMY - Any establishment where horses are kept for riding for compensation. Riding academies shall be situated on a minimum of 10 acres of land and only in districts where allowed.

ROADSIDE STAND - A wholly or partially enclosed shed generally for the sale of products produced on the land where they are to be sold, where stand shall be located so as to permit customers to drive completely off the highway while dealing.

SAWMILL - Commercial facility containing sawing and planing equipment utilized for the preparation of dimensional lumber used for construction.

SCRAP YARD - Any place of storage or deposit of more than 100 square feet, usually of a commercial nature where metals, glass, rags, etc., are held, whether for the purpose of disposal, reclamation, recycling or resale of such, including establishments having facilities for processing iron, steel and nonferrous scrap for remelting purposes.

SECTION - Unless otherwise noted, section and section numbers shall refer to this Law.

SEMI-PUBLIC - Places of worship, institutions for the aged and children, nurseries, non-profit colleges, hospitals, libraries,

cemeteries and institutions of the philanthropic nature (also, Open Space).

SERVICE BUSINESS (GENERAL) - For the purpose of this Law, whenever a general service business is listed as an allowed use, it shall signify that any service business which has a minimal negative impact and can meet the conditions specified in this Law shall be allowed in addition to the specific service uses listed as being allowed.

SETBACK - Distance measured from the middle of the street to a structure, sign, etc.

SHOOTING RANGE (COMMERCIAL) - The parcel(s) of land used for discharging of firearms with the intent to hit any object (moving or stationary) other than live game by any person who pays a fee (e.g., membership fees, shooting fees, etc.) to use said facilities. Commercial shooting ranges include but are not limited to non-profit clubs (skeet club, etc.) and profit motivated business.

SIGN - Any device or part thereof, attached thereto, or painted or represented thereon, which shall display or include any letter, work, model, banner, flag, pennant, insignia, device or representation used for the purpose of bringing the subject thereof to the attention of the public. The word sign does not include: the flag, pennant or insignia of any nation, state, city, or other political unit, or of any political, educational, charitable, philanthropic, civic, professional, religious, or like organization, or the property thereof.

SIGN (AREA) - The area defined by the frame or edge of a sign. Where there is no geometric frame or edge of the sign the area shall be defined by a projected, enclosed, 4-sided (straight sides) geometric shape which most closely outlines the said sign. Only 1 side of the sign shall be used in measuring the area.

SIGN (ADVERTISING) - A sign which offers services or goods produced or available somewhere other than on which the sign is located. The words "advertising sign" include the word "billboard." Neither directional warning nor other signs posted by public officials in the course of their public duty shall be construed as advertising signs.

SIGN (BILLBOARD) - Any large sign which directs attention on an idea, product, business activity, service or entertainment which is conducted, sold or offered elsewhere than upon the lot where such sign is located.

SIGN (BUSINESS) - A sign for permitted use conducted on or off the premises which shall identify the written name and/or the type of business and/or any trademark of an article for sale or rent on the premises or otherwise call attention to a use conducted on or off the premises.

SIGN (DIRECTIONAL) - A non-business sign which identifies an attraction or activity and provides directional information useful to the traveler in locating the attraction, such as mileage, route numbers, etc.

SIGN (FLASHING) - Any sign that flashes by giving off or reflecting light,or moves, or revolves in any way,or has flowing or moving lights or parts of the sign, or alternates in any way its color, shape, or intensity or illumination.

SIGN (IDENTIFICATION) - A sign for a permitted use conducted on the premises for articles sold or distributed by that use or displaying the name of the premises.

SIGN (INSTRUCTIONAL) - A sign conveying instructions with respect to the use of the premises or a portion of the premises on which it is maintained, or a use or practice being conducted on the premises.

SIGN (NAME PLATE) - Any sign indicating the name, occupation and/or address of the occupant. A name plate shall be not over 2 square feet in size.

SIGN (PUBLIC) - Those signs erected to direct flow, speed and direction of traffic, effect general public safety or name streets and buildings.

SIGN (TEMPORARY) - A sign which offers premises for sale, rent or development, or announces special events or calls attention to new construction or alteration, or offers a sale of seasonal garden produce, garage, household, porch items or signs of a similar nature, or political signs.

SOLAR STRUCTURE - Any dwelling unit containing either a passive or active heat storage device which is dependent on direct contact with the sun in order to operate. Said heat storage devices are commonly used to heat totally or partially water, rooms, etc.

SPECIAL FLOOD HAZARD AREA - Means that maximum area of the flood years (i.e., that has a 1% chance of being flooded each year - "100 year flood").

SPECIAL USE PERMIT - A special use permit deals with special permission, granted only by the Zoning Board of Appeals to occupy land for specific purposes when such use is not permitted by right but is listed as permitted by special use permit.

STORAGE STRUCTURE - Any constructed combination of materials located or attached to the ground utilized for non-inhabited storage purposes. Used trucks and similar motor vehicles shall not be utilized as storage structures.

STOREFRONT AREA - That area of the front of a building associated with the first floor only. For businesses located above a first floor the storefront area shall be calculated based on the ground floor entrance only.

STORY - That portion of a building included between the surface of any floor and the floor next above it, or if there be no floor above it then the space between any floor and the ceiling next above it.

STORY (HALF) - A story under a gable, hip or gambrel roof, the wall plates of which on at least 2 opposite exterior walls are not more than 2 feet above the floor of such story.

STRUCTURE - Anything constructed or erected with a fixed location on the ground or attached to something having a fixed location on the ground.

SUBSTANTIAL IMPROVEMENT - Means any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure either before the improvement or repair is started, or if the structure has been damaged and is being restored before the damage occurred. For the purpose of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not

that alteration effects the external dimensions of the structure. The term does not, however, include either any project for improvement of a structure to comply with existing state of local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions, or any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

SWIMMING POOL - Any man made receptacle for water (excepting farm ponds) located above or below ground designed for capacity of over 4 feet in depth at any point and intended to be used for swimming.

TEMPORARY DWELLING UNIT (MOBILE) - Dwellings intended for temporary occupancy and including but not limited to: travel trailers, motor homes, truck campers and tents. Persons residing in the primary dwelling unit located on the parcel.

TEMPORARY USE - An activity conducted within a structure or on a tract of land for a specific limited period of time which may not otherwise be permitted by the provisions of this Law. For example, a building used in conjunction with new construction which would be removed upon completion of the work.

TOWER - A structure generally of a commercial nature the purpose of which is to better enable the transmission or receiving of signals by achieving more height. For the purposes of this Law, a tower shall be capable of being climbed without utilizing special equipment and shall not include TV towers unless they are over 60 feet in height as measured from the base.

TOWNHOUSE - A dwelling unit designed to be occupied as a residence for 1 family and 1 of a group of 3 or more attached dwellings placed side by side, separated by party walls each containing 1 or 2 stories and each having separate front and rear, or side and rear, or front and side entrances from the outside.

TRACT - A large piece of land under single ownership.

TRASH - Glass, scrap metals, salvaged metals, rags, refuse, garbage, waste paper, salvaged machines, appliances or similar materials, etc., but not to include wood piles, lumber, building materials, compost, used farm machinery stored on a farm, etc.

TRAVEL TRAILER (CAMPER) - A relatively small temporary living quarter designed to be hauled behind a vehicle. Travel trailers are not designed as permanent living quarters and generally are used on a seasonal basis. They are supported at all times primarily by their own wheels. Travel trailers generally have self-contained independent utility systems (see Definition of Accessory Dwelling Unit).

TRAVEL TRAILER CAMP (COMMERCIAL CAMPGROUND) - A parcel of land used or intended to be used, let or rented on a seasonal basis for occupancy by campers or for occupancy by or of, travel trailers, motor homes, tents, or movable or temporary dwellings, rooms or sleeping quarters of any kind.

TRIPLEX - A dwelling arranged, intended and designed to be occupied by 3 families living independently of each other.

USE - Any purpose for which land or a building is designed, arranged, intended, or for which it is, or may be occupied or maintained.

VEHICLE DISMANTLING YARD - Any place of storage or deposit where 4 or more unregistered, old or second hand vehicles no longer intended for or in condition for legal use on public highways are held, whether for resale of parts or materials or used parts and waste materials, which when taken together equal in bulk 4 or more vehicles, shall constitute a vehicle dismantling yard. This excludes farm vehicles and facilities for processing iron, steel and/or nonferrous materials for scrap.

VEHICLE REPAIR SHOP - A commercial business operated for profit which repairs or services motor vehicles.

VARIANCE - Permissive waivers from the terms of the Law, as will not be contrary to the public interest where owing to special conditions a literal enforcement of the provisions of the Law will result in unnecessary hardship, or practical difficulty, or that the spirit of the Law shall be observed and substantial justice done and granted by the Zoning Board of Appeals.

WHOLESALE - A business establishment engaged in selling to retailers or jobbers rather than consumers in wholesale lots.

WHOLESALE BUSINESS (GENERAL) - For the purpose of this Law, whenever a general wholesale business is listed as an allowed use it shall signify that any wholesale business which has a minimal negative impact and can meet the conditions specified in this Law shall be allowed in addition to the specific wholesale uses listed as being allowed.

WHOLESALE LIMITED - A wholesale business with a maximum of 3 employees, no more than 4,000 square feet of floor space and no outside storage.

YARD (FRONT) - The area extending across the entire width of the lot between the building line or front main wall of a building and the middle of the road into which space there shall be no extension of building partitions in any district, or parking space(s), including any enveloping wall, fence or hedge around the parking area in any non-commercial districts.

YARD (REAR) - The area extending across the entire width of the lot between the rear wall of the principal building and rear line of the lot and unoccupied, except for parking, loading and unloading space and garages and carports.

YARD (SIDE) - That open area of a lot situated between the side lines of the building and the adjacent side lines of the lot.

ZONING BOARD OF APPEALS - Shall mean the Zoning Board of Appeals of the municipality.

ZONING PERMIT - Written permission issued by the appropriate Municipal Board/Officer authorizing the use of lots or structures. Zoning Permits are issued for uses which are permitted by the Zoning Law where all conditions required by the Law can be met for the district where the lot/structure is located. The relocation,

enlargement, alteration or other change of use shall require the issuing of a Zoning Permit. The 2 types of permits include: By Right and Special Use Permit.

ARTICLE III

ESTABLISHMENT OF DISTRICTS

SECTION 301 Creation and Enumeration of Districts

For the purpose and provisions of this Local Law, the municipality is hereby divided into the following types of districts:

Agriculture and Residential	(ARI)
Transition	(T)
Industrial Park (Floating)	(IP)

SECTION 302 Zoning Map

The boundaries of the aforesaid zoning districts are hereby established shown on the map entitled, "Zoning District Map of the Town of Villenova, New York; dated, _____, 1997," which map accompanies and is made a part of this Local Law and shall have the same force and effect as if the zoning map, together with all notations, references and other information shown thereon, were fully set forth and described therein.

SECTION 303 Interpretation of District Boundaries

Where uncertainty exists with respect to the boundaries of any of the aforesaid districts as shown on the Zoning Map the following rules shall apply:

A. General Rules

1. Where district boundaries are indicated as approximately following the center lines of streets or highways, street lines,or highway right of way lines shall be construed to be such boundaries.
2. Where district boundaries are so indicated that they approximately follow the lot lines; such lot lines shall be construed to be said boundaries.
3. Where district boundaries are so indicated that they are approximately parallel to the center lines, or street lines of streets, or the center lines or right of way lines of highways;such district boundaries shall be construed as being parallel thereto and at such distance as given; such dimension shall be determined by the use of the scale shown on said Zoning Map.
4. Where the boundary of a district follows a stream, lake or other body of water, said boundary line shall be deemed to be at the limit of jurisdiction of the municipality unless otherwise indicated.

B. Appeals - Any party aggrieved by an interpretation may appeal to the Zoning Board of Appeals whose decision will be final. However, all decisions of the Zoning Board of Appeals are subject to court reviews in accordance with applicable Laws of the State of New York. The Burden of Proof shall be on the Appellant.

ARTICLE IV

DISTRICT REGULATIONS

SECTION 401 Agricultural/Residential (ARI) District

A. Purpose - ARI Districts are established to promote maintenance of agricultural lands as well as to allow large lot residential development. The providing of municipal sewage or water systems is not recommended or encouraged. Any uses not listed are prohibited.

B. Uses by Right (Permit Required)
Single Family Dwelling - Detached (conventional, prefab., modular)
Mobile Homes, in accordance with Section 625
Duplex - Attached
Agricultural Land Use, in accordance with Section 513
Agricultural Buildings
General Agricultural Business
Animal Farms (mink, etc.)
Sawmill - Commercial
Horticulture - Private
Mobile Homes for Storage
Nursery/Greenhouse - Commercial
Blacksmith Shop
Utilities - Public (e.g., water)
Municipal Office
Tennis Court - Private
Swimming Pool - Private, in accordance with Section 611
Riding Academy/Stable
Garage - Accessory
Customary Accessory Use (over 150 sq. ft.)
Customary Accessory Use (150 sq. ft., or less)
Storage Structure (over 150 sq. ft.)
Storage Structure (150 sq. ft., or less)
Signs, in accordance with Section 614
Open Porch or Deck (100 sq. ft., or more)

C. Uses by Special Use Permit (Hearing Required)
Boarding Homes/Bed and Breakfast
Homes for the Aged
Nursing Home/Rest Home
Multiple Dwellings - attached
Mobile Home Parks, in accordance with Section 627
Cluster Residential Development,in accordance with Section 602
Roadside Stand - General, in accordance with Section 607
Antique Shop
Bakery Shop
Catalog Store
Drug Store
Shopping Center/Mall
Florist Shop
Food Supermarket
Corner Grocery Store
Newsstand
Building Materials Store
Mobile Home/Trailer Sales
Vehicle Service Station, in accordance with Section 609
Auto Sales/Used Car Lot
Farm Machinery/Implements Store
Department/Variety Store
Feed and Seed Shop
Furniture/Appliance Store
Hardware/Glass/Paint Store
Pet Store
Plumbing/Heating Shop
Rental Store
General Service Shop, in accordance with Section 601
Limited Wholesale Business - Warehouse
Home Occupation - General, in accordance with Section 603

Laboratory and Research - Commercial
Gravel and Sand Operations, in accordance with Section 616
Gas Compressor
School - Public/Private
Airport/Airstrip/Heliport
Day Care Center
Library/Museum/Gallery
Church/Rectory
Fraternal Meeting Facility
Large Group Gathering, in accordance with Section 624
Cemetery/Crematory
Hospitals
Public Uses
Public Park
Golf Course - Private/Public
Tennis Court - Public
Commercial Recreation
Swimming Pool - Public
Recreation Camp - Private
Hunting Camp, in accordance with Section 604
Travel Trailer Park - Commercial, in accordance with Section 629
Theater
Carnival/Circus - Temporary
Rifle Range/Skeet/Gun Club, in accordance with Section 605
Game Farm/Fish Hatchery/Preserve
Windmills - Private, in accordance with Section 617
Solar System, in accordance with Section 618
Parking - Commercial Lot, in accordance with Section 612
Temporary Dwelling Units, in accordance with Section 626
Signs, in accordance with Section 614
Load/Unload Facility, in accordance with Section 613
Fences/Walls, in accordance with Section 615
Heavy Vehicle Parking, in accordance with Section 623
Temporary Mobile Home, in accordance with Section 626
Commercial Tower - , in accordance with Section 617

D. Uses Requiring No Permit (Requires Compliance with Law)
Roadside Stand Limited - Limited, in accordance with Section 607
Household Sale/Garage Sale
Gas/Oil Well
Wildlife Habitat
Forestry/Lumbering/Reforestation
Topsoil Removal, in accordance with Section 508
Outdoor Storage - Recreational Vehicle
Parking - Private, in accordance with Section 612
Customary Accessory Use (150 sq. ft., or less)
Storage Structures (150 sq. ft., or less)
Signs, in accordance with Section 614
Junk Cars - Private Property, in accordance with Section 620
Open Porch/Deck (less than 100 sq. ft.)
Trash - Private Property, in accordance with Section 622
Fences/Walls, in accordance with Section 615
Heavy Vehicle Parking, in accordance with Section 623
TV Dish Antenna

E. Area Standards - See Section 505 for substandard sized lots. Note that State Health Laws may require more area than below.

1. Single family dwellings and other allowed uses (excluding structures which house or are intended to house more than 1 family unit) shall meet the following standards:

Minimum Lot Size (sq. ft.)	87,120
Minimum Lot Width (ft.)	150
Minimum Front Yard (measured from middle of road in ft.)	100
Minimum Rear Yard (ft.)	20
Minimum Side Yard (ft.)	20
Minimum Floor Space (sq. ft.)	750

2. Attached multi-family units shall meet the following standards:

Minimum Lot Size (base)	75,000
+ square feet per unit	10,000
Minimum Lot Width (base)	150
+ feet per unit	15
Maximum Lot Coverage (% of lot area)	40
Minimum Front Yard (measured from middle of road in ft.)	100
Minimum Rear Yard (ft.)	20
Minimum Side Yard (ft.)	20
Maximum Stories	3 1/2
Minimum Floor Space (each unit)	600
Minimum Mobile Home Size (utilize manufacturer's advertised size)	600

NOTE: Refer to Articles V and VI for other requirements.

SECTION 402 Transition District

A. Purpose - T. Districts are established to provide for the maintenance of rural acreage primarily for large lot residential development as well as agricultural uses. Municipal sewage or water systems may become necessary in some instances but are not to be encouraged. Some commercial uses are allowable.

B. Uses by Right (Permit Required)
Single Family Dwelling - detached (conventional, prefab., modular)
Mobile Homes, in accordance with Section 625
Duplex - Attached
Agricultural Land Use, in accordance with Section 513
Agricultural Buildings
Agricultural Business - General
Animal Farms (mink, etc.)
Sawmill - Commercial
Horticulture - Private
Nursery/Greenhouse - Commercial
Blacksmith Shop
Laboratory and Research - Commercial
Utilities - Public (e.g., water)
Municipal Office
Tennis Court - Private
Swimming Pool - Private, in accordance with Section 611
Riding Academy/Stable

Garage - Accessory
Customary Accessory Use (over 150 sq. ft.)
Storage Structure (over 150 sq. ft.)
Signs, in accordance with Section 614
Open Porch/Deck (100 sq. ft., or more)

C. Uses by Special Use Permit (Hearing Required)
Boarding Homes/Bed and Breakfast
Homes for the Aged
Nursing Home/Rest Home
Multiple Dwellings - Attached
Mobile Home Parks, in accordance with Section 627
Cluster Residential Development, in accordance with Section 602
Roadside Stand - General, in accordance with Section 607
Antique Shop
Bakery Shop
Catalog Store
General Retail Stores, in accordance with Section 601
General Service Shop, in accordance with Section 601
Shopping Center/Mall
Florist Shop
Food Supermarket
Corner Grocery Store
Newsstand
Building Materials Store
Mobile Home/Trailer Sales
Vehicle Service Station, in accordance with Section 609
Auto Sales/Used Car Lot
Farm Machinery/Implements Store
Department/Variety Store
Feed and Seed Shop
Furniture/Appliance Store
Hardware/Glass/Paint Store
Pet Store
Plumbing/Heating Shop
Rental Store
Professional/Business Office
Bank
Truck Terminal
Drive-in Business, in accordance with Section 608
Bar
Hotel/Motel
Auto body Repair Shop, in accordance with Section 610
Vehicle Repair Shop
Building Contractor Business
Kennel Business, in accordance with Section 606
Animal Shelter
Animal Hospital
Wholesale Business - Warehouse, in accordance with Section 601
Storage of Materials/Fuel - Wholesale
Home Occupation - General, in accordance with Section 603
General Limited Industry
Gravel and Sand Operation, in accordance with Section 616
Gas Compressor
General Heavy Industry
Manufacturing - General
Manufacturing of Food Products
Vehicle Dismantling Yard, in accordance with Section 621

Machine Shop
Junk/Scrap Yard, in accordance with section 621
Mill Structure
School - Public/Private
Airport/Airstrip/Heliport
Day Care Center
Library/Museum/Gallery
Church/Rectory
Fraternal Meeting Facility
Large Group Gathering, in accordance with Section 624
Cemetery/Crematory
Hospitals
Public Uses
Public Park
Golf Course - Private/Public
Tennis Court - Public
Commercial Recreation
Swimming Pool - Public
Recreation Camp - Private
Recreation Camp - Public/Quasi-Public
Hunting Camp, in accordance with Section 604
Travel Trailer Park - Commercial, in accordance with Section 629
Theater
Carnival/Circus - Temporary
Rifle Range/Skeet/Gun Club, in accordance with Section 605
Game Farm/Fish Hatchery/Preserve
Windmills - Private, in accordance with Section 617
Solar System, in accordance with Section 618
Parking - Commercial Lot, in accordance with Section 612
Temporary Dwelling Units, in accordance with Section 626
Signs, in accordance with Section 614
Load/Unload, in accordance with Section 613
Fences/Walls, in accordance with Section 615
Heavy Vehicle Parking, in accordance with Section 623
Temporary Mobile Home, in accordance with Section 626
Commercial Tower - in accordance with Section 617

D. Uses Requiring No Permit (Requires Compliance with Law)
Roadside Stand - Limited, in accordance with Section 607
Household Sale/Garage Sale
Gas/Oil Well
Wildlife Habitat
Forestry/Lumbering/Reforestation
Topsoil Removal, in accordance with Section 508
Outdoor Storage - Recreational Vehicle
Customary Accessory Use (150 sq. ft., or less)
Parking - Private, in accordance with Section 612
Storage Structures (150 sq. ft., or less)
Signs, in accordance with Section 614
Junk Cars - Private Property, in accordance with Section 620
Open Porch/Deck (less than 100 sq. ft.)
Trash - Private Property, in accordance with Section 622
Fences/Walls, in accordance with Section 615
Heavy Vehicle Parking, in accordance with Section 623
TV Dish Antenna

E. Area Standards - See Section 505 for substandard sized lots. Note that State Health Laws may require more area than below.

1. Single family dwellings and other allowed uses (excluding structures which house or are intended to house more than 1 family unit) shall meet the following standards:

Minimum Lot Size (sq. ft.)	43,560
Minimum Lot Width (ft.)	150
Minimum Front Yard (measured from middle of road in ft.)	100
Minimum Rear Yard (ft.)	75
Minimum Side Yard (ft.)	50
Minimum Floor Space (sq. ft.)	750

2. Attached multiple family units shall meet the following standards:

Minimum Lot Size (base	40,000
+ sq. ft., per unit)	10,000
Minimum Lot Width (base	150
+ ft., per unit)	15
Maximum Lot Coverage (% of Lot Area)	40
Minimum Front Yard (measured from middle of road in ft.)	100
Minimum Rear Yard (ft.)	
Side Yard (ft.)	50
Maximum Stories	3 1/2
Minimum Floor Space (each unit)	600
Minimum Mobile Home Size (utilize manufacturer's advertised size)	600

Note: Refer to Articles V and VI for other requirements.

SECTION 403 Industrial Park (IP) "Floating" District

A. Purpose - This district is formulated exclusively for Industrial Uses with Recreational Uses also allowed. This district is not located on the map initially but instead is ready to be formed when an appropriate site is proposed by a developer.

B. Uses Permitted by Right (Permit Required)
Agricultural Buildings, in accordance with Section 513
Home Occupation, in accordance with Section 603
General Limited Industry
Electronics and Small Parts Manufacturer
Laboratory and Research - Commercial
Machine Shop
Utilities - Quasi-Public (e.g., telephone)
Public Park
Golf Course - Private/Public
Riding Academy/Stable
Ski Area - Commercial
Tent Meeting
Pond
Garage - Accessory
Customary Accessory Use
Parking - Commercial Lot, in accordance with Section 612
Parking - Private, in accordance with Section 612
Signs, in accordance with Section 614
Open Porch/Deck

Fences/Walls, in accordance with Section 615
TV Dish Antenna, (over 4' diameter)
Demolition

C. Uses by Special Use Permit (Hearing Required)
Home Occupation, in accordance with Section 603
Gravel and Sand Operation
Gas Compressor
General Heavy Industry
Vehicle Dismantling Yard, in accordance with Section 621
Junk/Scrap Yard, in accordance with Section 621
Airport/Airstrip/Heliport
Library/Museum/Gallery - Public
Large Group Gathering, in accordance with Section 624
Tennis Court - Private
Amusement Park
Swimming Pool - Private
Swimming Pool - Public
Cabins/Cottages - Commercial
Carnival/Circus - Temporary
Windmills - Private, in accordance with Section 617
Solar System, in accordance with Section 618
Temporary Dwelling Units, in accordance with Section 626
Signs, in accordance with Section 614
Load/Unload Facility, in accordance with Section 613
Fences/Walls, in accordance with Section 615

Temporary Mobile Home, in accordance with Section 626
Commercial Tower - in accordance with Section 617

D. Uses Requiring No Permit (Requires Compliance with Law)
Agricultural Land Use, in accordance with Section 513
Limited Agriculture, in accordance with Section 513
Household Sale/Garage Sale
Home Occupation, in accordance with Section 603
Gas/Oil Well
Utilities - Public (e.g., water)
Carnival/Circus - Temporary - Public-Quasi - Public Sponsor
Solar System, in accordance with Section 618
Topsoil Removal
Outdoor Storage
Parking - Private, in accordance with Section 612
Storage Structure (over 140 sq. ft.)
Temporary Dwelling Units, in accordance with Section 626
Signs, in accordance with Section 614
Farm Animals - Non-Commercial
Junk Cars - Private Property, in accordance with Section 620
Fences/Walls, in accordance with Section 615
Heavy Vehicle Parking, in accordance with Section 623
Heating Fuel Tank - Oil/Propane
Gasoline/Volatile Fuel Tank
TV Dish Antenna (4' diameter and under)

E. Area Standards - See the following sections: Substandard Sized Lots, Established Front Yards and Municipal/County Utility Systems.

Non-Residential Uses

	Primary Use	Accessory Use
Minimum Lot Size (square feet)		
Minimum Lot Width (feet)		
Maximum Lot Cover (% of Lot Area)	30%	
Minimum Front Yard (feet from street edge)	50	50
Minimum Side Yard (feet)	25	25
Minimum Rear Yard (feet)	50	50
Maximum Height (stories or feet)	2 1/2	2 1/2
Minimum Floor Space (square feet)		

ARTICLE V

GENERAL PROVISIONS

SECTION 501 Access to Public Street

For the purpose of discouraging the need for new public roadways, every building shall be constructed or erected upon a lot or parcel of land which abuts upon a public street. However, for those parcels which do not abut a public highway a permanent easement to a public street shall be required upon which a PRIVATE road may be located. The municipality shall not be responsible for assuming any private road as a municipal road.

SECTION 502 Contiguous Parcels

A. New Construction - When 2 or more parcels of land, each of which lacks adequate area and dimension to qualify for a permitted use under the requirements of the use in districts in which they are located, are contiguous and are held in one ownership, they shall be used as one lot for new construction.

B. Demolition - If a structure is demolished or destroyed it shall be permitted to rebuild a structure without utilizing contiguous parcels.

C. Pre-Existing Uses - Pre-existing dwellings can be transferred to other owners without adjacent parcels owned by the seller being transferred.

SECTION 503 Corner Lots

Both street sides of a corner lot shall be treated as front yards in the application of bulk and area requirements.

SECTION 504 Height

A. The height limitation of this Law shall not apply to church spires, belfries, cupolas, silos, penthouses and domes not used for human occupancy; not to chimneys, ventilators, skylights, windmills, water tanks, bulkheads, similar features and necessary mechanical appurtenances usually carried above the roof level. Such features, however, shall be erected only to such height as is necessary to accomplish the purpose they are to serve.

B. The provisions of this Law shall not apply to prevent the erection above the building height limit of a parapet wall or cornice for ornament (and without windows) extending above such height limit not more than 5 feet.

SECTION 505 Existing Substandard Sized Lots

The minimum area requirements specified for each type of allowed use shall not prevent the construction of an allowable use on a substandard sized lot which existed and was officially recorded at the time of enactment of this Zoning Law if the following conditions are met:

A. Reasonable attempts have been made by owners of substandard sized lots to acquire available adjacent lands in order to make the substandard lot more in conformance with the area requirements of this Law.

B. The substandard lot is not less than 75% of all of the applicable standards, and;

C. The County Health Department approves the lot.

D. If (A) and (B) cannot be met but (C) has been accomplished then the applicant can request an Area Variance from the Zoning Board of Appeals (see Variances in the Article on Zoning Board of Appeals).

SECTION 506 Visibility at Intersections

For the purpose of maintaining sight lines and promoting traffic safety on a corner lot in any district, no fence, wall, hedge or other structure, or planting more than 3 feet in height shall be erected or placed within the triangular areas formed by the intersecting street edge lines and the imaginary straight line drawn between the points 50 feet from the intersecting street edge lines along the street edge lines.

SECTION 507 Interpretation of Permitted Uses

When a use is not specifically listed as a "Use by Right" or a "Use by Special Use Permit" within any zoning district it shall be assumed to be prohibited use unless it is determined in a written decision by the Board of Appeals that said use is similar to permitted uses and not inherently a nuisance, menace or danger to the health, safety or welfare of the residents of the municipality (see Section on Variance).

SECTION 508 Topsoil/Excavation

During the construction of a foundation, general landscaping or any other extensive excavating project; a person, firm, corporation, etc., shall not strip, excavate or otherwise remove soil/gravel unless the following conditions are met:

A. Topsoil - Topsoil is replenished or left with sufficient amounts to support future development needs.

B. Steep Slopes - Steep slopes shall not be created.

C. Ground Water Runoff - Runoff will not be caused to flow into neighboring properties, to pool or cause erosion.

D. Time requirement - All of the above conditions shall be met within 6 months from the time the project is completed.

SECTION 509 Preserving Yards, Courts & Open Space (Lot Coverage)

A. Preservation of Yards, Courts and Open Space - Yards, courts and other open space shall be kept undeveloped in order to meet setback and coverage requirements of this Law except as specified in (B) below.

B. Permitted Obstructions - The following shall not be considered to be obstructions when located in the preserved yards, courts and open space:

1. Open terraces, patios, open porches, awnings and canopies, chimneys, trellises, flag poles, open fire escapes, decks, balconies and other similar uses which do not extend more than 40% of the required setback nor come closer to a lot boundary line by more than 40% of the required setback;
2. Bay windows, steps, chimneys, overhanging eaves and gutters and other similar uses shall not extend more than 3 feet from the principal structure nor come within 2 feet of any property lines,and;
3. Off street parking spaces.

C. Location - All yards, courts and open space shall be located on the same lot as the structure for which the setback and area requirements are required.

Section 510 Established Front Yards

In an existing neighborhood where structures are not set back from the edge of the road the distance specified by this Law it shall be determined by the Zoning Officer what appropriate setback will be permitted by new construction or by alterations to existing structures. The varied setback shall be based on the setback of one adjacent structure but shall not be less than 40 feet from the middle of the road. Any variation requested which is in greater variation than that permitted by this rule will require an Area Variance.

SECTION 511 Number of Buildings on Lot (Lot Division)

A. Number of Buildings on a Lot - No more than one principal

residential dwelling shall be located on a zoning lot. However, this shall not preclude the placement of an additional number of dwelling units on the same lot if required area and setbacks are available for each additional dwelling unit. Upon sale of the additional dwelling units the lots created must conform to part (B) of this section (Division of Zoning Lots).

B. Division of Zoning Lots - No zoning lot improved with a building or buildings shall hereafter be divided into 2 or more zoning lots, and no portion of any zoning lot which is improved with a building or buildings shall be sold unless all zoning lots resulting from each such division or sale, and improved with a building or buildings, shall not be less conforming to all the bulk regulations of the zoning district in which the property is located.

SECTION 512 Driveways Within Right-of-Ways

When property to be developed fronts on a State, County or Town highway and access to the highway is desired, an approved permit from the applicable Highway Superintendent for the development of such highway access shall be obtained.

SECTION 513 Agriculture

A. Agricultural Preservation - In order to promote, preserve and protect agricultural businesses any portion of this Law that would reduce operational capability of an agricultural business shall be declared void in that one instance. However, where a documented health or safety problem exists or would be created if sections of this Law were not adhered to, then, and only then, will these sections be enforced but even only to the minimum necessary.

B. Interpretation - It shall be the duty of the Zoning Board of Appeals to interpret when a "loss of operational capability" exists due to a particular section of the Zoning Law.

C. State Law - Note that State Agriculture and Markets Laws may also apply where a State Agricultural District exists and that State Law could supersede this Local Law.

ARTICLE VI

SUPPLEMENTAL REGULATIONS

SECTION 601 Development Conditions

A. Purpose - The checklist which follows shall be considered by appropriate administrators/boards in their review of requests for Building Permits, Special Use Permits and Variances. Conditions which deal with these areas of concern may be attached to Permits/Variances in order to reduce or eliminate problem areas, conflicts between incompatible uses and generally to reduce health, safety or general welfare related problems. This checklist is not all inclusive and other related conditions may be imposed where reasonable and

necessary and in accordance with this Zoning Law.

B. Areas of Concern

1. Traffic Safety - Ingress/egress from roadway, building setbacks, corner visibility, offstreet parking, offstreet loading.
2. Safety - Trash disposal, steep slopes, open pits, toxic or flammable fluids.
3. Health - Sewers/water, sunlight, air movement, junk vehicles and trash storage.
4. Character of Neighborhood - Development density, traffic volume,lot sizes, compatible uses, buffers.
5. Public Costs - Road damage, need for new roads, need for new utilities.
6. Environmental Protection - Flood plain, wetlands, erosion, natural features.
7. Nuisances - Noise, odor, dust, lights, hours of operation, lot size, buffers, nuisance location.
8. Land Use Preservation - Open space unique features.
9. Aesthetics - Restoration, appearance, scenic views, buffers.

SECTION 602 Cluster Development and Subdivision of Land

A. Purpose - The purpose of this section is to provide developers of residential subdivisions with the option of clustering by permitting reductions in bulk and area requirements of this Law. In return the developer would compensate for the increased density by guaranteeing that selected natural features (woods, stream, open area, etc.) would be maintained for common use.

B. Procedure

1. Application Procedures - Developers requesting decreased densities for subdivisions should submit an application to the Zoning Officer who should refer the application to the Planning Board for their review and recommendation. A copy of the application shall also be presented to the Municipal Board at a regular meeting. The Planning Board shall make their recommendation in writing to the Municipal Board within 30 days of receipt of the complete application.
2. Contents of Application - The application shall include but not be limited to the following:

a. Overall development plans drawn to scale showing: exact size, shape and location of lot to be built upon. Kind, location, occupancy capacity of structures, bulk and uses; general floor plan of buildings, location and definition of open spaces,streets and all other means for pedestrian and vehicular circulation, parks, recreational areas and other non-building sites; provisions for automobile parking and loading, including size, arrangement and number of spaces and placement of lighting standards; general landscape plan, general location and nature of public and private utilities (including underground utilities) and other community facilities and services (including maintenance

facilities). Additional information related to water run off control, slope, contour, type of building, etc.; area to be utilized for storage of materials and type of architectural screen to be used shall be provided.

b. Area Requirements - Requests for area concessions shall include facts concerning the suitability of the site, the proposed density, the location and proposed uses and facilities for development, in accordance with the provision of this Law.

c. The applicant shall include such other pertinent information as the Planning Board shall prescribe.

3. Decisions - The Municipal Board shall approve, approve with conditions or disapprove such applications. The decision of the Board shall be accomplished within 60 days from when all necessary information has been supplied by the applicant.

C. Standards

1. Area Alterations - The regulations of the district in which the Cluster Residential Development is proposed for, shall be observed and maintained with the following exceptions: all area and bulk requirements may be reduced by up to 30% as determined by the Municipal Board as long as County Health Regulations are met.
2. Open Space - Open space land shall be set aside for the common use and enjoyment of all residents in the Cluster Residential Development. In general, the land set aside for permanent open space shall be the area differential between the regulations and requirements of the district and the requested requirements. Access to the open space lands must be convenient to all residents.

SECTION 603 Home Occupations

A. Conditions for Home Occupations - To be allowed in any district, Customary Home Occupation must be listed under uses allowed for the district in question and additionally, the following special standards must be met:

1. Floor Space - Not more than 40% of the first floor of the principal dwelling structure may be used and the total floor space to be utilized (including accessory buildings) shall not exceed 500 square feet.
2. Non-Resident Employment - No more than 1 non-resident shall be employed.
3. Parking - Sufficient off street parking shall be provided to handle peak volumes.
4. Signs - A sign no more than 20 square feet shall be allowed.
5. Nuisances - No offensive noise, vibration, smoke, dust, odors, heat or glare shall be produced which would be detrimental to neighboring properties.
6. Lot Size - The minimum lot size shall be 25% greater than the specified area.

7. Uses Allowed - Allowed uses shall include but not be limited to:antique shops, gift shops and blacksmith shops.
8. Prohibited Uses - Shall include but not be limited to: auto body repair shops.
9. Character of Neighborhood - The presence of a Customary Home Occupation shall have a minimal effect on the character of the neighborhood.

B. Eligibility - Uses not eligible for Home Occupation status possibly may be eligible for a Business Use Permit.

C. Pre-existing Home Occupations - Home occupations legally existing at the time of enactment of this Law shall not be required to comply with any of the above conditions.

SECTION 604 Seasonal Hunting Camps

For the purpose of preserving rural character and providing protection for existing uses, seasonal recreation camp shall be subject to the following:

A. Conditions

1. Lot Size - A minimum lot size between of 10 acres shall be required.
2. Structure Location - A minimum setback of 200 feet shall be required.
3. Construction - The type, size and method of construction shall be considered. If a mobile home is to be used it must meet floor space requirement of the district.
4. Buffer Zones - Existing natural buffers should be retained to the greatest degree possible and new buffers should be considered where it is apparent that they are necessary.
5. Year round Conversion - The conversion of seasonal camps to year round housing or any other allowed uses shall be allowed only by Special Use Permit.
6. Access to Public Roads - Seasonal camps must have access to public streets in accordance with the Section on "Access to Public Streets" or a 50 foot public right-of-way shall be required.
7. Other Requirements - Other reasonable conditions may be required as deemed necessary.

B. Pre-existing Parcels - This section shall only apply to parcels of land which are purchased after the effective date of this Law.

SECTION 605 Shooting Ranges - Commercial

A. Purpose - In order to promote safety and the general welfare of the public and to maintain the quality of neighborhoods the following regulations are to be enforced for all commercial ranges. New ranges shall be allowed only in accordance with the following conditions.

B. Conditions - The operation of a commercial range such as a shooting club shall be subject to the following conditions:

1. Safety Considerations - All ranges shall be so located and directed so as to present the safest situation possible with respect to the existing neighborhood.
2. Time of Day - Ranges shall only be utilized for Target practice for the period specified in the permit.
3. Character of Neighborhood - The density, types of structures, etc., shall be considered.
4. Other Conditions - Unlisted conditions deemed necessary.

SECTION 606 Kennels

A. Permit - The application shall include a diagram drawn to scale which displays the kennel building(s) and all other inhabited dwellings in the vicinity, information on buffers, number and type of animals, and any other information deemed necessary.

B. Definitions - Any premises on which 5 or more dogs or cats over 6 months old are housed, groomed, boarded, trained or sold for monetary gain.

C. Conditions to be Considered

1. Closeness to adjacent properties (minimum 500 feet);
2. Maximum number of animals to be maintained;
3. Effect on character of neighborhood, and;
4. Existing or proposed natural or man made buffers.

D. Pre-existing Kennels - Kennels in existence prior to the passage of this Law shall not be subject to regulations under this section, generally. However, if an existing kennel becomes a nuisance any of the above conditions can be imposed after public hearing.

SECTION 607 Roadside Stand

A. Definition - For the purpose of this Law, roadside stands shall be made up of 2 types; General Roadside Stand and Limited Roadside Stand.

1. General Roadside Stand - Produce and products sold are not necessarily grown or produced on premises where stand is located.
2. Limited Roadside Stand - All produce and products are grown or produced on the premises (lots) where the stand is located and are sold only by the owner(s) of said premises.

B. Regulations

1. General Roadside Stand - Permitted, in accordance with appropriate portions of Section 601 (Business Use Condition).
2. Limited Roadside Stand - Permitted with no permit as long as safe entry and exit and off street parking are provided.

C. Pre-existing Uses - All pre-existing roadside stands are exempt from this Law.

SECTION 608 Drive-in Establishment

A. Definition - Drive-in establishments shall include those businesses designed to either wholly or partially provide services to customers while in their automobiles parked on the premises. Example: Included but are not limited to: drive-in theaters, restaurants, film shops, etc.

B. Regulations - Drive-in establishments shall be allowed by Special Use Permits in districts where they are listed and the following conditions shall be considered prior to granting the permit:

1. Section 601, Business Use Conditions;
2. Provisions for traffic to "back-up" off of streets shall be made;
3. Locational considerations will be analyzed to insure that the character of the neighborhood will not be significantly diminished;
4. Hours of operation, and;
5. The need for buffers especially when situated near residential structures.

SECTION 609 Service Stations

A. Entrance/Exit - No public garage, or motor vehicle service station, or private garage for more than 5 vehicles shall have a vehicular entrance closer than 200 feet to an entrance to a church, school, theater, hospital, public park, playground or fire station. Such measurement shall be taken as the shortest distance between such entrances across the street and along the street frontage if both entrances are on the same side of the street or within the same square block.

B. Location of Pumps - All motor vehicle service stations shall be so arranged and all gasoline pumps shall be so placed as to require all servicing on the premises and outside the public way, and; no gasoline pump shall be placed closer to any side property line than 50 feet.

C. Inoperative Vehicles - No inoperative motor vehicle awaiting repair shall be kept on the premises of motor vehicle service stations for longer than 2 weeks.

D. Waste Materials - All waste material, motor and motor parts will be stored within the structure or enclosed within fencing so as not to be visible from off the property.

E. Pre-existing Uses - All service stations existing at the effective date of this Law shall comply with the following regulations of this Section (C) and (D). Compliance shall take place within one year. All expansions or enlargements shall be subject to all regulations in this Section which are determined to be reasonable during Special Use Permit proceedings.

SECTION 610 Auto Body Repair Shops

Commercial Auto Body Repair Shops shall be allowed in any

Districts when specifically listed as an allowed use under the following conditions:

A. Vehicle Storage - When more than 3 vehicles are stored outside they shall be enclosed within an appropriate fence which shall make it impossible to view the vehicles.

B. Hours of Operation - The hours of operation shall be derived so as to limit the noise during non-business hours.

C. Area Requirement - The lot on which the shop is to be located shall be a minimum of 3 acres.

D. Location - The shop shall be allowed only if it is to be located at least 400 feet from existing residential structures on adjacent parcels.

E. Other Conditions - Other conditions as deemed necessary by the Zoning Board of Appeals (see Section 601, Development Conditions).

SECTION 611 Private Swimming Pools

A private swimming pool installed as an accessory to a residential use shall meet the following requirements:

A. Fence - Any such pool which is installed in-ground shall be completely enclosed by a security fence not less than 4 feet in height and for all pools there shall be gates or doors equipped with self-closing and self-latching devices designed to keep and capable of keeping such gates or doors securely closed at all times when not in actual use.

B. Filtration System/Noise - Pools which are equipped with an integral filtration system and filter pumps or other mechanical devices shall be so located and constructed as not to interfere with the peace, comfort and repose of the occupant of any adjoining property.

C. Maintenance - Both in-ground and above-ground pools, accessory buildings, fences, etc., shall be properly maintained.

D. Draining - The Zoning Officer shall be insured that provisions for the drainage of such pools are adequate and will not interfere with adjacent properties.

E. Area Requirements - Pool shall be installed, in accordance with the area requirements of the appropriate district.

SECTION 612 OffStreet Parking

A. Purpose - Offstreet parking space(s) with a proper and safe access shall be provided within a structure or in the open to serve adequately the uses on each lot within the district. Any application for a Zoning Permit for a new or enlarged building structure or change in use shall include with it a sketch fully dimensioned showing any parking in compliance with the regulations of this Law.

B. Size Requirements - A required off street parking space shall be an area of not less than 162 square feet, not less than 8 1/2 feet wide by 19 feet long, exclusive of access drivers or aisles, ramps, columns or office and work areas, accessible from streets or alleys, or from private driveways, or storage or parking of passenger automobiles or commercial vehicles under 1 1/2 ton capacity. Aisles between vehicular parking spaces shall not be less than 12 feet in width when serving automobiles parked at a 45 degree angle in one direction not less than 20 feet in width when serving automobiles parked perpendicular to the aisles and accommodating two-way traffic.

C. Street Access - Parking facilities shall be designed with appropriate means of vehicular access to a street or alley in such a manner as will at least interfere with the movement of traffic.

D. Location - It is recommended but not mandatory that no parking space not portion thereof established on the same zoning lot with a building shall be located within a required front yard and no parking spaces nor portion thereof established on a lot without a building shall be located closer to any street line than the front yard setback requirements of this Law in the same manner as a building or structure. The aforementioned required setbacks shall not be applicable to Residential Driveways which may be used for parking.

E. Material Composition - All open offstreet parking space, except those accessory to single family dwellings, duplexes and farm operations shall be surfaced with some all weather dustless materials.

F. Number of Spaces - The following parking spaces shall be provided and satisfactorily maintained by the owner of the property for each use which after the date when this Law becomes effective is erected, enlarged or altered for use for any of the following reasons:

Uses	Minimum of 1 Space Per
One Family Residence & Mobile Home	1/2 Dwelling Unit
Two Family Residence	1/2 Dwelling Unit
Multi-Family Residence	1/2 Dwelling Unit
Church	5 Fixed Seats
Home for Aged	3 Residents
Elementary School	20 Students
High School & College	12 Students
Library	100 Sq. Ft.
Places of Assembly Inc., Convention Hall & Dance Hall	100 Sq. Ft.
Club, Lodge (w/out Sleeping Accommodations)	4 Members
Places Providing Sleeping Accommodations, Inc., Hotels, Motels & Tourist Homes	Sleeping Unit
Mortuaries or Funeral Parlors	1/8 Viewing Room, plus 1

Offices & Banks	for Every Employee 100 Sq. Ft., Floor Area
Food Market	200 Sq. Ft., Floor Area
Eating & Drinking Establishments	4 Seats or 1 for each 200 Sq. Ft., Floor Area, Whichever is More
Bowling Alley	1/2 Alley
Other Commercial	300 Sq. Ft., Sales Area
Industrial	Employee (max. Work Shift)
Other Uses not Listed Above	500 Sq. Ft., Floor Area
Farm Operations	Exempt

SECTION 613 Loading & Unloading

A. Need - Offstreet loading and/or unloading spaces for non-farm commercial vehicles while loading and/or unloading shall be provided for new uses where it is deemed that such facilities are necessary to serve the use or uses on the lot. At least 1 off street loading and/or unloading space shall be provided for all non-farm commercial establishments in excess of 3,500 square feet of floor area.

B. Size - Each loading and/or unloading space shall be at least 14 feet wide, 60 feet long and shall have at least a 15 foot vertical clearance and shall have a 60 foot maneuvering area. Refer to Variance Section where this requirement cannot be met.

C. Use of Parking Spaces - Parking space shall not be used for loading and/or unloading purposes except during hours when business operations are suspended or if pedestrian and vehicle traffic will not be obstructed.

D. Design - Loading and/or unloading facilities shall be designed so that trucks need not back in or out or park in any public right of way. No truck shall be allowed to stand in a traveled cartway or pedestrian walkway or in any way block the effective flow of persons or vehicles. The loading and/or unloading area shall have an all weather surface to provide safe and convenient access during all seasons.

E. Pre-existing Uses - Any use existing as of the effective date of this Law shall not be subject to this section.

SECTION 614 Signs

A. Purpose - The intent of this section is to preserve and enhance the Commercial and Industrial Districts by encouraging signs in character and scale with individual buildings and with the municipality to avoid a chaotic, unsafe or unattractive clutter of signs by prohibiting signs or advertising devices which are inappropriate in size or type to municipal character, and to protect the character of

the Residential Districts by strictly limiting signs within them.

B. Administration

1. Permits Required - Except as listed in paragraphs (B2) and (B3), a Zoning Permit shall be required before an outdoor sign is created, altered, relocated or enlarged. A permit shall not be issued until all applicable sign regulations are met. All requests for permits must be accompanied by a plan drawn to scale showing the exact size, shape, location and type of sign.
2. Exempt Signs - The following signs shall be exempt from all regulations of this section: public signs such as directional, street, traffic and personal identification signs not more than 2 square feet in size.
3. Signs Requiring No Permit - The following signs shall be subject to all regulations of this section but shall be exempt from obtaining a permit as required above:
   a. Temporary signs to include contractor signs, political signs and fruit stand signs (see C3e below);
   b. Non-illuminated indoor signs;
   c. Realty signs, and;
   d. Household sale signs (see C3d below).

C. Specific Regulations by Sign Type - Specific regulations shall take precedence over the more general sign regulations.

1. Signs Attached to Buildings
   a. No sign shall project more than 12 inches from the building wall on which it is attached;
   b. No sign shall project higher than the roof line;
   c. No sign shall be permitted to be mounted on the roof of a building above the roof line;
   d. No sign shall extend higher than 18 feet in height as measured from the ground, and;
   e. No sign shall be so located as to overhang above a walkway or a right of way.
2. Freestanding Signs - Freestanding signs where allowed shall be in accordance with the following:
   a. Height - A maximum height of 18 feet from the ground to the top of the sign shall be allowed;
   b. Setback - Freestanding signs shall be set back a minimum of 25 feet from the road edge.

3. Temporary Sign Regulations - The following specific regulations shall apply to temporary signs:
   a. Contractor signs shall be allowed during periods from when the job commences and is completed. The sign must be removed if substantial progress on the job is not taking place. The maximum size shall be 10 square feet.
   b. Political signs up to 10 square feet in size shall be allowed 4 weeks before and 1 week after the election and it shall be the responsibility of the candidate to comply with this regulation. Permission from the property owner must be received prior to sign placement.
   c. Sandwich signs in Business Districts shall be

allowed when located on premise when located within 3 feet of the building and when there is at least 9 feet of clearance between the sign and the edge of the street curb. The size of the sign shall not exceed 3' x 5' in size. However, sandwich signs shall not be allowed from November 1 through March 31.

d. Household sale signs shall be permitted, in accordance with the following regulations:
   1. Maximum Size - No more than 4 feet high by 4 feet wide;
   2. Maximum Number - No more than 2 signs shall be used and permission must be received from property owners where off premise signs are located;
   3. Location - Signs shall not be placed on "off premise" trees or utility poles;
   4. Illumination - Signs shall not be illuminated, and;
   5. Time - Household signs may be erected on the day the sale starts and must be removed on the last day of the sale.

e. Seasonal On Premise Roadside Stand Signs shall be allowed, in accordance with the following conditions:
   1. Maximum Size - No more than 4 feet high by 4 feet wide;
   2. Maximum Number - No more than 2 signs shall be used per property with more signs requiring a permit;
   3. Location - Signs shall not be placed on off premise trees or utility poles;
   4. Illumination - Signs shall not be illuminated;
   5. Time - Roadside stand signs shall only be permitted during the season in which the agricultural product being sold is available, and;
   6. Permits - No permit shall be required for seasonal on premise roadside stand signs.

f. Real Estate Signs up to 10 square feet in size shall be allowed until 1 month after the sale is finalized.

g. Signs for Quasi-public uses to include: churches schools, libraries, hospitals and nursing homes shall be a maximum of 25 square feet in size and shall require a Special Use Permit. If the sign is to be freestanding it shall be set back 15 feet from the street edge.

4. Billboards shall only be allowed under the following conditions:

   a. Off Premise Billboards

      1. Advertises tourist oriented businesses located within the township;
      2. A maximum of 4 signs for each business;
      3. A maximum size of 600 square feet for each sign, and;

4. Maximum height of 100 feet.

b. On Premise Billboards

1. Advertises tourist oriented businesses located with the township;
2. A maximum of 4 signs for each business;
3. A maximum cumulative sign size of 800 square feet or 1,500 square feet for a "Multiple Use Business" and;
4. Maximum height of 100 feet.

5. Interior Illuminated Window Signs - Inside illuminated signs shall be a maximum of 2 square feet each and no more than 5% of the front window area can contain such signs. No permit is required. More than these maximum limits would require a Special Use Permit.

6. Residential Development Signs - Any sign allowed for a subdivision or multiple family development shall be allowed by Special Use Permit. A maximum size of 50 square feet shall be permitted and said signs may be illuminated lightly.

7. Home Occupation Signs - See supplemental section on Home Occupations.

D. General Regulations for Business Signs - The following general regulations shall only apply to signs for which regulations covered herein, are not covered in other more specific subsections.

Permit Type For Business Signs Business			Size of Signs-(max.Sq.Ft.)	
Districts	On Prem.	Off Prem.	On Prem.	Off Prem.
ARI,T,IP	R-3/	N/A	50-2/	N/A

LEGEND: R - By Right Permit
N/A - Not Allowed

Notes: 1/ The sign size provided represents the maximum square feet allowed per business.
2/ Or 20% of the store front, whichever is greater
3/ Sign proposed to be located 100 feet or less from a Residential District shall require a Special Use Permit

Signs	Maximum Number	
District	Primary	Secondary
ARI,T,IP	2	2

Note: More than the maximum number of signs shall be allowed by Special Use Permit with conditions attached if it can be accomplished in good character with the neighborhood and does not exceed size requirements.

E. General Regulations

1. Condition
   a. Every permitted sign must be constructed of durable materials and kept in good condition and repair.
   b. Any sign which is allowed to become dilapidated may be removed by the municipality at the expense of the owner or lessee of the property on which it is located.
2. Location
   a. Traffic
      1. No sign shall be so located that the sign might interfere with traffic, be confused with or obstruct the view or effectiveness of any official traffic sign,signal or marking.
      2. No sign shall be stapled, pasted or otherwise attached to utility poles or trees within a road or street right of way.
   b. Ingress/Egress
      1. No sign shall be located which shall prevent free ingress or egress from any window, door or fire escape.
      2. No sign shall be so placed that it will obscure light and/or air movement from a building.
3. Illumination
   a. No off premise neon signs are permitted. Any existing off premise neon signs must be removed within 6 months from the date of this ordinance.
   b. Illuminating arrangements for signs shall be such that the light is concentrated on the sign with a minimal spillover cast on the street, sidewalk or adjacent properties.
   c. Signs which contain, include or are illuminated by any flashing, intermittent or moving lights are prohibited.
4. Moving Parts
   a. No signs shall utilize moving parts.
   b. Pennants, banners, flags, bunting whirligigs or other similar attention getting devices shall not be permitted where its purpose is to advertise or bring attention to a commercial business operation. This provision does not apply to the displaying of a national, state or other flags not intended for advertising.

F. Cessation

1. If a use ceases for a period of 1 year all detached signs must be removed.
2. Such signs may be removed by the municipality at the expense of the owner or lessee of the property on which the sign is located if the sign has not been removed after 30 days notice.

G. New York State Regulations

1. New York State Highway Regulations related to outdoor advertising shall also apply where applicable.

H. Pre-existing Signs

1. General Regulations Covered - Legally existing non-conforming signs shall be required to comply with the following general paragraphs:

a. Part E1b, Dilapidation, and;
b. Part F, Cessation.

2. Compliance - Sign owners notified of a violation shall respond within 30 days of receipt on how they intend to comply. Compliance shall take place within 3 months of notification.

SECTION 615 Fences

For the purpose of protecting properties adjacent to fences and walls from indiscriminate placement, unsightliness, related health and safety problems, etc., the following rules and standards shall apply:

A. Definition - Fences shall for the purpose of this Law include hedges and walls and are further defined in Section 202.

B. Administration (Permit Requirements)

1. Boundary Fences - If a boundary fence is to be located more than 150 feet from structures on adjacent parcels NO PERMIT is required. If the distance is 150 feet or less then a Special Use Permit shall be required. Fences less than 4 feet high require no permit.
2. Non-Boundary Fences - If a Non-boundary fence is to be located more than 50 feet from a property boundary then NO PERMIT shall be required. If the distance is 50 feet or less a Special Use Permit shall be required. Fences less than 4 feet high require no permit.
3. Fire Hazard - Any fence which is flammable or positioned in such a manner so as to be excessively disruptive to extinguishing a fire shall be prohibited.
4. Finished Sides - The finished sides of all fences must face adjacent properties. This rule can be waived if agreed to in writing by adjacent property owners.
5. Maintenance - All fences shall be maintained structurally and visually.

C. Pre-existing Fences - Fences in existence at the time of enactment of this Law shall only be subject to the maintenance provisions of this section. Compliance shall take place within 1 year of enactment of this Law.

SECTION 616 Gravel Operations

A. Purpose - Gravel pits not regulated by the NYSDEC shall be regulated by this section; the purpose being to limit the nuisances associated with gravel pits and to insure that residential neighborhoods are protected.

B. Conditions

1. Equipment Location - No excavation, power activated sorting machinery or equipment, blasting or stockpiling shall be allowed with 300 feet of any residential structures located on adjacent parcels unless permission to waive this requirement is received in writing from adjacent property owners. No power activated sorting machinery or equipment shall be located within 100 feet of any public road or other property line unless permission to waive this requirement is received in writing from adjacent property owners.

2. Fencing - Fencing of all pits, excavations, etc., during and following cessation of operations until such time as reclamation is completed per state approved reclamation plan may be required if an unsafe condition warrants such a fence as determined by the Zoning Officer. The owner of the operation may appeal the Zoning Officer's decision to the Zoning Board of Appeals. When considering the appropriateness of fencing the following shall be taken into consideration: Neighborhood character, type of operation, size of lot, population in surrounding area,topography, traffic volume, etc.
3. State Requirements - In addition, all New York State Department of Environmental Conservation Regulations on Mined Land Reclamation shall apply covering the following areas:
   a. State Permit;
   b. Mining Plan - Affected land, procedures, disposition of materials, haulage ways, pollution prevention (dust, noise control, drainage and water control) screening;
   c. Reclamation Plan - Specific land use objective for reclaimed land, disposition of materials, treatment of haulage ways, drainage, water impoundments, grading and slopes, screening, revegetation, schedule of implementation;
   d. Reclamation Bond - Posted as determined by NYSDEC.

SECTION 617 Commercial Towers/Windmills

Commercial Towers and windmills in districts where allowed shall be subject to the following conditions:

A. Location - Towers and windmills shall be removed from surrounding residential structures sufficiently so as to not cause a nuisance due to appearance or other factors. As a minimum the base of a tower shall be at least 100 feet or 30% of the tower height, whichever is greater, from all property lines. (Mount on buildings/towers,etc.)

B. Buffer - The placement or retention of buffers shall be required where they would improve the compatibility of the use with surrounding areas. The retention of existing vegetation shall be addressed.

C. Safety-The base of a tower shall be sufficiently protected from entry either by tower design or by protective fences, etc.. Where guy wires are utilized, the anchor points shall be sufficiently protected to minimize the possibility of hitting the guy wires with recreational vehicles. Additionally, a sign shall be conspicuously placed near the base of a communications tower and it shall generally state that DANGER exists and that no access is permitted.

D. Lighting-The MINIMAL amount of lighting necessary to meet state and federal regulations shall be considered for all towers. The FAA has various lighting options and they must all be considered. Light pollution or light spillover shall be minimized to the greatest degree possible. The applicant shall fully disclose methods and plans for protecting nearby and distant properties from light spillover.

E. Aesthetic Impact-The base of the tower and any accessory buildings shall be appropriately screened. Consideration will be given to the type and design of uses found in the area of the tower. Landscaping and materials used for accessory buildings shall be specified. The entire facility must be reasonably compatible with the surrounding environment. Maintenance of existing vegetation shall be considered as will the color, material and design of the tower so as to minimize the negative aesthetic impact.

F. Co-location-In order to minimize tower proliferations, applicants must show proof that they have exhausted all reasonable alternatives for sharing space on existing towers. (Space on tower, structural capacity, frequency interference, service area, comparable cost).

G. Inspections-Periodic inspections of towers may be required to ensure structural integrity. The frequency of inspections shall be specified with five year intervals recommended. Inspections shall be conducted by a licensed engineer. Based on the results of an inspection, repair or removal may be required.

H. Abandonment-Tower owners shall notify the municipality in writing when a tower is no longer in use and shall remove all towers that have not been used for a twelve month period. Removal shall be within six months of written notification. Owners may request a Special Use Permit hearing to ask for an extension for just cause.

I. State Environmental Quality Review Act-In complying with SEQR, the "visual addendum" should be utilized to assist in the review of the tower proposals.

J. Other Regulations-State and Federal regulations covering towers must be complied with and documented.

K. Required Notification-Property owners within 100 feet, airport operators and other potentially affected landowners shall be notified.

L. Non-Inteference-A certified statement that the operation of the tower will not interfere with usual and customary transmission of radio and television service enjoyed by nearby residential and non-residential properties. Pre-tower testing may be required in order to gauge post-tower interference.

M. Pre-existing Towers-All towers which exist at the time of enactment of this section may be required as necessary to comply with B, C, D, E, G, H and I of this section. At a Special Use Permit hearing, the conditions to be met will be specified along with a reasonable time period for implementation.

SECTION 618 Solar Systems

In order to promote and protect the use of solar systems (active and passive) the following regulations shall apply:

A. Solar Permit and Placement - The placement of structures which are to contain solar systems shall be by Special Use Permit IF protection is to be sought under Part (B) of this section. If no protection is sought for a solar system then no permit shall be required for the installation unless the floor space is increased. Consideration will be given to locating the solar structure the furthest distance from adjoining properties on the southern exposure which is reasonably possible. This distance shall be a minimum of 100 feet and may be required to be more if the slope so dictates.

B. Adjacent Property Control - The placement of structures, trees, towers, etc., which have the potential of blocking the sun from adjacent solar systems established by Special Use Permit under Part (A) of this section shall also only be allowed by Special Use Permit. The placement of said potential obstruction shall be such that it least interferes with the adjacent solar collectors while still allowing reasonable use of the land.

C. Notification - The owners of all properties within 200 feet of the property on which the solar system is to be placed will be notified in writing of the intent to place a solar system in the neighborhood and the possible effects that this could have on future development. The date, time and location of the public hearing shall be included in the notification.

SECTION 619 Unsafe Structures

A. Purpose and Definition - The purpose of this section is to identify obvious unsafe structures and through a series of district steps eliminate the safety problem in an equitable manner. An unsafe structure shall be defined as any structure which due to inadequate maintenance, dilapidation, obsolescence, fire/wind or other similar types of damage becomes structurally unsafe, unsanitary or in any other way is dangerous to human life. Such unsafe structures shall for the purpose of this Law be declared illegal.

B. Initial Identification - When a potentially unsafe structure is brought to the attention of the Zoning Officer, the Zoning Officer shall inspect the structure within a five day period.

C. Written Request - A written report of the findings shall be submitted to the Municipal Board and if applicable the County Health Department shall receive a report also.

D. Notification of Owners - If the report indicates that remedial actions are necessary the owner(s) of the property shall be notified in writing with the defects listed, the corrective actions necessary and a time schedule for completing the work. The time allowed shall be reasonably set in accordance with the amount of work involved in correcting the problem. The owner may appeal to the Zoning Board of Appeals if he believes the work to be accomplished or the time frame is not appropriate. A public hearing shall be scheduled to hear the variance/interpretation request with a written decision resulting.

E. Prohibition of Occupancy - If at any time the Municipal Board upon reviewing all reports determines that there is actual and immediate danger of failure or collapse, health or other serious safety problems which endanger life they may order the property vacated forthwith and that it not be reoccupied until the specified repairs and improvements are completed, inspected and approved by the Zoning Officer. The Zoning Officer shall post a notice at each entrance stating: THIS BUILDING UNSAFE AND ITS USE OR OCCUPANCY HAS BEEN PROHIBITED BY THE ZONING OFFICER. Such notice shall remain posted until the required repairs are made or demolition is completed. It shall be unlawful for any person, firm or corporation, or their agents, or other servants to remove such notice without written permission of the Zoning Officer or for any person to enter the building except for the purpose of making the required repairs or of demolition of the same.

F. Non-Compliance - In case the owner, agents or person in control cannot be found within a reasonable period of time or if such owner, agent, or person in control shall fail, neglect or refuse to comply with notice to repair, rehabilitate, or demolish such building or structure or portion thereof, the Municipal Board shall be advised of all the facts in the case and shall institute an appropriate action to remedy the situation and the cost thereof shall be added to the taxes on that parcel of property.

SECTION 620 Junk Cars - Private Property

A. Number of Junk Vehicles Allowed - A maximum of two (2) junk vehicles shall be allowed to be maintained outdoors on any premises in the Town of Villenova by the Landowner(s). More than two (2) junk vehicles shall constitute a vehicle dismantling yard and be subject to regulations in the dismantling/scrap yard section.

B. Location - Any additional junk vehicles other than the permitted two (2) set forth in paragraph (A) above shall be stored inside a building or in a place on the premises out of sight so as not to be visible from any public highway and/or adjoining parcels of property.

C. The Definition of Landowner - For the purpose of this section shall include the record title owner(s) of the premises, a life tenant, a tenant under a written or unwritten lease, a month to month tenant, squatters, a tenant by sufferance or any other person who occupies the premises with or without the owner's permission. Any such person described herein who drives, carries or places directly or indirectly, a junk vehicle on any premise located in the Town of Villenova knowing that two (2) other junk vehicles are already located out-of-doors on the premises shall be in violation of this section.

D. Pre-existing Junk Cars - All junk vehicles existing at the effective date of this Law shall be brought into compliance with this section within thirty (30) days from the date of adoption and filing of this Zoning Law.

SECTION 621 Vehicle Dismantling-Scrap Yards

A. Conditions - Prior to the granting of a Special Use Permit assurances will be received that the following conditions, where appropriate, will be met:

1. Fences
   a. Vehicle dismantling and scrap yards shall be completely surrounded with a fence for screening and security purposes of at least 8 feet in height.
   b. There shall be located a gate in the fence which shall be kept locked at all times except when the vehicle dismantling or scrap yard is in operation.
   c. The fence shall be located a minimum of 125 feet from adjacent public highways.
   d. All dismantling and work on the vehicles or scrap shall take place within the fenced area.
2. Location Considerations
   a. Vehicle dismantling and scrap yards shall be allowed where there will be a minimum negative effect on the character of existing neighborhoods.
   b. No vehicle dismantling or scrap yard shall be permitted within 500 feet of a church, school, public building or other place of public assembly.
   c. Vehicle dismantling and scrap yards shall not be permitted to be located upon sloped areas where an 8 foot fence will not reasonably screen the contents.
3. Off Street Parking - Sufficient off street parking shall be provided for customers.
4. Fire Safety
   a. The Fire Inspector shall be notified prior to the granting of a Special Use Permit for a vehicle dismantling or scrap yard and be given 30 days within which to make recommendations.
   b. Inside, adjacent to and contiguous with the fence, a strip of land at least 10 feet wide shall be kept clear of all dry grass or other growth or combustible material so as to provide a fire lane around the whole area.
   c. There shall be maintained at least one (1) fire extinguisher of approved design and capacity for each 40,000 square feet of area. Each fire extinguisher shall be hung or mounted in a conspicuous place, clearly marked and visible.
   d. All vehicles and scrap shall be disassembled or dismantled by means other than burning. It shall be arranged in neat rows so as to permit easy, clear passage through the area.
5. Visual Considerations
   a. There shall be no stacking of vehicles of scrap above 8 feet in height from the ground.
   b. An appropriate buffer shall be established between adjacent properties.

6. Minimum Lot Size
   a. Adequate acreage shall be available to handle present and future needs of proposed vehicle dismantling or scrap yards.
7. Other Considerations
   a. Suitable sanitary facilities shall be provided in accordance with State Health Laws.
   b. Inspection of vehicle dismantling and scrap yards shall be allowed at any reasonable time to insure compliance with this and other Laws.
   c. Reasonable hours of operation may be specified.
   d. Other reasonable conditions may be imposed as is deemed necessary.

B. Pre-existing Vehicle Dismantling and Scrap Yards - Vehicle dismantling and scrap yards in existence before the enactment of this Law shall be subject to the following: (A1) Fences, (A4) Fire Safety and (A7) Other Conditions. Compliance shall take place within a reasonable period of time as determined by the Planning Board. In addition, any expansion of enlargement of any pre-existing yards shall be subject to all of the regulations of this Law when they can be reasonably enforced as determined by the permitting board.

SECTION 622 Trash Storage on Private Property

A. Quantity Allowed (New Trash)
   1. Trash originating from the parcel on which it is placed shall be allowed temporarily up to 500 cubic feet. However, if it is determined by the Zoning Board of Appeals without a doubt that a health and/or safety problem exists then the landowner has thirty (30) days, weather permitting, from the notification in which to remove the trash in violation.
   2. Trash originated from outside of the township shall not be allowed to be dumped on any parcel within the township.

B. Definition of Trash - Glass, scrap metals, salvaged metals, rags, refuse, garbage, wastepaper, salvaged machines, appliances, or similar materials, etc., but not to include: wood piles, lumber, building materials, compost, used farm machinery, etc., which shall be stored in compliance with residence setback lines.

C. Buffers (Locations)
   1. All new accumulations of trash created after the enactment of this Law shall be out of sight of highways and adjacent properties to the greatest degree possible. Additionally, new accumulations of trash shall be placed a minimum of 200 feet from any parcel boundary or public roadways.
   2. Pre-existing accumulations of trash which are clearly visible from reasonable locations on adjacent properties or pose a safety or health problem shall be removed, covered or screened within ninety (90) days (weather permitting) from the date of enactment of this Law.

SECTION 623 Heavy Vehicles

A. Purpose - This section has as its main purpose the

preservation of developed neighborhoods and particularly the elimination of noise from diesel engines and air conditioning units caused by large commercial truck parking. Visual intrusion into residential neighborhoods is also a primary concern.

B. Regulations - Heavy vehicles shall comply with the following regulations:

1. Location - Heavy vehicles shall be allowed to park in any district under the following conditions:
   a. The vehicle is not parked on a road or in a public road right-of-way.

   b. The vehicle is located such that a nuisance is not created. If the Zoning Board of Appeals determines a nuisance exists the owner of the vehicle shall be required to get a Special Use Permit.

C. Pre-existing Heavy Vehicles - This section shall apply to all heavy vehicles immediately, including those that have, in the past, parked in such a manner so as not to be in compliance with this section.

SECTION 624 Large Group Gatherings

A. Purpose - In order to promote a safe and healthy gathering of large groups of people as defined in the Definition section, certain conditions shall be complied with as defined below.

B. Conditions - Prior to the granting of a Special Use Permit the following will be taken into consideration:
1. Traffic safety, parking, access;
2. Noise;
3. Health and sanitation;
4. Character of neighborhood development density;
5. Beverages to be served;
6. Security and traffic control;
7. Clean-up and restoration of land, and;
8. Other appropriate considerations.

C. Sponsor Responsibility - The sponsor of any large group gathering shall be responsible for compliance with any conditions which are specifically imposed as well as the overall conduct of the gathering.

D. Exempt Gatherings - Non-profit and local civic group sponsored gatherings shall be exempt from permit requirements.

E. Pre-existing Uses - All gatherings held after the effective date of this Law shall be subject to this section.

SECTION 625 Mobile Home Conditions

A. Conditions - Prior to the granting of a permit for the placement of a mobile home on a private lot it shall be insured that all regulations (except floor area requirements) required of single family structures shall be complied with in addition to the following:

1. Placement of the mobile home on the lot shall be such that the character of the neighborhood is best considered.
2. Adequate parking is available.
3. Adequate storage areas will be available.
4. Frost-free foundation--a continuous masonry perimeter installed at a frost-free depth. Such perimeter requires adequate ventilation and the manufacturer's recommended vapor barrier installed according to the manufacturer's recommendations, and is necessary prior to the issuance of a certificate of occupancy.
5. The minimum mobile home allowed to be placed on a lot after the enactment date of this Law shall be 12 x 50 feet (manufacturer's advertised size).

B. Replacement of Mobile Homes - Where a mobile home is to be replaced with another mobile home or any other dwelling unit, a permit shall be required (see section on "Non-conforming Mobile Homes").

C. Pre-existing Mobile Homes - Existing mobile homes not skirted at the time of enactment of this Law shall comply with the skirting requirement (A4) above within 1 year from the date of enactment of this Law.

SECTION 626 Temporary Permits for Mobile Home

The temporary placement of a mobile home (intended for occupation or not) on a lot shall be permitted in accordance with the following:

A. Location on Lot - The temporary placement of mobile homes on a lot shall be in conformance with area standards of the district UNLESS it is determined that such placement would not be practical in which case the conditions for placement shall be specified.

B. Skirting - The installation of skirting on temporary mobile homes shall be optional as determined by the owner of the mobile home. If skirting is installed it shall be constructed of a fire resistant material.

C. Length of Time - Length of time that a mobile home may temporarily remain on a lot may be specified.

D. Other Conditions - Conditions which must be met in granting a Special Use Permit may be specified.

SECTION 627 Mobile Home Parks

Mobile Home Parks shall consist of 2 or more mobile homes located on a single lot. Each mobile home requires a separate permit. In the development of new parks as well as the expansion of existing parks the following conditions shall be maintained.

A. Area and Setback Requirements
1. Size of Park - Parks shall be created on a parcel(s) of land totaling at least 5 acres.
2. Buffer - An appropriate vegetation or open space buffer shall be located around the perimeter of the park. The

type and size of the buffer shall be determined by the density and type of adjacent uses and the need for separating the uses. As a minimum, a 25 foot buffer (open space or vegetation) shall be required with the Zoning Board of Appeals determining the need for a greater buffer.

3. Lot Size - Each mobile home lot shall consist of a lot of a minimum of 11,000 square feet and a minimum of 70 feet at the narrowest point. The park shall average no more than 4 mobile homes per acre.

B. Drainage - The park shall be located on a well-drained site properly graded to insure rapid drainage and freedom from stagnant pools of water.

C. Streets/Walkways/Parking
1. Parking - Space for parking of 2 automobiles must be provided for each mobile home lot adjacent to it.
2. Park Roadways - Park roadways shall be a minimum of 20 feet in width and shall all have unobstructed access to a public street or highway.
3. Walkways - Walkways of not less than 2 feet in width shall be provided to the service buildings.
4. Grade & Surface Composition - All driveways and walkways within the park shall be of suitable grade and shall be surfaced with gravel as a minimum.

D. Skirting - Mobile homes shall be skirted with an attractive fire resistant material within thirty (30) days from the time of setup.

E. Lighting & Utilities - All driveways and walkways within the park shall be lighted at night with electric lamps of such candle power and so situation as may be directed by the Zoning Board of Appeals. It is recommended that consideration in each instance be given to the construction of all utilities underground. It shall be required that all lines between the meter and lot be underground.

F. Patios - All lots may have a patio convenient to the entrance of each mobile home.

G. Park Design - It is recommended that the design of the park not be barracks-like in nature and not designed on the gridiron pattern with identical rectangular spaces. The angling of spaces and the clustering of mobile homes around cul-de-sacs could be considered. Should this latter type of design be hampered by the minimum space size of 11,000 feet and space width of 70 feet the Municipal Board upon recommendation of the Zoning Board of Appeals shall have the authority to wave those 2 requirements.

SECTION 628 Travel Trailer - Accessory Use

A. Length of Occupancy - Travel trailers may be lived in on a seasonal basis but shall not be used as a permanent year round home.

B. Utility Hookups - When a travel trailer is inhabited for an

extended period of time and it is possible that a health violation could exist the Chautauqua County Health Department shall be notified in writing and requested to investigate.

C. Location - Whether inhabited or not, travel trailers shall be placed a minimum of 25 feet from any property line. Travel trailers may be stored as long as it does not create a nuisance.

SECTION 629 Travel Trailer Campgrounds (Commercial)
Travel Trailer Campgrounds shall be allowed in (ARI) and (T) Districts by Special Use Permit in accordance with the following conditions:

A. Area and Setback Requirements
1. All lots (pads) shall be a minimum of 75 feet from any public highway.
2. A 20 foot wide buffer zone of appropriate vegetation shall be provided around the circumference of the park where adjacent property use is of such a nature that there could be conflicts.
3. Minimum lot sizes shall be 2,500 square feet for a vacation camp and 1,500 square feet for overnight camps as required by State Law.

B. Streets and Walkways
1. Access to the park must be designed to assure safe and convenient movement of traffic into and out of the park with a minimum disruption of traffic on adjacent streets. This shall include a minimum clear view of 150 feet while pulling out onto the adjacent street.
2. Walkways shall be provided to service buildings.

C. Parking - Off street parking, loading and maneuvering space shall be provided.

D. Occupancy - Travel trailers shall be used for seasonal occupancy only. Trailers shall not be utilized as a permanent residence.

E. Accessory Uses - Accessory uses such as snack bars, recreational facilities, showers, laundromats, etc., customarily associated with travel trailer campgrounds shall be permitted. However, the land utilized in this manner should not account for more than 10% of the total area of the park and the services shall be directed towards the occupants of the park. Finally, no commercial character shall be visible from outside the park and such services shall only be allowed when the number of sites is sufficient to support these services.

F. Location - Parks shall not be located so as to cause heavy traffic to be directed through residential areas no accustomed to or capable of supporting heavy traffic.

G. Pre-existing Camps - Travel trailer camps in existence before the enactment of this Law shall be subject to all of the regulations in this Law within reason as determined by the permitting board. Compliance shall occur within 3 months or a longer specified time period if it is determined in a written

decision to be necessary.

ARTICLE VII

ADMINISTRATION BY ENFORCEMENT OFFICER

SECTION 701 Enforcement

This Law shall be enforced by the Zoning Officer who shall be appointed by the municipality. No Zoning Permit shall be issued by him except where there is compliance with all provisions of this Law.

SECTION 702 Duties

It shall be the duty of the Zoning Officer in connection with this Law to do the following:

A. Permits - Issue Zoning Permits or refuse to issue the same and give the reasons for such refusal to the applicant in writing.

B. Records - Keep a record of all applications for permits and record of all permits issued with a notation of all special conditions involved.

C. Fees - Receive all required fees and deposit them with the Municipal Clerk.

D. Coordination - Keep the Municipal Board and the Zoning Board of Appeals and Planning Board informed and advised of all matters other than routine matters in connection with this Law.

E. Reports - Submit such reports as may be deemed necessary.

F. Assist Applicants - Whenever possible to advise and assist persons applying for Zoning Permits with the preparation of their applications.

G. Violations - Assist in securing warrants and prosecution of violators of the provisions of this Law.

H. Notices - Serve all notices that may be required to be served in connection with this Law.

I. Fire Inspector - Notify Fire Inspector of all permits issued.

J. Amendment Recommendations - Make recommendations for keeping the Zoning Law and accompanying map up-to-date.

K. Inspections - Inspect new construction or changes of use during and/or after construction or change in use to insure conformity with the provisions of this Law and other applicable Laws.

L. Preparation and service of appearance tickets for Court

enforcement of the Zoning Law and prosecution of violations.

SECTION 703 Zoning Permits

A. No building, structure or lot shall be erected, added to, structurally enlarged or changed to another use until a Zoning Permit has been issued by the Zoning Officer. Excluded, however, from these Zoning Permit requirements are:
1. Interior modifications unless additional dwelling units or different types of uses are created.
2. Home repairs or improvements not involving additions or enlargements of floor space.
3. Uses listed in the district regulations as allowed with no permit. When a project is excluded from the Zoning Permit requirement it is still subject to all applicable regulations of this Law such as yard setbacks, etc.

B. Permit Contents - The application for a Zoning Permit shall be made on a form obtained from the Zoning Officer. The form shall as a minimum contain the following:
1. Applicant Information - Name, address, etc.
2. Property Identification - Street address and Section/Block/Lot.
3. Project Description Including Purpose - Proposed use.
4. Construction Type - Height, family units, lot dimension, setbacks, accessory buildings, etc.
5. Other Information - Copy of Health Department permit, offstreet parking, location of wetlands, floodplains, need for curb cut.
6. Signature of Applicant.
7. Sketch drawn to approximate scale showing the lot size, setback, and highways.

C. Commercial Permit Requirements - All applications for Zoning Permits for commercial buildings must contain information detailing drainage and landscaping plans, off street parking, off street loading and any other data the Zoning Board of Appeals deems necessary.

D. Validity - Zoning Permits shall be valid for a 1 year period only. However, they may be extended for an additional 6 month period with the approval of the Zoning Officer. Within 1 year from the date that the Zoning Permit is granted the exterior of the structure shall be completed, backfilling and rough grading will be accomplished and no new building materials will be stored outside. Upon expiration of the 1 year period a new Zoning Permit will be required in order not to be in violation of the Zoning Law.

E. Notification of Adjacent Property Owners - The Zoning Officer may attempt to notify adjacent property owners when requests are filed for Zoning Permits on adjoining property if, in the opinion of the Zoning Officer the proposed project is of such a nature to be controversial. Failure of such adjacent property owners to receive such notice, however, shall not be a basis for invalidating such a Zoning Permit nor of contesting the actions of the Zoning Officer, Board of Appeals, Planning Board or the Municipal Board in regard to the issuance or withholding of such permit.

F. Decisions - All decisions by the Zoning Officer to grant or deny a Zoning Permit shall be made in writing within 10 days from the time that the completed Zoning Permit form is submitted along with full payment of the required fee. The decision form shall as a minimum include a project description, location information, reference to section of the Zoning Law which would not be complied with and a description of alternatives open to applicants who are turned down.

SECTION 704 Schedule of Fees

Dwelling Units (Per Unit)	
Up to 1,500 Sq. Ft.	$10.00
Over 1,500 Sq. Ft.	$20.00
Accessory Uses	$ 5.00
Business (Non-Agricultural)	
Up to 1,500 Sq. Ft.	$20.00
Over 1,500 Sq. Ft.	$40.00
Agricultural Use	$10.00
All Other Uses	$10.00
Hearing Fee in Addition to Above Fees	$10.00

ARTICLE VIII

NON-CONFORMING USES

SECTION 801 Continuation

The lawful use of any building or land existing at the time of the enactment of this Law may be continued although such use does not conform with the provisions of this Law. All pre-existing uses which do not conform with specific provisions of this Law shall not be required to comply with these provisions unless it is specifically stated within this Law that they much comply within a certain reasonable time period.

SECTION 802 Alteration of Structures

A. Unsafe Structures - Conforming and non-conforming buildings damaged by fire, wind and other catastrophic causes as well as structures declared to be unsafe due to general dilapidation may be restored or rebuilt for the non-conforming use it was used for last. Unsafe structures cannot be restored or rebuilt if it would result in a use which is more non-conforming than the structure was prior to becoming unsafe. When the unsafe condition was caused by fire, wind or any catastrophic causes the permit must be applied for within 6 months from the date of the fire, etc. Otherwise, the Zoning Permit need not be granted. If property owner fails to do so within 3 months of notification by the Town, the Town can have the structure demolished and the cost thereof assessed to the taxes or parcel.

B. Alterations of Structures - A non-conforming structure may be added to or altered during its life to an extent of up to 50% of the market value of the building as long as the

alterations do not cause the structure to be more non-conforming. If the alterations are made to bring the building into conformity with all provisions of this Law then the 50% rules does not apply. Alterations above 50% shall be allowed if all conditions of this Law are met.

SECTION 803 Prior Approved Construction

Nothing herein contained shall require any change in plan, construction or designated use of a building for which a Zoning Permit has been heretofore issued and the construction of which

shall have been diligently carried on within 3 months of the date of such permit.

SECTION 804 Abandonment

Whenever a non-conforming use has been voluntarily discontinued for a period of 1 year such use shall not thereafter be re-established and any future use shall be in conformity with the provisions of this Law.

SECTION 805 Displacement

No non-conforming use shall be extended to displace a conforming use.

SECTION 806 District Changes

Whenever the boundaries of a district or zone shall be changed so as to transfer an area from one district or zone to another district or zone of a different classification the provisions of this article shall also apply to any non-conforming uses existing therein.

SECTION 807 Non-conforming Yards Changes

An allowed use which is not in conformance with yard requirements (e.g., setbacks, etc.) may be removed and replaced with another structure (same use) which is more in compliance with the yard requirements without going through area variance procedures. The Zoning Officer shall determine the applicability of this section to specific areas.

SECTION 808 Use Changes

Once changed to a conforming use, no building or land shall be permitted to revert to a non-conforming use.

A legal non-conforming use may be changed to another non-conforming use which is of such a character so as to be less of a nuisance and more in conformance with the Zoning Law requirements. Once changed the use would not be allowed to return to the original use. The Zoning Board of Appeals would make all determinations as to what new non-conforming uses would be allowable through the normal use variance procedures (see section on Variances).

SECTION 809 Non-conforming Mobile Homes

Mobile homes legally existing at the time this Law goes into effect shall continue to be allowed even in districts where they are presently not to be allowed. All conforming mobile homes may be replaced with more conforming mobile homes (e.g., floor space requirements).

ARTICLE IX

ZONING BOARD OF APPEALS

SECTION 901 Creation

A Zoning Board of Appeals is hereby created. Said Board shall be appointed and function in accordance with the enabling Law. Said Board shall consist of 3 members. The Board may prescribe for its affairs.

SECTION 902 General Procedures (Duties)

A. Duties - The Zoning Board of Appeals shall act in strict accordance with procedures specified by Law and by this Zoning Law. The major duties of the Board shall be to hear and decide on variance requests as well as to interpret the meaning of the Zoning Law as requested. Additionally, they shall hear requests for selected Special Use Permits when a Variance (Use of Area) is also required.

B. Format for Requests - All requests shall be in writing on forms prescribed by the Zoning Board of Appeals. Specific provisions of the Zoning Law shall be referred to and as a minimum, the following information shall be provided by the person requesting the variance/interpretation:
   1. Property identification;
   2. Project description;
   3. Drawing of sufficient detail to provide needed information sufficient to decide on the request;
   4. Reasons for permit denial;
   5. Proof of unnecessary hardship or practical difficulties, and;
   6. Hearing information.

C. Referral to Planning Board - On an optional basis the Zoning Board of Appeals may request in writing a recommendation by the Planning Board. The failure of the Planning Board to submit said report shall be deemed to be an approval of the appeal or interpretation in favor of the applicant.

D. Hearings - All hearing procedures shall be in accordance with appropriate Laws with respect to notices, timeliness, etc.

E. Decisions - Every decision of the Zoning Board of Appeals shall be by resolution, each of which shall contain a full record of the findings. Decisions shall be made in a timely manner in accordance with State Law. As per State Law a majority of the membership are needed to pass or reject any request.

F. Time Requirements - All appeals to the Zoning Board of Appeals for interpretations or variances shall be submitted to the Zoning Board of Appeals within 30 days of the date of denial of the application.

SECTION 903 Interpretation

The Zoning Board of Appeals shall have the power to interpret the meaning of this Zoning whenever called upon by the Municipal Board, Zoning Officer or an aggrieved party. This shall include the power to reverse any order, requirement, decision or determination of an administrative official or Board. This interpretive power shall include the determination or district boundary lines.

SECTION 904 Use & Area Variances

A. Reasons for Variances - The Zoning Board of Appeals has the authority to vary or modify the strict letter of the Zoning Law where a literal interpretation would cause practical difficulties (Area Variances) or unnecessary hardships (Use Variances).

B. Applicability & Limitations
   1. The Zoning Board of Appeals can decide appeals from a person who feels aggrieved by a decision of the Enforcement Officer.
   2. The Zoning Board of Appeals may reverse, affirm or modify the decision made by the Municipal Board.
   3. The Zoning Board of Appeals has absolutely no power to amend the Zoning Law and must exercise great care to insure that its rulings do not, in effect, amend the Zoning Law.

C. Basis for Granting Area Variances
   1. Area Variances provide relief of a dimensional nature (e.g., lot shape or grade) and must be based on practical difficulty. The Burden of Proof is on the applicant and if relief is warranted it should be the minimum necessary.
   2. The following 5 determinations must be considered in order to decide if "Practical Difficulty" is present:
      a. How substantial the variation is in relation to the requirements of the Zoning Law;
      b. The effect of the proposal on increased population density and governmental facilities (e.g., fire, water, etc.);
      c. Whether a substantial change in the character of the neighborhood or a detrimental effect on adjoining properties would take place;
      d. Whether the difficulty can be eliminated by some other reasonable alternative other than a variance (e.g., add room to other side of house), and;
      e. Will justice be served in allowing the variance.
   3. The fact that the practical difficulty was self-imposed does not disqualify the applicant from being granted an Area Variance.
   4. If a property owner will suffer significant economic

injury by strict interpretation of the area standards and practical difficulties are present, then the Area Variance can only be denied based on health, safety or general welfare reasons.

D. Basis for Granting Use Variances

1. Use Variances provide relief to an applicant who is denied through application of the Zoning Law by the Municipal Board the right to use land or structures in a certain manner since the use is not listed as an allowable use in the Zoning Law. In order to be granted the Use Variance the applicant must prove that "Unnecessary Hardship" exists and this is accomplished by showing all of the following:
   a. The land in question cannot yield a reasonable return if used only for a purpose allowed in the district. This does not mean that profits will necessarily be maximized.
   b. The use requested by the variance will not alter the essential character of the neighborhood and be detrimental to properties in the vicinity.
   c. The plight of the applicant is due to unique circumstances and not to the general conditions in the neighborhood.

3. In the case of a Use Variance, if the hardship is self-imposed then the variance should, generally speaking, be denied. An example of this would be the purchase of property which is not appropriate for the proposed use.

E. In granting any variance the Zoning Board of Appeals shall prescribe any conditions that it deems to be necessary or desirable and are in compliance with the intent of the Zoning Law. The decisions must be written in the form of a resolution and must state in detail the reasons for granting or denying the variance and the conditions imposed.

F. Temporary Variances - The Zoning Board of Appeals may issue for uses which are of a temporary nature, a Variance. Said Variance shall clearly state the conditions of the variance to include when it shall terminate, the possibility of renewal and other conditions deemed necessary.

SECTION 905 Special Use Permits

A. Applicability - Whenever a Variance (Use or Area) is required before a Special Use Permit can be reviewed the Zoning Board of Appeals shall be the authorized Board for dealing with both the Variance and the Special Use Permit. This Special Use Permit review is only authorized by the Zoning Board of Appeals for commercial projects involving 5,000 or less square feet of floor space or residential projects involving 5 or less residential units.

B. Basis for Granting Special Use Permits - See article on Planning Board section on Special Use Permit.

C. Referral to Municipal Board & Planning Board

1. Prior to action on Special Use Permits the Zoning Board of Appeals shall advise the Municipal Board and Planning Board of the proposed actions.

2. The Municipal Board and Planning Board shall have 15 days in which to review the proposed action and return their recommendation to the Zoning Board of Appeals. After the 15 days have expired the Zoning Board of Appeals may act without receipt of a response.

SECTION 906 Mandatory Referral (General Municipal Law 239 1 & m)

A. Applicability - In accordance with General Municipal Law 239 1 & m, before issuing a Special Use Permit or granting a variance affecting any real property lying within a distance of 500 feet of the boundary of this Municipality or from the boundary of any existing or proposed county or state park or other recreation area, or from the right-of-way of any existing or proposed county or state parkway, thruway, expressway, road or highway, or from the channel owned by the county or for which the county has established channel lines, or from the existing or proposed boundary of any county or state owned land on which a public building or institution is situated the matter shall be referred to the Chautauqua County Planning Board.

B. Response Time - Within 30 days after receipt of a full statement of such referred matter the Chautauqua County Planning Board to which referral is made or an authorized agent of said agency shall report its recommendations thereon to the Board of Appeals, accompanied by a full statement of the reasons for such recommendations. If the Chautauqua County Planning Board fails to report within such period of 30 days the Board of Appeals may act without such report. If the Chautauqua County Planning Board disapproved the proposal or recommends modification thereof, the Board of Appeals shall not act contrary to such disapproval or recommendation except by a vote of a majority plus 1 of all the members thereof and after the adoption of a resolution fully setting forth the reasons for such contrary action.

C. Report of Action - Within 7 days after final action by the Board of Appeals, modifications or disapproval of a referred matter the Board of Appeals shall file a report of the final action it has taken with the Chautauqua County Planning Board which had made the recommendations, modifications or disapproval.

ARTICLE X

MUNICIPAL PLANNING BOARD

SECTION 1001 Creation

The Municipal Board shall appoint a Planning Board consisting of 3 members as prescribed by Law.

SECTION 1002 Duties: Special Use Permit & Recommendations

The Planning Board shall have the following duties with respect to the Zoning Law:

A. Special Use Permit

1. Applicability - The Planning Board shall hear all requests for Special Use Permits for commercial projects involving 5,000 or less square feet of floor space and for residential projects involving 5 or less residential units. However, the aforementioned projects which also require an Area or Use Variance shall not be handled by the Planning Board (see article in Zoning Board of Appeals).
2. General Provisions - The special uses listed in this Zoning Law for which conformance to additional standards are required, shall be deemed to be permitted uses in their respective districts subject to the satisfaction of the requirements and standards set forth herein, in addition to all other requirements of this Zoning Law. All such uses are hereby declared to possess characteristics of such unique and special forms that each specific use shall be considered as an individual case.
3. Standards - The location and size of the use, the nature and intensity of the operations involved, the size of the site in relation to it and the location of the site with respect to the existing or future streets giving access to it, shall be such that it will be in harmony with the orderly development of the district and the location, nature and height of buildings; walls and fences will not discourage the appropriate development and use of adjacent land and buildings or impair the value thereof. Operations in connection with any special use shall not be more objectionable to nearby properties by reason of noise, fumes, vibrations or lights than would be the operations of any permitted use.
4. Conditions
   a. In the granting of Special Use Permits the Permitting Board shall attach such conditions and safeguards as it deems appropriate under this Law.
   b. The supplemental section of this Law entitled, Development Conditions will be referred to and used as a checklist of possible conditions to be attached to the Special Use Permit being requested and this section is not all inclusive.
   c. A plan for the proposed development of a site for designated special use shall be submitted with an application for a Special Use Permit and plan shall show the location of all buildings, lots, parking areas, traffic access and circulation drives, open spaces, landscaping and any other pertinent information that the Permitting Board deems necessary.
5. Administrator
   a. Procedures - The Permitting Board shall act in strict accordance with procedures specified by Law and by the Zoning Law with regard to public hearings, notices, publications, etc.
   b. Expiration - A Special Use Permit shall be deemed to authorize only one particular use and shall expire if the special use shall cease for more than 1 year for any reason.
   c. Existing Violations - No Special Use Permit shall

be issued for a property where there is an existing violation of this Law.

B. Recommendations
   1. Optional Reports - The Planning Board shall submit reports within 30 days after referral on any matter referred to it.
   2. Mandatory Recommendations - The Planning Board shall submit recommendations to the appropriate Board on all applications for:
      a. Cluster Residential Development;
      b. Mobile Home Park;
      c. Zoning amendments, and;
      d. All other uses for which a referral to the Planning Board is mandatory.
   3. Failure to Report - When the Planning Board fails to make a recommendation/report within 15 days from receipt of the request it shall be deemed that the Planning Board has no objection to the request or proposal. The 15 day requirement may be extended with permission of the Board making the referral.

C. Review of Zoning Law - To review the Zoning Law at least every 5 years and make written recommendations for amendments should they be necessary.

SECTION 1003 Mandatory Referral

Under General Municipal Law 239 l & m, certain Special Use Permits and amendments must be referred to the County Planning Board prior to local decisions being made. See Article IX, Zoning Board of Appeals for procedures to be followed (section on Mandatory Referrals).

ARTICLE XI

MUNICIPAL BOARD

SECTION 1101 Duties: Amendments & Special Use/Site Plan

The Municipal Board shall have the following duties with respect to this Zoning Law.

A. Amendments
   1. The Municipal Board may, from time to time on its own motion, or on petition, or on recommendation of the Planning Board, amend, supplement or repeal the regulations and provisions of this Law after public notice and hearing.
   2. The Municipal Board by resolution adopted at a scheduled meeting shall fix the time and place of a public hearing on the proposed amendment and cause notice to be given in accordance with applicable Law.

B. Special Use Permit/Site Plan Review
   1. Applicability - The Municipal Board shall hear all requests for Special Use Permits/Site Plan Reviews for

commercial projects involving over 5,000 square feet of floor space and for residential projects involving more than 5 residential units.

2. Special Use Permit Provisions
   a. General Provisions - The special uses listed in this Zoning Law for which conformance to additional standards are required shall be deemed to be permitted uses in their respective districts subject to the satisfaction of the requirements and standards set forth herein in addition to all other requirements of this Zoning Law. All such uses are hereby declared to possess characteristics of such unique and special form that each specific use shall be considered as an individual case.
   b. Standards - The location and size of the use, the nature and intensity of the operations involved, the size of the site in relation to it and the location of the site with respect to the existing or future streets giving access to it shall be such that it will be in harmony with the orderly development of the district and location, nature and height of buildings, walls and fences will not discourage the appropriate development and use of adjacent land and buildings or impair the value thereof. Operations in connection with any special use shall not be more objectionable to nearby properties by reason of noise, fumes, vibrations or lights than would be the operations of any permitted use.
   c. Conditions
      1. In the granting of Special Use Permits the Permitting Board shall attach such conditions and safeguards as it deems appropriate under this Law.
      2. The supplemental section of this Law entitled Development Conditions will be referred to and used as a checklist of possible conditions to be attached to the Special Use Permit being requested. It should not be assumed that this section is all inclusive.
      3. A plan for the proposed development of a site for designated special use shall be submitted with an application for a Special Use Permit and plan shall show the location of all buildings, lots, parking areas, traffic access and circulation drives and any other pertinent information that the Permitting Board deems necessary.
   d. Procedures - The Permitting Board shall act in strict accordance with procedures specified by Law and by the Zoning Law with regard to public hearings, notices, publications, etc.
   e. Expiration - A Special Use Permit shall be deemed to authorize only one particular use and shall expire if the special use shall cease for more than 1 year.
   f. Existing Violations - No Special Use Permit shall be issued for a property where there is an existing violation of this Law.
3. Site Plan Review Requirements

a. Purpose - Site Plan Review has the purpose of specifying for all involved parties what the intended design, arrangement and uses of the land shall consist of so as to optimize the physical, social and economic effects on the community for specified types of development.

b. Administration

1. Permits - The Permitting Board shall be responsible for a site plan review of all commercial development with over 5,000 square feet of floor space or residential development involving more than 5 dwelling units. In these instances the Permitting Board shall also be responsible for administering the Special Use Permit requirements with both processes taking place simultaneously.
2. Expiration - A Site Plan Review shall be deemed to authorize only one particular use and shall expire if the use shall cease for more than 1 year.
3. Hearings - An attempt shall be made to integrate where appropriate the Site Plan Review requirements into the required Special Use Permit Hearing. Thus, eliminating the need for two hearings.
4. Referral - The Permitting Board shall within 7 days of receipt of the complete application submit to the Planning Board a request for an opinion on any proposed project. The Permitting Board shall wait 14 days for a response prior to acting on the matter.
5. Decision Requirements - Within 45 days of receipt of the complete application the Permitting Board shall render a decision to the Zoning Officer. If no decision is made within the 45 day period the site plan shall be considered approved. The applicant shall be notified in writing of its decision with the reasons for the decision specified.

c. Information Required - Sketches drawn to approximate scale will be prepared by the applicant where feasible to display the following information:

1. Administration, Legal and Other Miscellaneous Information
   a. Project title and date;
   b. Name, address and telephone number of applicant, owner (if different), contractor, architect and other major involved parties;
   c. Construction schedule to include phasing and the completion date;
   d. Performance bond to include amount, public improvements covered and bond approval;
   e. Location, width and purpose of all easements, public land holdings, leases, covenants, deed restrictions or any other unique land restriction, and;
   f. Record of all applications for permits from the Federal, State or County governments to include approval status.

2. Existing Man Made Features to be Shown
   a. Boundary lines of project site as well as adjacent properties, and;
   b. Ownership pattern of all adjacent parcels.
   c. Existing structures on project site and adjacent property to include location, dimensions, height and use. Decks and accessory structures should also be shown as well as historic structures.
   d. Roadways to include: public roads, private roads or driveways on the site, on and off street parking, load/unload zones, access and egress, pedestrian pathways or sidewalks. Width and elevations should be included.
   e. Utilities shall be identified to include: location and size of water, sewer, drainage pipes, telephone, electric, gas and TV cable. Additionally, any solar systems should be identified.
   f. Miscellaneous features to include: fences, signs, outside lighting, public address systems, storage areas and retaining walls shall be shown.
   g. Fire lanes and fire hydrants if any exist should be displayed.
   h. Recreational areas both on the site and adjacent should be displayed to include public and private facilities.
   i. Trash or garbage collection areas shall be identified.
   j. Services such as banks, schools, retail or service districts should be identified.
   k. Zoning district boundaries shall be identified.
   l. Other information deemed necessary by Permitting Board.
3. Existing Natural Features to be Shown
   a. Topographic features with a minimum interval of 10 feet but preferably 2 feet. Areas of steep slope should be delineated.
   b. Geographic features such as depth to bedrock and load bearing capacity for large development proposals.
   c. Hydro-geological features including: drainage and run off patterns, flood hazard areas, wetlands, depth of ground water and drainage capacity of soil.
   d. Landscaping and vegetative cover including: wooded areas, significant isolated trees, ground cover, shrubs and other similar features. Buffers should be identified.
   e. Water courses to include: lakes, streams or ponds.
   f. Archaeologically significant areas.
   g. Significant viewscapes should be identified.
   h. Other information deemed necessary by Permitting Board.
4. New Proposal Features
   a. Referring to the EXISTING man made and natural features above provide a description/sketch of any changes that are being proposed.
   b. Include construction materials proposed for use.
   c. Provide design features.
   d. List the positive and negative effects for each

existing feature listed above (e.g., traffic to be generated and the effects it will have on specific roadways).

SECTION 1102 Referral to Municipal Planning Board

A. Prior to action on Special Use Permits or Zoning Amendments, Special Use Permits/Site Plan Review Permits, the Municipal Board shall advise the Planning Board of the proposed action.

B. The Planning Board shall have 30 days in which to review the proposed action and return their recommendation to the Municipal Board. After the 30 days has expired the Municipal Board may act without receipt of a recommendation from the Planning Board.

SECTION 1103 Mandatory Referral

General Municipal Law 239 1 & m, must be followed when amending a Zoning Law. The Mandatory Referral section found in the Zoning Board of Appeals Article should be consulted for the procedure to be followed.

ARTICLE XII

VIOLATIONS AND PENALTIES

SECTION 1201 Violations

Whenever a violation of this Law occurs any person may file a complaint in regard thereto. All such complaints must be in writing and shall be filed with the Zoning Officer who shall properly record such complaint and immediately investigate.

SECTION 1202 Penalties

Any violation of any provision of this Law shall be punishable by fine not to exceed $250.00. Each week's continued violation shall constitute a separate additional violation.

ARTICLE XIII

LEGALITY

SECTION 1301 Conflicts

In their interpretation and application the provisions of this Law shall be held to be minimum requirements adopted for the promotion of the public health, safety or the general welfare. Whenever the requirements of this Law are at variance with the requirements of any other lawfully adopted rules, regulations or ordinances, the most restrictive or that imposing the higher standards shall govern.

SECTION 1302 Separability

The invalidity of any provisions of this Law shall not invalidate any other part thereof.

SECTION 1303 Repealer

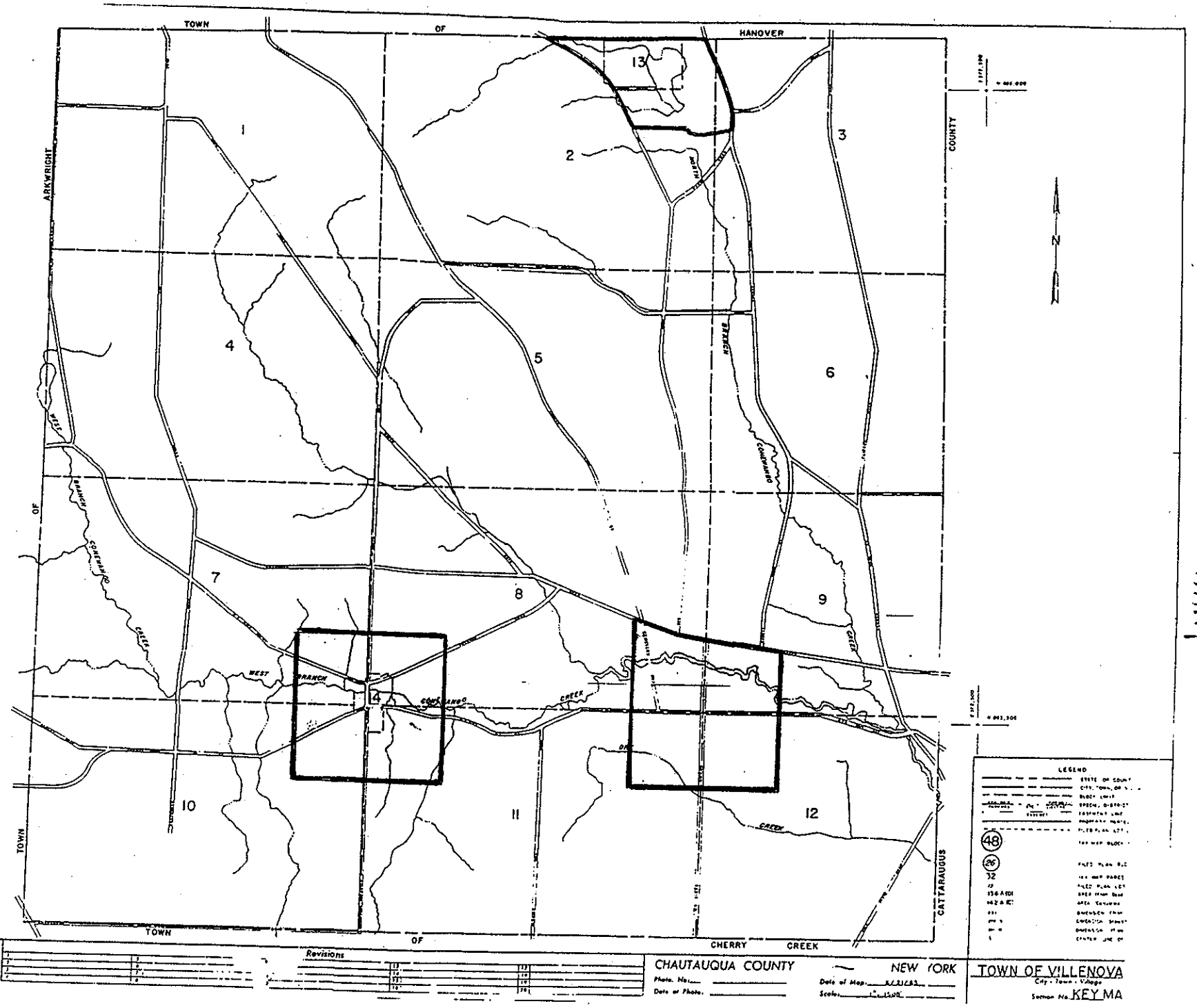
Any previously adopted regulations of the Municipality dealing with issues covered in the Zoning Law together with all changes and amendments thereto, is hereby repealed and declared to be of no effect.

SECTION 1304 Effect

This Local Law shall take effect 10 days after the date of its publication and posting as required by Law.

401 ARI DISTRICT

402 T DISTRICTS



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Hanover Wind Law

Town of Hanover

Article XVI

Wind Energy Conversion Systems: (WECS)

SECTION 1601 - Legislative-Intent

The **Town of Hanover** recognizes the increased demand for converting wind energy into electrical energy. The intent of this local law is to regulate wind energy **(WECS)** in the **Town of Hanover.** The intent of this local law is to accommodate the necessary infrastructure for the provision of utility scale and Small **WECS** wind-powered electricity generation in facilities so that they may be developed in a manner hereby deemed to be compatible with the general health, welfare and safety of the residents of the **Town of Hanover.** Furthermore, to address the visual, aesthetic and land use compatibility aspects of wind energy conversion systems. **(WECS)**

SECTION 1601 .1- Authority

The Town Board of the Town of Hanover enacts this Local Law under the authority granted by:

1. Article IX of the New York State Constitution, § 2(c)(6) and (10).

2. New York Statute of Local Governments, § 10(1) and (7).

3. New York Municipal Home Rule Law, § 10(1)(i) and (ii) and § 10(1)(a)(6), (11),(12), and (14).

4. New York Town Law § 130(1)(Building Code), (3)(Electrical Code), (5)(Fire Prevention), (7)(Use of streets and highways), (7-a)(Location of Driveways), (11)(Peace, good order and safety), (15)(Promotion of public welfare), (15-a)(Excavated Lands), (16)(Unsafe buildings), (19)(Trespass), and (25)(Building lines).

5. New York Town Law § 64(17-a)(protection of aesthetic interests) and (23)(General powers).

SECTION 1602 - Definitions

Accessory, Facility, or Equipment: Any structure other than a **WECS**, related to the use and purpose of deriving energy from such towers, located at the tower facility.

Agricultural Or Farm Operations: means the land and on-farm buildings, equipment, manure processing and handling facilities, and practices which contribute to the production, preparation, and marketing of crops, livestock, and livestock products as a utility scale enterprise, including a "utility scale horse boarding operation" as defined in subdivision thirteen of New York Agriculture and Markets Law § 301 and "timber processing," as defined in subdivision fourteen of New York Agriculture and Markets

Law § 301. Such farm operation may consist of one or more parcels of owned or rented land, which parcels may be contiguous or noncontiguous to each other.

EAF: Environmental Assessment Form used in the implementation of the SEQRA as that term is defined in Part 617 of Title 6 of the New York Codes, Rules and Regulations.

EIS: Environmental Impact Statement used in the implementation of the SEQRA as that term is defined in Part 617 of Title 6 of the New York Codes, Rules and Regulations.

Nacelle: The portion of the wind turbine that connects the rotor to the support tower and houses the generator, gearbox, drive train and braking system.

Residence: Shall mean any dwelling suitable for habitation existing in the Town of Hanover on the date an application is received including seasonal homes, hotels, hospitals, motels, dormitories, sanitariums, nursing homes, senior housing, schools or other buildings used for educational purposes. A residence may be part of a multi-dwelling or multi-purpose building, but shall not include correctional institutions.

SEQRA: The New York State Environmental Quality Review Act and its implementing regulations in Title VI of the New York Code of Rules and Regulations, Part 617.

Site: The parcel or parcels of land where a WECS is to be placed. The site can be publicly or privately owned by an individual or a group of individuals controlling single or adjacent properties. Where multiple lots are in joint ownership, the combined lots shall be considered as one for purposes of applying set back requirements. Any property that has a **WECS**, or has entered an agreement for said facility or a set back agreement, shall not be considered off-site.

Siting Agency: The applicant, person or persons who are applying to site a utility scale wind energy-deriving tower facility.

Small WECS: A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than ten (10) kilowatts, and which is intended to primarily reduce consumption of utility power at that location.

Sound Pressure Level: Means that level which is equaled or exceeded a stated percentage of time. L_{10}-50 dBA indicates that at any hour of the day 50 dBA can be equaled or exceeded only ten (10%) percent of the time, or for six (6) minutes. The measurement of the sound pressure level can be done according to the international standard for acoustic noise measurement techniques for wind generators (IEC 61400-11), or other accepted procedures.

SWPPP: Stormwater Management Pollution Prevention Plan, as required by New York State Department of Environmental Conservation regulations.

Total Height: The height of the tower and the furthest vertical extension of the **WECS**.

Utility Scale: Means a **WECS** other than a Small **WECS**.

Wind energy conversion systems (WECS): Shall mean any mechanism designed for the purpose of converting, wind energy into electrical energy.

Wind Energy Facility: Any wind energy conversion system, Small WECS, or wind measurement tower, including all related infrastructure, electrical lines and substations, access roads, and other accessory structures and appurtances.

Wind Measurement Tower: A tower used for the measurement of meteorological data such as temperature, wind speed, and wind direction.

Wind Overlay Zoning District: A district which encompasses one or more underlying zones and that establishes requirements for Wind Energy Facilities.

SECTION 1603 Permits

A. No Wind Energy Facility shall be constructed, reconstructed, modified, or operated in the Town of Hanover except in compliance with this Local Law.

B. No **WECS** shall be constructed, reconstructed, modified, or operated in the Town of Hanover except in a Wind Energy Overlay District with a Special Use Permit approved pursuant to this Local Law.

C. No Wind Measurement Tower shall be constructed, reconstructed, modified, or operated in the Town of Hanover except pursuant to a Special Use Permit issued pursuant to this Local Law.

D. No Small Wind Energy Conversion System shall be constructed, reconstructed, modified, or operated in the Town of Hanover except pursuant to a Special Use Permit issued pursuant to this Local Law.

E. This Local Law shall apply to all areas of the Town of Hanover.

F. **Exemptions.** No permit or other approval shall be required under this Article for **WECS** utilized solely for agricultural operations in a state or county agricultural district, as long as the facility is set back at least one and a half times its Total Height from a property line, and does not exceed 120 feet in height. Towers over 120 feet in Total Height utilized solely for agricultural operations in a state or county agricultural district shall apply for a Special Use Permit in accordance with this Local Law, but shall not require a height variance. Prior to the construction of a **WECS** under this exemption, the property owner or a designated agent shall submit a sketch plan or building permit application to the Town to demonstrate compliance with the setback requirements.

G. **Transfer.** No transfer of any Wind Energy Facility or Special Use Permit, nor sale of the entity owning such facility including the sale of more than 30% of the stock of such entity (not counting sales of shares on a public exchange), will occur without prior approval of the Town, which approval shall be granted upon written acceptance of the transferee of the obligations of the transferor under this Section, and the transferee's

demonstration, in the sole discretion of the Town Board, that it can meet the technical and financial obligations of the transferor. No transfer shall eliminate the liability of the transferor nor of any other party under this Section unless the entire interest of the transferor in all facilities in the Town is transferred and there are no outstanding obligations or violations.

H. Notwithstanding the requirements of this Section, replacement in kind or modification of a Wind Energy Facility may occur without Town Board approval when (1) there will be no increase in Total Height; (2) no change in the location of the **WECS**; (3) no additional lighting or change in facility color; (4) no increase in noise produced by the **WECS**, and (5) the **WECS** is not currently in violation of any permit condition or provision of this Local Law.

I. The Town shall require any applicant to enter into an escrow agreement to pay the engineering and legal costs of any application review, including the review required by SEQRA.

SECTION 1604 Procedure

1. Applications for siting **WECS** facilities shall be submitted to the Hanover Code Enforcement officer. Applications shall be made by the owner of the property or his/her duly authorized representative, who shall attend the meeting of the Town Board to discuss the application. Any application deemed incomplete by the code enforcement officer or the Town Board shall be returned to the applicant and the Town or its Officer or Board shall undertake no action.
2. The Town Board may refer the application to the Planning Board for recommendations, which shall be reported by the Planning Board to Town Board within forty-five (45) days of said referral.
3. **Public Hearing:** After reviewing the site plan and recommendations, if any, from other involved Town or County Agencies, the Town Board shall hold a Public Hearing, which Public Hearing shall be held within sixty-two (62) days from the day the application is received by the Town Board. Notices of the Public Hearing shall be mailed to adjacent property owners within five hundred (500) feet from the property line boundaries of the proposed Wind Energy Overlay District and published in the Town's official newspaper, one time, not less then ten (10) nor more than twenty (20) days before said hearing. But where any hearing is adjourned by the Town Board to hear additional comments, no further publication or mailing shall be required.
4. The applicant shall prepare and mail the notice of public hearing prepared by the Town, and shall submit an affidavit of service to the Town Clerk. The assessment roll of the Town shall be used to determine mailing addresses.
5. The public hearing may be combined with public hearings on any environmental impact statement or requested waivers.

6. **Final Special Use permit and Site Plan:** A final site plan for the Special Use Permit application shall substantially conform to the site plan that has been approved, and may incorporate any revisions or other features recommended by the Town of Hanover Planning Board.
7. **Town of Hanover Town Board Action:** Within sixty-two (62) days from the date of the public hearing, the Hanover Town Board shall render a decision of approval, conditional approval or disapproval. This time period may be extended by mutual consent of the applicant and the Board. The decision of the Hanover Town Board shall be filed in the Office of the Town Clerk within five (5) business days after such decision is rendered, and a copy thereof mailed to the applicant.
8. **Conditions attached to the Issuance of Special Use Permits:** The Town of Hanover Town Board shall have the authority to impose reasonable conditions and restrictions as are directly related to and incidental to proposed special use permit. Upon its granting of said special use permit, any such conditions must be met in connection with the issuance of permits
9. **Reimbursable Costs:** Costs incurred by the Hanover Town and Planning Boards for consultation fees or other extraordinary expense in connection with the review of a proposed special use permit shall be charged to the applicant.

Section 1605 Wind Energy Conversion System Facility Permit Required

No Wind Energy Conversion System shall be sited, located, constructed, erected or modified without the issuance of a special use permit as prescribed in this article. (Reference 1603)

Section 1606 Zoning District and Bulk Requirements

1. WECS Facilities may be permitted in the Wind Overlay Zoning District, which may be created in the Agricultural Residential (A-1) District, upon the issuance by the Hanover Town Board of a Special Use Permit, under this Article; all applications will require a site plan as provided herein.
2. Setbacks. Each WECS shall be setback as measured from the center of the WECS a minimum distance of:

    a. 500 feet from the nearest Site boundary property line, right-of-way, easements, and power lines and 500 feet where the boundary is with state, county, town, or village –owned property.
    b. 500 feet from the nearest public road.
    c. 1,000 feet from the nearest off-site Residence, school, church or historic structure existing at the time of application, as measured to the exterior of such structure.

d. 100 feet from state-identified wetlands. This distance may be adjusted to be greater at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence the flight patterns of resident birds.
e. 500 feet from gas wells, electric or gas distribution lines unless waived in writing by the property owner and well owner or applicable utility owner.

3. **Noise Limit.** The statistical sound pressure level generated by a **WECS** shall not exceed L_{10} - 50 dBA measured at any off site Residence existing at the time of the application. If the ambient sound pressure level exceeds 48 dBA, the standard shall be ambient dBA plus 5 dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement.
4. In the event audible noise due to **WECS** operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in subparagraph 3 of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if the 1/3 octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous 1/3 octave bands by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.
5. In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is exceeded for more than five minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences, schools, hospitals, churches, and public libraries. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project Site are sufficient to allow Wind Turbine operation, provided that the wind velocity does not exceed 30 mph at the ambient noise measurement location.
6. Any noise level falling between two whole decibels shall be the lower of the two.
7. All applications for **WECS** exceeding 120 feet in height shall be treated as a Type One Action under the State Environmental Quality Review Act.

SECTION 1607: APPLICATION REQUIREMENTS

A plan for the proposed development of a project utility scale **WECS**, including the proposed Wind Energy Overlay District and individual Special Use Permit applications for **WECS** shall show and include the following:

A. Name of the project, the address and Section, Block and Lot number of each proposed **WECS** location and the boundary lines of the parcel on which the project will be located, a location map showing proposed sites location, date, North arrow and scale. Engineering and or Surveyor maps.

B. Name and mailing address of the developer or applicant and owners of the parcels where development is proposed.

C. Name and mailing address of all owners of record of abutting parcels, or those owners within fifteen hundred (1,500) feet of the property lines of parcel where development is proposed. The applicant may delay submitting this list until the Town Board calls for a public hearing on the application.

D. A map prepared by a surveyor or engineer licensed in the State of New York shall be provided in the EIS showing all existing lot lines, easements and right-of-ways, and a sketch plan showing proposed road access including provisions for paving, if any, proposed transmission lines and accessory facilities and location of all existing and proposed utility systems to the facility. A map of all above and below ground utilities near the tower site that could possibly be impacted.

E. Boundaries of the proposed Wind Energy Overlay Zoning District.

F. A map showing existing and proposed topography at a maximum of five (5) foot contour intervals. (Applies to utility scale only)

G. A landscape plan showing all existing natural land features, trees, forest cover, buildings and structures and all proposed changes to these features including size and type of plant material and erosion control measures. (Applies to utility scale only)

H. State Environmental Quality review Act (SEQRA). Nothing shall prohibit the Board from requiring an environmental impact statement if deemed necessary by the Board. WECS are considered a Type 1 action and require a full Environmental Assessment Form (EAF) and a visual EAF to be completed and submitted to the town.

I. Photography, assessing the visibility from the key viewpoints, existing tree lines and proposed elevations. Pictures shall be digitally enhanced to simulate the appearance of the "as built" above the ground site facilities as they would appear from distances within three (3) mile

radius of such **WECS**. No fewer than four (4) and no more than the number of proposed individual **WECS** plus three (3) color photos.

Pictures shall be no smaller than 8"x10". This requirement may be waived for Small **WECS**.

J. Documentation of the proposed intent and capacity of energy generation as well as a justification for the height of any WECS.

K. Justification for any clearing required. (Applies to utility scale only)

L. **Preliminary report proposed by the WECS siting agency describing**: (Applies to utility scale only)
   i. Surrounding topography in relation to the capabilities for generation of electricity by wind.
   ii. Required improvements for construction activities, including those within the public right-of-way or land controlled by the Town of Hanover.
   iii. Proposed mitigation measures for visual impacts of the tower facility.
   iv. Proposed safety measures to mitigate wind energy-deriving tower failure.

M. Elevation map showing the wind energy-deriving tower's height and design including a cross section of the structure and components of the nacelle; the wind energy-deriving tower's compliance with the applicable structural standards and the wind energy-deriving tower's abilities in terms of producing energy. (Applies to utility scale only)

N. A description of the general geographic areas that would be acceptable for wind projects within the Town of Hanover: furthermore, demonstration that the proposed site is the most appropriate site within the immediate area for the location of the **WECS**. (May waive for Small **WECS**)

O. Description of the applicant's long range plans with project market demand and long-range facility needs within the Town of Hanover. (May waive for Small **WECS**)

P. Digital elevation model-based project visibility map showing the impact of visibility of the project from other locations, to a distance radius of three (3) miles from the center of the project. The base map used shall be a published topographic map showing natural and structural or built features. (To be provided in the EIS. May waive for Small **WECS**)

Q. Report showing soil logs, soil profile analysis and storm water run-off calculation for the area being disturbed. (To be provided in the SWPPP and EIS. May waive for Small **WECS**)

R. Plans to prevent the pollution of the surface or ground water, erosion of soil, both during and after construction, excessive run-off and flooding of the other properties as applicable. There should be pre-construction and post –construction drainage calculations for the site done by a New York State licensed engineer showing there will be no increase of run-off from the site. (To be provided in the SWPPP and EIS, May waive for Small **WECS**)

S. All information regarding requirements for migratory bird flyways with documents by the EPA, NYSDEC or US Fish and Wildlife Service. (To be provided in the EIS, May waive for Small **WECS**)

T. All information regarding FAA rules and regulations, additional permits necessary or any other applicable regulations from the Federal Communications Commission (FCC) and Federal Aviation Agency (FAA) for installation of conversion systems. Proof of compliance with the FCC and FAA regulations shall be submitted prior to the finalization of the EIS and issuance of a Special Use Permit by the Town Board, Town of Hanover.

U. Blade Throw and Ice Throw Risk: Either the Application or the EIS shall evaluate the risk from Blade Throw and Ice Throw Risk.

V. **Catastrophic Tower Failure**: A report from the turbine manufacturer stating:
   i. The wind speed and conditions that the turbine is designed to withstand (including all assumptions)
   ii. The incidence of catastrophic failures and the conditions reported at the time of failure.

W. **Noise Report**: A noise report that shall at a minimum include the following: (May waive for Small **WECS**)

   i. A description and map of the project's noise producing features, including the range of noise levels expected, and the tonal and frequency characteristics expected, and the basis of the expectation.

   ii. A description and map of the noise sensitive receptors, i.e., residences, libraries, schools, places of worship and other facilities where quiet is important within two (2) miles of the proposed facility.

   iii. A report prepared by a qualified engineer, that analyzes the pre-existing ambient daytime and nighttime noise regime (including seasonal variation), including but not limited to: separate measurements of low frequency and A-weighted noise levels across a range of wind speeds (including near cut-in), turbulence measurements, distance from the turbines, location of sensitive receptors relative to wind direction: and analyses at

affected sensitive receptors located two (2) miles of the proposed project site. Potential sensitive receptors at relatively less windy or quieter locations than the project should be emphasized.

iv. A description and map showing the potential noise impacts, including estimates of expected noise impacts upon construction and operation workers, and estimates of expected noise levels at sensitive receptor locations.

v. A description and map of the cumulative noise impacts.

vi. A description of the projects proposed noise control features, including specific measures proposed to protect workers, and specific measures proposed to mitigate noise impacts for sensitive receptors to a level of insignificance.

vii. Identification of any problem areas

viii. Summary of Project Developer's proposed Noise Complaint resolution Program, including post-construction testing.

ix. Manufactures Noise design and field-testing data both audible (dBA) and low frequency (deep base vibration) for all proposed structures.

Section 1608 - Standards:

The development of utility scale WECS and related structures may be permitted with approval by the Hanover Town Board, subject to the following requirements:

A. **Location**: Applications for wind energy-deriving towers shall locate, erect and site towers in accordance with the following requirements:

1. No **WECS** shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the link's operations.

2. No **WECS** shall be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antenna (including residential reception antenna) for radio, television, or wireless phone or other personnel communication systems would produce electromagnetic interference with signal transmission or reception. If it is determined that a **WECS** is causing electromagnetic interference, the applicant/operator shall take the necessary corrective action to eliminate this interference including

relocation or removal of the facilities, or resolution of the issue with the impacted parties. Failure to remedy electromagnetic interference is grounds for revocation of the Special Use Permit for the specific **WECS** or **WECS** causing the interference.

3. No individual tower facility shall be installed in any location where there is a recognized migratory flight path for birds or at a location where birds commonly congregate, unless applicant can demonstrate that the operation of the wind energy-deriving Tower will not have a significant impact on either migratory or resident birds. Conclusions of no significant impact within these recognized areas shall be the results of studies conducted over a period of a minimum of one year by expert consultants and in compliance with NYS DEC regulations, at the expense of the applicant.

4. **WECS** shall be painted a non-obtrusive (e.g. light environmental color such as white, gray or beige) color that is non reflective.

5. A New York State Licensed professional engineer shall certify that the construction and installation of the conversion system meets or exceeds the manufacture's construction and installation standards. (Town Board may waive for Small **WECS**)

B. Emergency Shutdown/Safety

1. Procedures acceptable to the Hanover Town Board for emergency shutdown of power generation unit shall be established and available with local agencies as required by the Town.

2. No tower or facility shall exhibit any signs or advertising. Applicant shall post an emergency telephone number so that the appropriate people may be contacted should any wind energy-deriving tower need immediate attention.

3. No **WECS** shall be permitted that lack an automatic braking, governing, or feathering system to prevent uncontrolled rotation, over speeding, and excessive pressure on the tower structure, rotor blades, and turbine components.

4. The safety of the design of all conversion systems shall be certified by a licensed professional engineer experienced in **WECS**. The standard for certification shall be good engineering practices and shall conform to New York State's officially adopted building and electrical codes.

5. The minimum distance between the ground and any part of the rotor blade shall be thirty (30) feet.

C. **Lighting:**

Lighting shall be in compliance with FAA regulations.

D. **Utility Service**

All power transmission lines from the wind generation electricity facilities to non-site substations shall be underground unless specifically waived by the Town Board as part of the Special Use Permit. Where the electrical components of an installation vary from the Manufacturer's standard design or specifications, the proposed modifications shall be reviewed and certified by a N.Y.S. registered professional engineer for compliance with requirements of the national Electrical Underwriter's Code and good engineering practices.

E. **Height:**

1. The height of any WECS shall be limited to the minimum required to provide needed energy by demonstrated demand, or need.

2. Small **WECS** shall not exceed a total of seventy-five (75) feet unless the parcel on which the **WECS** is to be located is ten (10) acres or more, in which case the maximum height of the tower, including the turbine and blades, shall be 120 feet.

3. **WECS** shall not exceed a total height of 420 feet including the turbine and blades.

E. **Access Road:**

Existing roadways shall be used for access to the site whenever possible. In the case of constructing roadways, they shall be constructed in a way so that they do not disrupt normal drainage patterns, and are not conspicuous to the surrounding environment.

G. **Accessory Structures/Facilities**

Transmission facilities and or buildings shall be located behind ridges or vegetation to screen from visibility unless specifically waived by the Town Board as part of the Special Use Permit. Removal of trees and other vegetation on the site shall affect the minimum area and number of trees possible to minimize soil erosion.

H. Security Provisions:

1. No climbing device of any kind shall be attached to the outside of a **WECS**. Only internal ladders with locked doors.

2. All towers or poles must be unclimbable by design or protected by anti-climbing devices.

3. A **WECS** is prohibited upon the roof of any structure unless the structure has been approved for installation of a conversion system by a structural engineer certified by the State of New York.

I. Compliance with the National Electrical Code:

1. Building permit applications shall be accompanied by a one line drawing identifying the electrical components of the wind system to be installed in sufficient detail to allow for a determination that the manner conforms to the National Electrical Code. The application shall include a statement from a New York State licensed professional engineer indicating that the electrical system conforms to good engineering practices and complies with the National Electrical Code. The manufacturer normally supplies this certification. All equipment and materials shall be used or installed in accordance with such drawings and diagrams.

2. All electrical lines shall be placed in compliance with the current electrical code standards and appropriately marked and identified as specified by the Town. A visible warning sign of "High Voltage" will be placed at the base of all **WECS**. The letters on the sign shall be a minimum of six (6) inches in height.

3. The applicant shall, prior to the receipt of a building permit, demonstrate that the proposed facility meets the system reliability requirements of the New York Independent System Operator, or provide proof that it has executed an Interconnection Agreement with the New York Independent System Operator and/or the applicable Transmission owner.

J. Insurance/Liability

The applicant, owner, lessee or assignee shall maintain a current insurance policy which will cover installation and operation of the **WECS** at all times. As part of the application review process, the Town of Hanover may require proof that the applicant is carrying sufficient liability, workers compensation, etc, during installation and operations of proposed facility. Limits for said policy shall be set according to the size and scope of each project.

K. Abatement:

1. Any **WECS** which has not been generating energy for a period of one (1) year shall be removed from the premises to a place of safe and legal disposal. Any and all structures, guy cables, guy anchors and or enclosures accessory to such **WECS** shall also be removed. The site shall be restored to as natural a condition as possible. Such removal shall be completed within six (6) months after 1 year of non-use of such **WECS**. The permittee is responsible for removal.

2. **Bond/Security**: All successful applicants shall furnish and file with the Town Clerk a performance bond to be payable to the Town and in an amount to be determined by the Town for the purpose of covering damage to any Town property during the construction, maintenance, operation or removal of the **WECS** facility.

3. **Decommissioning Security**. In addition, all successful applicants shall furnish and file with the Town Clerk a bond or other security for the purpose of paying for the removal of and de-commissioning of the **WECS** facilities in the event that such **WECS** facilities are no longer in use and require removal under this article and upon failure of the then-owner or operator to remove same in accordance with this article (such bond or other security, a "Decommissioning Bond"). The Decommissioning Bond shall remain valid and enforceable during the entire time the facility is permitted to operate and for an additional period of two years thereafter and as may be necessary to ensure the de-commissioning and removal of the **WECS** in the event the owner/operator fails to do so as required by this article. The Decommissioning Bond may consist of a letter of credit from a State of New York-licensed financial institution. All costs of the financial security shall be borne by the applicant.

4. **Decommissioning Plan**: The applicant shall submit a decommissioning plan, which shall include: 1) the anticipated life of the **WECS**; 2) the estimated decommissioning costs in current dollars; 3) how said estimate was determined; 4) the method of ensuring that funds will be available for decommissioning and restoration; (5) the method, such by annual re-estimate by a licensed engineer, that the decommissioning cost will be kept current; and 6) the manner in which the **WECS** will be decommissioned and the Site restored, which shall include removal of all structures and debris to a depth of three feet, restoration of the soil, and restoration of vegetation (consistent and compatible with surrounding vegetation), less any fencing or residual minor improvements requested by the landowner. The Plan shall include the Decommissioning Bond required by this Section.

5. If removal of towers and appurtenant facilities is required and applicant, permit holder, or successors fails to remove the towers and appurtenant facilities from the property within one hundred twenty (120) days from the date of notification by the Town Board, the Board shall contract for such removal and pay for removal from the Bond.

L. Right of Entry and Inspection:

Upon notice to the applicant, the Code Enforcement Officer or any duly authorized agent of the Town shall be allowed to enter on the property and make such inspections as deemed necessary during the construction and assembly of the **WECS,** and to ensure compliance with permit conditions.

M. Fees

Applications, permits, and inspection fees for WECS applicants under this article shall be as established by the Town Board of the Town of Hanover by Town Board Resolutions, as from time to time enacted.

SECTION 1609 – WECS FACILITIES MAINTENANCE

The Town Code Enforcement Officer and/or Building Inspector or outside consultant designated by the Town Board are empowered to enforce these regulations.

1. The sufficiency of the bond for removal shall be confirmed at least every year by an analysis of the cost of removal and property restoration performed by a licensed New York State professional Engineer with results to be communicated to the Town. If the bond amount in force is not sufficient to cover the cost of the removal, it shall be increased within thirty (30) days to cover such amount.
2. The Facility shall be inspected at least every two (2) years for structural Integrity by a New York licensed professional engineer and a copy of the inspection report submitted to the Town.
3. All **WECS** shall be maintained in good order and repair and all such work shall comply with all applicable code requirements of any governmental body issuing such rules and/or regulations.
4. No outside storage of vehicles, materials or waste shall be allowed except for the limited periods when the facility is undergoing construction, repair or maintenance.

SECTION 1610 – EXEMPTIONS

Notwithstanding the requirements of this Section, replacement in kind or modification of a Wind Energy Facility may occur without Town Board approval when (1) there will be no increase in Total Height; (2) no change in the location of the WECS; (3) no additional lighting or change in facility color; (4) no increase in noise produced by the WECS, and (5) the WECS is not currently in violation of any permit condition or provision of this Local Law

SECTION 1611 – PURPOSE AND INTENT—SMALL WIND ENERGY CONVERSION SYSTEM

1. The purpose of this section is to provide standards for Small WECS designed for home, farm, and Small **WECS** use on the same parcel, and that are primarily used to reduce consumption of utility power at that location and not for sale off-premises.
2. Applications for Small **WECS** energy permits shall include:
   a) Name, address, telephone number of the applicant. If the applicant will be represented by an agent, name, address, and telephone number of the agent, as well as an original signature.
   b) Name, address, telephone number of the property owner. If the property owner is not the applicant, the application shall include a letter or other written permission signed by the property owner (i) confirming that the property owner is familiar with the proposed applications and (ii) authorizing the submission of the application.
   c) Address of each proposed tower location, including Tax Map section, block and lot number.
   d) Evidence that the proposed tower height does not exceed the height recommended by the manufacturer or distributor of the system.
   e) A line drawing of the electrical components of the system in sufficient detail to allow for a determination that the manner of installation conforms to the Uniform Fire Prevention and Building Code.
   f) Sufficient information demonstrating that the system will be used primarily to reduce consumption of electricity at that location.
   g) Written evidence that the electric utility service provider that serves the proposed Site has been informed of the applicant's intent to install an interconnected customer-owned electricity generator, unless the applicant does not plan, and so states in the application, to connect the system to the electricity grid.
   h) A visual analysis of the Small **WECS** as installed, which may include a computerized photographic simulation, demonstrating the visual impacts from nearby strategic vantage points. The visual analysis shall also indicate the color treatment of the system's components and any visual screening incorporated into the project that is intended to lessen the system's visual prominence.

3. **Development Standards**. All Small wind energy systems shall comply with the following standards. Additionally, such systems shall also comply with all the requirements established by other sections of this Article that are not in conflict with the requirements contained in this section.

a) A system shall be located on a lot a minimum of one acre in size, however, this requirement can be met by multiple owners submitting a joint application.

b) Only one small wind energy system tower per legal lot shall be allowed, unless there are multiple applicants, in which their joint lots shall be treated as one lot for the purposes of this section.

c) Small **WECS** shall be used primarily to reduce the on-site consumption of electricity.

d) Tower heights may be allowed as follows:

(i.) See Section 1608 E (2).

(ii.) The allowed height shall be reduced if necessary to comply with all applicable Federal Aviation Requirements, including Subpart B (commencing with Section 77.11) of Part 77 of Title 14 of the Code of Federal Regulations regarding installations close to airports.

e) The maximum turbine power output is limited to 10 KW.

f) The system's tower and blades shall be painted a non-reflective, unobtrusive color that blends the system and its components into the surrounding landscape to the greatest extent possible and incorporate non-reflective surfaces to minimize any visual disruption.

g) The system shall be designed and located in such a manner to minimize adverse visual impacts from public viewing areas.

h) Exterior lighting on any structure associated with the system shall not be allowed except that which is specifically required by the Federal Aviation Administration.

i) All on-site electrical wires associated with the system shall be installed underground except for "tie-ins" to a public utility company and public utility company transmission poles, towers and lines. This standard may be modified by the decision-maker if the project terrain is determined to be unsuitable due to reasons of excessive grading, biological impacts, or similar factors.

j) The system shall be operated such that no disruptive electromagnetic interference is caused. If it has been demonstrated that a system is causing harmful interference, the system operator shall promptly mitigate the harmful interference or cease operation of the system.

k) At least one sign shall be posted on the tower at a height of five feet warning of electrical shock or high voltage and harm from revolving machinery. No brand names, logo or advertising shall be placed or painted on the tower, rotor, generator or tail vane where it would be visible from the ground, except that a system or tower's manufacturer's logo may be displayed on a system generator housing in an unobtrusive manner.

l) Anchor points for any guy wires for a system tower shall be located within the property that the system is located on and not on or across any above-ground electric transmission or distribution lines. The point of attachment for the guy wires shall be enclosed by a fence six feet high or sheathed in bright orange or yellow covering from three to eight feet above the ground.

m) Construction of on-site access roadways shall be minimized. Temporary access roads utilized for initial installation shall be re-graded and re-vegetated to the pre-existing natural condition after completion of installation.

n) To prevent harmful wind turbulence from existing structures, the minimum height of the lowest part of any horizontal axis wind turbine blade shall be at least 30 feet above the highest structure or tree within a 250 foot radius. Modification of this standard may be made when the applicant demonstrates that a lower height will not jeopardize the safety of the wind turbine structure.

o) All small wind energy system tower structures shall be designed and constructed to be in compliance with pertinent provisions of the Uniform Fire Prevention and Building Code.

p) All Small **WECS** shall be equipped with manual and automatic over-speed controls. The conformance of rotor and over-speed control design and fabrication with good engineering practices shall be certified by the manufacturer.

5. **Standards.** A Small **WECS** shall comply with the following standards:

   a) **Setback** requirements. A Small **WECS** shall not be located closer to a property line than one and a half times the total height of the facility.

   b) **Noise.** Except during short-term events, including utility outages and severe wind storms, a Small **WECS** shall be designed, installed, and operated so that noise generated by the system shall not exceed the 50 decibels (dBA) as measured at the closest neighboring inhabited dwelling.

6. **Abandonment of Use**. A Small **WECS** which is not used for twelve (12) successive months shall be deemed abandoned and shall be dismantled and removed from the property at the expense of the property owner. Failure to abide by and faithfully comply with this section or with any and all conditions that may be attached to the granting of any building permit shall constitute grounds for the revocation of the permit by the Town.

   All Small **WECS** shall be maintained in good condition and in accordance with all requirements of this section.

7. A Small **WECS** shall be permitted only in Zoning District (A-1), Agricultural Residential.

SECTION 1612 – WIND MEASUREMENT TOWERS

1. **Wind Site Assessment**. The Town Board acknowledges that prior to construction of a **WECS**, a wind site assessment is conducted to determine the wind speeds and the feasibility of using particular sites. Installation of Wind Measurement Towers, also known as anemometer ("MET") towers, shall be permitted on the issuance of a Special Use Permit in accordance with this section.

2. **Applications for Wind Measurement Towers.**

A. An application for a Wind Measurement Tower shall include:

   a) Name, address, telephone number of the applicant. If the applicant is represented by an agent, the application shall include the name,

address, and telephone number of the agent as well as an original signature of the applicant authorizing the representation.

b) Name, address, telephone number of the property owner. If the property owner is not the applicant, the application shall include a letter or other written permission signed by the property owner (i) confirming that the property owner is familiar with the proposed applications and (ii) authorizing the submission of the application.

c) Address of each proposed tower location, including Tax Map section, block and lot number.

d) Proposed Development Plan and Map.

e) **Decommissioning Plan:** The applicant shall submit a decommissioning plan, which shall include: 1) the anticipated life of the Wind Measurement Tower; 2) the estimated decommissioning costs in current dollars; 3) how said estimate was determined; 4) the method of ensuring that funds will be available for decommissioning and restoration; (5) the method, such by annual re-estimate by a licensed engineer, that the decommissioning cost will be kept current; and 6) the manner in which the Wind Measurement Tower will be decommissioned and the Site restored, which shall include removal of all structures and debris to a depth of three feet, restoration of the soil, and restoration of vegetation (consistent and compatible with surrounding vegetation), less any fencing or residual minor improvements requested by the landowner. The Plan shall include the Decommissioning Bond required by this Section.

f. **Decommissioning Security.** The applicant, or successors, shall continuously maintain a fund or bond payable to the Town for the removal of non-functional towers and appurtenant facilities in an amount to be determined by the Town for the period of the of the life of the facility. This fund may consist of a letter of credit from a State of New York-licensed financial institution. All costs of the financial security shall be borne by the applicant.

3. **Standards for Wind Measurement Towers.**

A. The distance between a Wind Measurement Tower and the property line shall be at least one and a half times the total height of the tower. Sites can include more than one piece of property and the requirement shall apply to the combined properties. Exceptions for neighboring property are also allowed with the consent of those property owners.

B. Special Use Permits for Wind Measurement Towers may be issued for a period of up to two years. Permits shall be renewable upon application to the Town Board in accordance with the procedure of § 1-20.

SECTION 1613 – VIOLATIONS/PENALTIES

This article is adopted pursuant to the zoning and planning powers granted to the Town under Town Law of the State of New York and other applicable law, rule and regulation. In the event of any violation of this article or permit issued hereunder, the Town may

seek enforcement under any available authority, including but not limited to Town Law, Section 268, as from time to time amended.

Any applicant upon receipt of a Special Use Permit for a Wind Energy Conversion System Facility that substantially does not meet any of the requirements and/or conditions of that permit, shall have its permit revoked and the **WECS** Facility removed within one hundred twenty (120) days of notification by the Town of such violation. Nothing herein shall limit or prohibit the Town from seeking equitable or injunctive relief for a violation of this article in any court of competent jurisdiction.

SECTION 1614 – HOST COMMUNITY AGREEMENT

Nothing in this Article shall be read as limiting the ability of the Town to enter into Host Community Agreements with any applicant to compensate the Town for expenses or impacts on the community.

SECTION 1615 – TAX EXEMPTION

The Town hereby exercises its right to opt out of the Tax Exemption provisions of Real Property Tax Law Section 487, pursuant to the authority granted by paragraph 8 of that law.

SECTION 1616 - SEVERABILITY

Should any provision of this Local Law be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of this Local Law as a whole or any part thereof other than the part so decided to be unconstitutional or invalid.

SECTION 1617 - MISCELLANEOUS

The amendments in this local law shall apply to any and all applications pending at the time of enactment for which final permits have not been issued.

SECTION 1618 - REPEALER

That the enactment of this local law shall act as a repealer of Local Law No. 4 of 2006 previously enacted by the Town Board of the Town of Hanover providing for wind energy conversion systems. That in the event of any conflict in local law, ordinance, rule or regulation having to do with wind energy conversion systems and wind energy facilities, the provisions of this Local Law shall prevail.

SECTION 1619 – EFFECTIVE DATE

This local law shall be effective upon its filing with the Secretary of State in accordance with the Municipal Home Rule Law.

Effective Date: _____

Hanover Zoning Law

TOWN OF HANOVER
68 HANOVER STREET
SILVER CREEK, N.Y. 14136
Phone (716) 934-2920

1998

TOWN OF HANOVER ZONING LAWS

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ADDENDUM A-**SCHEDULE OF FEES**

PURSUANT to the authority conferred by Article 16 of the Town Law of the State of New York and for each of the purposes specified therein, the Town Board of the Town of Hanover, County of Chautauqua and State of New York, does hereby enact the following zoning Law regulating and restricting the location, size and use of buildings and other structures and the use of land in the Town of Hanover.

SECTION 1. TITLE

This Zoning Law shall be known and may be cited as "ZONING LAW OF THE YEAR 1998 FOR ZONING IN THE SPECIFIED DISTRICTS OF THE TOWN OF HANOVER, NEW YORK".

SECTION 2. INTENT AND PURPOSE

This Zoning Law is intended to serve the following purposes:

A. To promote the public health, safety, morals, comfort and general welfare of all.

B. To conserve the values of property throughout the Town of Hanover and to protect the character and stability of agriculture, residential and business areas and to promote the orderly and beneficial development of such areas.

C. To provide adequate light, air, privacy, and conveniences of access to property.

D. To lessen or avoid congestion in the public streets and highways, including provision for and control of parking.

E. To regulate and restrict the location and use of buildings, structures and land for trade, residence and other uses, and to regulate and restrict the intensity of such uses, and to establish building or setback lines.

F. To divide the entire Town (outside the limits of villages) into districts of such number, shape and area and of such different classes, according to the use of the land and buildings, and the intensity of such use, as may be deemed best suited to carry out the purposes of this Zoning Law.

G. To regulate uses, buildings or structures incompatible with the character of such districts respectively;

H. To regulate additions to and alteration or remodeling of existing buildings or structures in such a way as to assure compliance with the restrictions and limitations lawfully imposed hereunder.

I. To encourage flexibility in the design and development of land so as to promote its most appropriate use, facilitate the adequate and economic provisions of streets and utilities, preserve the natural and scenic qualities of open land and enhance and protect the environmental quality of the town.

SECTION 3. RULES AND DEFINITIONS

In the construction of this Law, the rules and definitions contained in this section shall be observed and applied except when the context indicates otherwise.

3.1 RULES

Words used in the present tense shall include the future and words used in the singular number shall include the plural number, and the plural, the singular.

The word "shall" is mandatory and not discretionary.

The word "may" is permissive.

The word "lot" shall include the words "plot", "piece" and "parcel"; the word "building" includes all other structures of every kind regardless of similarity to buildings; and the phrase "used for" shall include the phrases "arranged for", "designed for", "intended for", "maintained for" and "occupied for".

The following words and terms, wherever they occur in this Law shall be interpreted as herein defined.

3.2 DEFINITIONS

ACCESSORY BUILDING OR USE. An "accessory building or use" is one which:

(a.) Is subordinate to and serves a principle building or principal use; and
(b.) Is subordinate in area, extent to purpose to the principal building or principal use served; and
(c.) Contributes to the comfort or necessity of occupants of the principal building or principal use served; and
(d.) Is located on the same zoning lot as the principal building or principal use served.

AGRICULTURE. Land, including necessary buildings and structures, that has as its principal use the raising or keeping of livestock or the growing of crops.

AIRPORT OR AIRCRAFT LANDING FIELD. Any landing area, runway or other facility (including heliports) designed, used or intended to be used either publicly or privately by any person or persons for the landing or taking off of aircraft, including all necessary taxiways, aircraft storage and tiedown areas, hangars, and all other necessary buildings and open spaces.

ALTERATIONS. As applied to a building or structure, a change or rearrangement in the structural parts or in the exit facilities or an enlargement, whether by extending on a side or by increasing the height or by the moving from one (1) location or position to another.

ANIMAL HOSPITAL. Any building or portion thereof designed or used for the care, observation or treatment of domestic animals.

AREA BUILDING. The total of areas taken on a horizontal plane at the main grade level of the principal building and all accessory buildings exclusive of uncovered porch's, terraces and steps.

AREA VARIANCE. A variance which does not involve a use which is prohibited by the zoning law (e.g. set back lines, frontage requirements, lot size restrictions, density regulations, yard requirements).

AUTO SERVICE STATIONS. Any area of land, including structures thereon, that is used or designed to be used for the supply of gasoline or oil or other fuel for the propulsion of motor vehicles and which may include facilities used or designed to be used for polishing, greasing, washing, spraying, dry cleaning or otherwise cleaning or servicing such motor vehicles.

BILLBOARD. Any structure or portion thereof upon which are signs or advertisements used as an outdoor display. This definition does not include any bulletin boards used to announce church services, or to display court or other public office notices, or signs offering the sale or lease of the premises on which the sign is located.

BOARDING HOUSE. A dwelling in which more than three (3) persons individually or as families are housed or lodged for hire with or without meals. A rooming house or a furnished rooming house shall be deemed a boarding house.

BUILDING AREA. The space remaining on a zoning lot after the minimum open space requirements of this ordinance have been complied with.

BUILDING. Any structure with substantial walls and roof securely affixed to the land and entirely separated on all sides from any other structure by space or by walls in which there are no communicating doors, windows, or openings; and which is designed or intended for the shelter, enclosure or protection of persons, animals or chattels. Any structure with interior areas not normally accessible for human use, such as gas holders, oil tanks, water tanks, grain elevators, coal bunkers, oil cracking towers and other similar structures, are not considered as buildings.

BUILDING, DETACHED. A building surrounded by open space on the same lot.

BUILDING, HEIGHT. The vertical distance measured from the sidewalk level or its equivalent established grade opposite the middle of the front of the building to the highest point of the roof in the case of a flat roof, to the deck of mansard roof; and to the mean height level between eaves and the ridge of a gable, hip or gambrel roof; provided that where buildings are set back from the street line, the height of the building may be measured from the average elevation of the finished lot grade at the front of the building, or as regulated by special requirements set up in this law

BUILDING, NON-CONFORMING. Any building which does not conform to the regulations of this Law prescribing required yards, coverage, height, and setbacks, minimum required usable open space for the district in which such building is located.

BUILDING, PRINCIPAL. A building in which is conducted the main use of the zoning lot on which it is situated.

BUILDING, SETBACK LINE. A line parallel to the street line at a distance from it, regulated by the front yard requirements set up in this Law.

BUILDING, TEMPORARY. Any building not designed to be permanently located in the place where it is, or where it is intended to be placed or affixed.
CAMP. Any one (1) or more of the following other than a hospital, place of detention or school offering general instruction:

TYPE 1. Any area of land or water on which are located two (2) or more cabins, tents, trailers, shelters, houseboats, or other accommodations of a design or character suitable for seasonal or other more or less temporary living purposes, regardless of whether such structures or other accommodations actually are occupied seasonally or otherwise: or

TYPE 2. Any land, including any building thereon, used for any assembly of persons for what is commonly known as "day camp" purposes; and any of the foregoing establishments whether or not conducted for profit and whether or not occupied by adults or children, either as individuals, families or groups.

CLUB OR LODGE, PRIVATE. A non-profit association of persons who are bona fide members paying annual dues, which owns, hires, or leases a building, or portion thereof, the use of such premises being restricted to members and their guests.

COVERAGE. That percentage of the plot or lot covered by the building area.

DUMP. A lot or land or part thereof used primarily for the disposal or abandonment, dumping, burial, burning or any other means and for whatever purpose of garbage, sewage, trash, refuse, junk, discarded machinery, vehicles or parts thereof, or waste material of any kind.

DWELLING. A building designed or used exclusively for residential occupancy, including one (1) family dwelling units, two (2) family dwelling units and multiple-family dwelling units, but not including hotels, motels, boarding or lodging houses.

DWELLING, TWO FAMILY. A building designed or altered to provide dwelling units for occupancy by two (2) families.

DWELLING UNIT. One (1) or more rooms in a residential structure which are arranged, designed, used or intended for use by one (1) family for living or sleeping purposes, and which include complete kitchen and bath facilities permanently installed.

ERECT. The act of placing or affixing a component of a structure upon the ground or upon another such exponent.

FAMILY. One (1) or more persons related by blood, marriage or adoption, or a group of not more than five (5) persons (excluding servants) who need not be related by blood, marriage or adoption, living together and maintaining a common household, but not including sororities, fraternities or other similar organizations.

FARM. An area which is used for the growing of the usual farm products such as vegetables, fruit trees and grain, and for the packing or storage of the products produced on the premises, as well as for the raising thereon of the usual farm poultry and farm animals, such as horses, cattle, sheep and swine.

FEED LOT. To include the commercial feeding of garbage or offal to swine or other animals on open lots where no feed is raised on the premises, or the commercial feeding of poultry broilers, or laboratory animals such as mice, rats, rabbits, etc. (Subject to distance regulations from residential property.)

FLOOR AREA, GROSS. For the purpose of determining requirements for off-street parking and off-street loading, the floor area shall mean the sum of the gross horizontal areas of the several floors of the building, or portion thereof, devoted to such use, including accessory storage areas located within selling or working space, such as counters, racks, or closets and any basement floor area devoted to retailing activities, to the production or processing of goods, or to business or professional offices. However, floor area for purposes of measurement for off-street parking spaces shall not include: Floor area devoted primarily to storage purposes (except as otherwise noted herein), floor area devoted to off-street parking or loading facilities; floor including aisles, ramps and maneuvering space; or basement floor area other than area devoted to retailing activities, to the production or process of goods, or to business or professional offices.

FUEL BULK STATION. A place where crude petroleum, gasoline, naphtha benzene, benzyl, diesel fuel, kerosene or other flammable liquid which has a flash point at or below two hundred (200) degrees Fahrenheit (closed cup tester) is stored for wholesale purposes, where the aggregate capacity of all storage tanks is more than eight thousand (8,000) gallons, regardless of whether the fuel is stored above the ground, underground or in mobile tank cars or trucks.

GOLF COURSE. Public, semi-public or private grounds over which the game of golf is played, including accessory buildings and land uses incidental thereto.

HOME OCCUPATION. An accessory use of a service character customarily conducted within a dwelling by the residents thereof, which is clearly secondary to the use of the dwelling for living purposes and does not change the character thereof or have any exterior evidence of such secondary use other than a small name plate and in connection therewith and there is not involved the keeping of

stock in trade. The office of a physician, surgeon, dentist, or other professional person, including an instructor in violin, piano, or other individual musical instrument limited to a single pupil at a time, who offers skilled services to clients, and is not professionally engaged in the purchase or sale of economic goods, shall be deemed to be home occupations; and the occupations of dressmaker, milliner or seamstress, each with not more than one (1) paid assistant shall be deemed to be home occupations. Dancing instruction, band instrument instruction in groups, tea rooms, tourist homes, beauty parlors, real estate offices, convalescent homes, mortuary establishments and stores, trades or businesses of any kind not herein excepted shall not be deemed to be home occupations.

HOSPITAL. Unless otherwise specified, the term "hospital" shall be deemed to include sanitarium, sanatorium, clinic, rest home, nursing home, convalescent home, and any other place for the diagnosis, treatment or other care of ailments and shall be deemed to be limited to places for the diagnosis, treatment or other care of human ailments.

HOTEL, MOTEL, INN OR AUTO COURT. An establishment containing lodging accommodations designed for use by transients or travelers or temporary guests. Facilities provided may include maid service, laundering of linen used on the premises, telephone and secretarial or desk service.

JUNK YARD. An open area where waste, scrap metal, paper, rags or similar materials are bought, sold, exchanged, stores, baled, packed, disassembled or handled, including auto and building wrecking yards, but not including similar uses taking place entirely with a completely closed building.

JUNKER. An automobile, truck or other motor vehicle which has been damaged to such an extent that it cannot be operated under its own power and will require major repairs before being made usable, or such a vehicle which does not comply with the state or county laws or ordinances for vehicles.

KENNEL. Any lot or premises or portion thereof on which more than four (4) dogs, cats and other household domestic animals, over four (4) months of age are boarded for compensation or just kept for sale.

LIGHT INDUSTRY. The manufacture, preparation, processing, milling or repair of any article, substance or commodity and which involves no dangerous or toxic product or emissions.

LINE OF BUILDING. (For measuring yards.) A line parallel to the nearest lot line drawn through the point of a building or a group of buildings nearest to such lot line, exclusive of such features specified as being permitted to extend into a yard.

LINE, STREET. The dividing line between the street and the lot.

LOADING AND UNLOADING SPACE, OFF-STREET. An open hard surface area of land other than a street or public way, the principle use of which is for the standing, loading, and unloading of motor vehicles, tractors and trailers, to avoid undue interference with public streets and alleys. Such space shall not be less than ten feet (10') in width, seventy-five feet (75') in length and fourteen feet (14') in height, exclusive of access aisles and maneuvering space.

LOT. The word "Lot" when used alone shall mean a "zoning lot" unless the context of this law clearly indicates otherwise.

LOT, CORNER. A parcel of land situated at the intersection of two (2) or more streets or adjoining a curved street at the end of a block.

LOT COVERAGE. The area of a zoning lot occupied by the principal building or buildings and accessory buildings.

LOT DEPTH. The horizontal distance between the front and rear lot lines measured in the mean direction of the side lot lines.

LOT FRONTAGE. The front of a lot shall be that boundary of a lot along a public street; for a corner lot, the owner may elect either street line as the front lot line.

LOT LINE, FRONT. The front property line of a zoning lot.

LOT, THROUGH. A lot having frontage on two (2) parallel or approximately parallel streets, and which is not a corner lot.

LOT, WIDTH. The mean horizontal distance between the side lot lines measured within the lot boundaries, of the minimum distance between the side lot lines within the buildable area.

LOT, ZONING. See "ZONING LOT"

MANUFACTURE. The making of anything by any agency or process.

MANUFACTURED HOME COURT. A tract of land where two (2) or more manufactured homes are parked.

MOTOR VEHICLE REPAIR, MAJOR. Engine rebuilding or major reconditioning of worn or damaged motor vehicles or trailers; collision service, including body, frame or fender straightening or repair; and overall painting of

vehicles within an enclosed building.

MOTOR VEHICLE REPAIR, MINOR. Incidental repairs, replacement of parts, and motor service to motor vehicles, but does not include any operation specified under "Major Motor Vehicle Repairs".

MULTI-FAMILY RESIDENCE. A building used or designed for three (3) or more dwelling units, including apartments and townhouses.

NAMEPLATE. A sign indicating the name and address of a building or the name of the occupant thereof and the practice of a permitted occupation therein.

NON-CONFORMING USE. A building, structure or use of land existing at the time of enactment of this Law, and which does not conform to the regulations of the district or zone in which it is situated.

NURSERY SCHOOL. A school designed to provide daytime care of instruction for two (2) or more children from two (2) to five (5) years of age inclusive, and operated on a regular basis.

PARKING SPACE, AUTOMOBILE. Space within a public or private parking area of not less than one hundred sixty-two feet (162'), eight and one-half feet (8 ½') by nineteen feet (19'), exclusive of access drives or aisles, ramps, columns, or office and work area, for the storage of one (1) passenger automobile or commercial vehicle under one and one-half (1 ½) ton capacity.

POLITICAL SIGNS. Any sign or signs advertising a candidate or candidates for public office.

PRINCIPAL USE. The main use of land or buildings as distinguished from a subordinate or accessory use.

PUBLIC UTILITY. Any person or firm, corporation, or municipal department, duly authorized to furnish under regulation to the public, electricity, gas, steam, telephone, transportation, sewer, water or cable television service.

QUARRY, SAND PIT, GRAVEL PIT, TOP SOIL STRIPPING. A lot or land or part thereof used for the purpose of extracting stone, sand, gravel or top soil for sale, as an industrial operation and exclusive of the process of grading a lot preparatory to the construction of a building for which application for a building permit has been made.

RAILROAD RIGHT-OF-WAY. A strip of land with tracks and auxiliary facilities

for track operation, but does not include depot landing platforms, stations, train sheds, warehouses, car shops, car yards, locomotive shops, water towers, etc.

RUNWAY. A strip or area of pavement used exclusively for the landing and taking off of aircraft or for the movement of vehicles incidental to such use.

SIGN. A name, identification, description, display or illustration which is affixed to, or painted or represented directly or indirectly upon a building, structure, tree, rock or other object or piece of land and which directs attention to an object, product, place, activity, person, institution, organization, or business.

SIGN, ADVERTISING (BILLBOARD). A sign which directs attention to a business, commodity, service or entertainment conducted, sold or offered upon the premises where such sign is located, or to which it is affixed.

SIGN, BUSINESS. A sign which directs attention to a business or profession conducted or to a commodity, service or entertainment sold or offered upon the premises where such a sign is located, or to which it is affixed.

SIGN, FLASHING. Any illuminated sign on which the artificial light is not maintained stationary or constant in intensity and color at all times when such sign is in use. For the purpose of this Law, any revolving, illuminated sign shall be considered a flashing sign.

SPECIAL USE. Any use of land or buildings, or both, described and permitted herein, subject to the provisions of SECTION 13.7.

STABLE, LIVERY. Any building, other than a private stable, designed, arranged, used or intended to be used for the storage of horses and horse-drawn livery or both.

STAND, ROADSIDE. A structure for the display and sale of only farm products which are produced on the premises.

STORY. That portion of a building included between the surface of any floor, and the surface of the floor above it, or if there is no floor above, then the space between the floor and the ceiling next above it. Any portion of a story exceeding fourteen feet (14') in height shall be considered as an additional story for each fourteen feet (14') or fraction thereof.

STREET. A public or private way which affords the principal means of access to abutting properties.

STREET GRADE. The officially established grade of the street upon which a lot fronts. If there is no officially established grade, the existing grade of the street shall be taken as the street grade.

STREET LINE. A line separating an abutting lot, piece or parcel from a street.

STRUCTURAL ALTERATIONS. Any change other than incidental repairs which would prolong the life of the supporting members of a building or structure such as bearing walls, columns, beams and girders.

STRUCTURE. Anything constructed or erected, the use of which requires location on the ground, or attachment to something having location on the ground.

TAVERN OR LOUNGE. A building where liquors are sold to be consumed on the premises but not including restaurants where the principal business is serving food.

TERRACE, OPEN. A level and rather narrow plane or platform which, for the purpose of this Law, is located adjacent to one (1) or more faces of the principle structure and which is constructed not more than four feet (4') in height above the average level of the adjoining ground.

THEATER, OUTDOOR DRIVE-IN. An open lot or part thereof, with its appurtenant facilities devoted primarily to the showing of moving pictures or theatrical productions, on a paid admission basis, to patrons seated in automobiles or on outdoor seats.

TOURIST COURTS, MOTOR LODGES, MOTELS. A group of attached or detached buildings containing individual sleeping or living units, designed for or used temporarily by automobile tourists or transients, with garage attached or parking space conveniently located to each unit, including auto courts, motels, motor lodges, or other similar type uses.

TOURIST HOMES. A dwelling in which accommodations are provided or offered for transient guests.

USE. The purpose for which land or a building thereon is designed, arranged or intended, or for which it is occupied or maintained, let or leased.

USE VARIANCE. A variance which permits a use of land which is proscribed by the zoning regulations.

VARIANCE. Permissive waivers from the terms of the law, as will not be contrary to the public interest, where owing to special conditions, a literal enforcement of the provisions of the law will result in unnecessary hardship or practical difficulty so that the spirit of the law shall be observed and substantial justice done and granted by the Zoning Board of Appeals

YARD. An unoccupied space open to the sky, on the same lot with a building or structure.

YARD, FRONT. An open unoccupied space on the same lot with a building situated between the street line and a line connecting the parts of the building setting back from the nearest to such street line, and extending to the side lines of the lot.

YARD, REAR. A yard extending across the full width of the zoning lot and lying between the rear line of the lot and the nearest line of the principal building.

YARD, SIDE. The part of the yard lying between the nearest line of the principal building and a side lot line, and extending from the required front yard (or from the front lot line, if there is no required front yard) to the required rear yard.

ZONING LOT. A plot of ground, made of one or more parcels which is or may be occupied by a use, building or buildings including the open spaces required by this Local Law.

ZONING MAP. The map or maps incorporated into this Local Law as a part thereof, designating Zoning Districts.

SECTION 4 - GENERAL PROVISIONS

4.1 INTERPRETATION

(a) MINIMUM REQUIREMENTS. The provisions of this Law shall be held to be the minimum requirements for the promotion of the public health, safety, morals and welfare.

(b) RELATIONSHIP WITH OTHER LAWS. Where the conditions imposed by any provision of this Ordinance upon the use of land or buildings or upon the bulk of building other provision of this Law or any other law, resolution, rule or regulation of any kind, the regulations which are more restrictive (or which impose higher standards or requirements) shall govern.

(c) EFFECT OF EXISTING AGREEMENTS. This Law is not intended to ABOLISH any easement, covenant or any other private agreement provided that where the regulations of this Law are more restrictive (or impose higher standards or requirements) than such easements, covenants or other private agreements, the requirements if this Law shall govern.

4.2 SCOPE OF REGULATIONS

(a) CHANGES IN STRUCTURES OR USE. Except as may otherwise be provided in Section 5, "Non-Conforming Buildings, Structures, and Uses", all buildings erected hereafter, all uses of land or buildings established hereafter, all structural alteration or relocation of existing uses occurring shall be subject to all regulations of this Law which are applicable to the zoning districts in which such buildings, uses or land shall be located.

(b) NON-CONFORMING BUILDINGS, STRUCTURES AND USES. Any lawful buildings, structures or use existing at the time of the enactment of this Law may be continued, even though such building, structure or use does not conform to the provisions of this Law for the district in which it is located, and when ever a distance shall be changed hereafter, the then existing lawful use may be continued, subject to the provisions of Section 5, "Non-Conforming Buildings, Structures and Uses

(c) BUILDING PERMITS. Where a building permit for a building or structure has been issued in accordance with law prior to the effective date of this Law, and provided that construction is begun within ninety (90) days of such effective date and diligently prosecuted to completion, said building or structure may be completed in accordance with the approved plans on the basis of which the building permit has been issued, and further may upon completion be occupied under a Certificate of Occupancy by the use for which originally designated, subject thereafter to the provisions of Section 5, "Non-Conforming Buildings, Structures and Uses".

(d) BUILDING ERECTIONS, ADDITION, OR ALTERATIONS: No building or structure shall be erected added to or structurally altered until a building permit has been issued by the building inspector. All such application for such permits shall be in accordance with the requirements of the building code. This requirement in no way negates the intent of section 4.9.

(e) FEES: The town board may, by resolution, amend all required fees, including but not limited to building permit fees, inspection fees, review fees, appeal fees, permits, junk yard permits and planning board fees, including subdivision permit fees, together with such other and further fees as may from time to time be established.

4.3 LOT COVERAGE

(a) MAINTENANCE OF YARDS, COURTS AND OTHER OPEN SPACES. The maintenance of yards, courts, and other open spaces and minimum lot area legally required for a building shall be continuing obligation of the owner of such building or of the property on which it is located, as long as the building is in existence. Furthermore, no legally required yards, courts, other open spaces or minimum lot area allocated to any building shall, by virtue of change of ownership or for any other reason be used to satisfy yard, court, other open space, or minimum lot requirements for any other building.

(b) DIVISION OF ZONING LOTS. No zoning lot improved with a building or buildings shall hereafter be divided in to two or more zoning lots and no portion of any zoning lot which is improved with a building or buildings shall be sold, unless all zoning lots resulting from each such division or sale and improved with a building or buildings shall not be less conforming to all the building regulations of the zoning district in which the property is located.

(c) LOCATION OF REQUIRED OPEN SPACE. All yards, courts, and other open spaces allocated to a building or dwelling group shall be located on the same zoning lot as such building or dwelling group.

(d) REQUIRED YARDS FOR EXISTING BUILDINGS. No yards now or hereafter provided for a building existing on the effective date of this Ordinance shall subsequently be reduced below, or further reduced below if already less than the minimum yard requirements of this Law for equivalent new construction.

(e) PERMITTED OBSTRUCTIONS IN REQUIRED YARDS. The following shall not be considered to be obstructions when located in the required yards, specified:

(1) IN ALL YARDS. Open terraces not over four feet above the ground by not including a permanently roofed-over terrace or porch; awnings and canopies; steps, four feet or less above grade, which are necessary for access to a permitted building, or for access to a zoning into the yard; recreational and laundry-drying equipment; arbors and trellises and flag poles. Open mesh-type fences having a height of six feet or less may be used to locate property lines within the required side or rear yards. Fences, walls or lattice-work screens which form outside living rooms, or provide necessary privacy for swimming pools or other activities, and are

actual projections from the bearing walls of existing dwellings, may be extended into either the side or the rear yard but not both yards where the fence, wall or screen has not less than fifty percent of the surface open or is a vertical type of louvered fence, which can prevent free movement of air from one or more directions and yet have more than fifty percent of its surface open when viewed on an angle from two directions, provided, however

(a) That the projection shall not prohibit the erection of an open mesh type fence over six feet in height enclosing an elementary or high school site, and

(b) That this projection shall not limit the height, type or location of a fence, wall or other structures which are located within buildable area exclusive of the side or rear yards of the property.

(2) IN FRONT YARDS. One-story bay windows projecting three feet (3') or less into the yard; and overhanging eaves and gutters projecting three feet (3') or less into the yard. OPEN MESHED TYPE FENCES ARE OKAY IF NOT OVER FOUR FEET (4'). OTHER FENCES ARE OKAY IF NOT GREATER THAN THREE FEET (3').

(3) IN REAR YARDS. Enclosed, attached or detached off-street parking spaces; necessary sheds, tool rooms, and similar buildings or structures for domestic or agricultural storage, balconies; breezeways and open porches; one-story bay windows projecting three feet (3') or less into the yard; overhanging eaves and gutters projecting three feet (3') or less into the yard. No accessory building shall be nearer than ten feet (10') to any principal building unless attached.

(4) IN SIDE YARDS. Overhanging eaves and gutters projecting into the yard for a distance not exceeding forty percent (40%) of the required yard width, but in no case exceeding thirty inches (30").

(f) CORNER CLEARANCE. There shall be no material obstructions to vision on any corner lot between a height of two feet (2') and a height of ten feet (10') above the finished grade of either street within the triangle formed by the street line connecting such street line forty feet (40') from their intersection.

4.4 LOT AREA AND DIMENSION.

(a) CONTIGUOUS PARCELS. When two (2) or more parcels of land, each of which lacks adequate area and dimension to qualify for a permitted use under the requirements of the Use District in which they are located, are contiguous and are held in one (1) zoning lot for such use, ONLY IF THE TWO (2) SAID LOTS ARE CONTAINED IN ONE INSTRUMENT OF CONVEYANCE (E.G. DEED). IN THE EVENT THAT THEY ARE NOT ON ONE (1) DEED, THEY HAVE TO COME TO THE PLANNING BOARD FOR APPROVAL TO BE TREATED AS ONE (1) ZONING LOT.

(b) LOTS OR PARCELS OF LAND OF RECORD. Any single lot or parcel of land held in one (1) ownership, which was of record at the time of adoption of this Law that does not meet the requirements for minimum lot width and area, may be utilized for a permitted use, provided that yards, courts or usable open spaces are not less than seventy-five percent (75%) of the minimum required dimensions of area.

4.5 ACCESS TO PUBLIC STREET. Except as otherwise provided for in this Law every building shall be constructed or erected upon a lot, or parcel of land, which abuts upon a public street.

4.6 NUMBER OF BUILDING ON A ZONING LOT. No more than one (1) principal detached residential building shall be located on a zoning lot, nor shall a principal detached residential building be located on the same zoning lot with any other principal building.

4.7 ACCESSORY BUILDING.

(a) LOCATION. No part of any accessory building shall be located closer than five feet (5') from any side or rear property line, nor closer than ten feet (10') to any main building, unless attached and a part of such main building.

(b) TIME OF CONSTRUCTION. No accessory building or structure shall be constructed on any lot prior to the start of construction of the principal building to which it is accessory.

(c) PERCENTAGE OF REQUIRED REAR YARD OCCUPIED. No accessory building or buildings shall occupy more than forty percent (40%) of the area of a required rear yard.

(d) HEIGHT OF ACCESSORY BUILDINGS IN REQUIRED REAR YARDS. No accessory building or portion thereof located in a required rear yard shall exceed fifteen feet (15') in height.

(e) ON REVERSED CORNER LOTS. On a reversed corner lot in a Residence District, and within fifteen feet (15') of any adjacent property to the rear in a Residence District, no accessory building or portion thereof located in a required rear yard shall be closer to the side lot line abutting the street than a distance equal to sixty percent (60%) of the least depth which would be required under this Law for the front yard on such adjacent property to the rear. Further, in the above instance no such accessory building shall be located within five feet of any part of a rear lot line which coincides with a side lot line or portion thereof of property in a Residence District.

4.8 - INTERPRETATION OF PERMITTED USES: When a use is not specifically listed as a use by right of a use by special use permit within any district it shall be presumed to be a prohibited use, unless it is determined in a written decision by the Zoning Board of Appeals after proper application, that such use is similar to permitted uses, and not inherently a nuisance, menace or danger to the health, safety or welfare of the residents of the Town of Hanover.

4.9 PERMITS NOT REQUIRED. Building permits will not be required for any accessory building that has an area of less than one hundred square feet (100'), NOT TO EXCEED TWELVE FEET (12') IN HEIGHT. However, these buildings must conform to all yard set back provisions, as applicable, in this Law.

SECTION 4-A - NEW YORK STATE FIRE AND BUILDING CODE

4-A.1 DESIGNATION OF ENFORCEMENT OFFICE AS PUBLIC OFFICIAL. There is hereby designated in the Town of Hanover a public official to be known as the Code Enforcement Officer, who shall be appointed by the supervisor with the approval of the town board at a compensation to be fixed by it.

4-A.2 ACTING ENFORCEMENT OFFICER. In the absence of the enforcement officer, or in the case of his inability to act for any reason, the supervisor shall have the power, with the consent of the town board to designate a person to act on behalf of the enforcement officer and to exercise all the powers conferred upon him by this law.

4.A.3 RESTRICTIONS ON ENFORCEMENT OFFICER. The Code Enforcement Officer shall not engage in any activity inconsistent with his duties, nor shall he, during the term of his employment, be engaged directly or indirectly in any building business, in the furnishing of labor, materials, supplies, or appliances for, or the supervision of, the construction, alteration, demolition or maintenance of a building or thepreparation of plans or specifications thereof within the town of Hanover, excepting that this provision shall not prohibit any enforcement officer from engaging in any such activities in connection with the construction of a building or structure owned by him for his own personal use and occupancy of for the use and occupancy of members of his immediate family, and not constructed for sale.

4.A.4 DUTIES AND POWERS OF ENFORCEMENT OFFICER.

(a) Except as otherwise specifically provided by law, rule or regulation, or except as herein otherwise provided, the enforcement officer shall administer and enforce all of the provisions of laws, rules and Regulations applicable to the plans, specifications, or permits for the construction, alteration and repair of buildings and structures, and the installation and use of materials and equipment therein, and the location, use and occupancy thereof.

(b) He shall proclaim rules and regulations subject to the approval of the town board to secure the intent and purposes of this local law and a proper enforcement of the laws, rules and regulations governing building plans, specifications, construction, alteration or repairs.

(c) He shall receive applications, approve plans and specifications and issue permits for the erection and alteration of buildings or structures or parts thereof and shall examine the premises for which such applications have been received, plans approved, or such permits have been issued for the purpose of insuring compliance with laws, rules and regulations governing building construction or alterations.

(d) He shall issue in writing all appropriate notices or orders to remove illegal or unsafe conditions, to require the necessary safeguards during construction and to insure compliance during the entire course of construction with the requirements of such laws, rules and regulations, and such notices or orders may be served upon the property owner of or his agent personally, or by sending by certified mail a copy of such order to the owner or his agent at the address set forth in the application for permission for the construction or alteration of such building, and by posting the same upon a conspicuous portion of the premises to which the notice applies.

(e) Whenever the same may be appropriate to determine compliance with the provisions of applicable laws, rules and regulations covering building construction or alteration, he may, in his discretion, accept and rely upon written reports of tests in the field by experienced, professional persons or by accredited and authorized testing laboratories or service and inspection bureaus or agencies.

(f) He shall issue a certificate of occupancy, where appropriate, for a building constructed or altered in accordance with the provisions of the state uniform construction code which certificate shall certify that the building conforms to the requirements of the state uniform construction code.

(g) He shall keep permanent official records of all transactions and activities conducted by him including all applications received, plans approved, permits and certificates issued, fees charged and collected, inspection reports, all rules and regulations proclaimed by him with the consent of the town board and notices and orders issued. All such records shall be public records open to public inspection during normal business hours.

(h) He shall, annually, submit a written report and summary of all business conducted including approvals, permits and certificates issued, fees collected, orders, and notices proclaimed, inspections, and tests made and appeals or litigation pending or concluded.

(I) He shall make file inspections annually to insure compliance with chapter C of the uniform fire and building code.. For uses involving hazardous or flammable materials, more frequent inspections may be made at the discretion of the enforcement officer.

(j) He shall make inspections of new construction, as necessary, to insure compliance with chapter C of the uniform fire and building code. A minimum of seven (7) inspections shall be made, although they may be made concurrently, where possible. Inspections shall be made at reasonable times after showing proper credentials.

(k) It is the code enforcement officer's duty to enforce the code and zoning laws, and it is the duty of the town attorney to prosecute code violations with assistance from the code enforcement officer.

4-A.5 APPLICATION FOR BUILDING PERMIT.

(a) No person, firm or corporation shall commence the erection, construction, enlargement, alteration, improvement, conversion or change in the nature of the occupancy of any building or structure, or Cause the same to be done , without first obtaining a separate building permit; except that no building permit shall be required for the performance of ordinary repairs which are not structural in nature.

(b) Application for a building permit shall be made on forms provided and shall contain the following information:

(1) A description of the land on which the proposed work is to be done;

(2) A statement of the use or occupancy of all parts of the land and the proposed building or structure;

(3) The valuation of the proposed work;

(4) The full name and address of the owner and of the applicant, and the names and addresses of their responsible officers if any of them are corporations, and the name and address of the owner's authorized agent, if any;

(5) A brief description of the nature of the proposed work;

(6) If the construction of is to be in accordance with the provisions of the state uniform construction code, a statement that the application is made for permission to construct in accordance with the provisions of such code;

(7) A statement that the applicant consents to permit the building official, any building inspector and any officer or employee of the building department to enter upon the premises without a search warrant in the manner prescribed in this law.

(8) Such other information as may reasonably be required by the enforcement officer to establish compliance of the proposed work with the requirements of the applicable building laws, rules and regulations.

(9) Copies of all building permits issued shall be sent by the Code Enforcement Office to all department heads within forty-eight (48)

hours of granting and filing of the permit.

(c) The application shall be signed by the owner or his authorized agent.

(d) The application shall be made by the owner or by the agent, architect, engineer or builder employed in connection with the proposed work. Where such application is made by a person other than the owner, it shall be accompanied by an affidavit of the owner that the proposed work is authorized by the owner and that the applicant is authorized to make such application; and the affidavit shall contain a statement that the owner authorizes the applicant to consent to permit the Code Enforcement Officer for inspection purposes.

(e) Each application for a building permit shall be accompanied by duplicate copies of plans and specifications, including a plot plan, drawn to scale, showing the location and size of all proposed new construction and all existing structures on the site, the nature and character of the work to be performed and the materials to be incorporated, distance from lot lines, the relationship of structures on adjoining property, widths and grades of adjoining streets, walks and alleys, and, where required by the building official, details of structural, mechanical and electrical work, including computations, stress diagrams and other essential technical data; plans and specifications shall bear the signature of the person responsible for the design and drawings and where required by section 7202 or 7302, as amended, of articles 145 or 147 of the Education Law of The State of New York , the seal of a licensed architect or a licensed professional engineer; the Enforcement Officer may waive the requirements for filing plans and specifications for minor alterations and issue a building permit so stating.

(f) Amendments, if any to the application or the plans and specifications accompanying the same shall be filed and approved prior to the commencement of such change of work.

(g) The Code Enforcement Officer shall examine or cause to be examined all applications for permits and the plans, specifications and documents filed therewith. He shall approve or disapprove the application within sixty (60) days from the date of submission of the application.

(h) Upon approval of the application and upon receipt of the legal fees therefor, the building permit to the applicant upon the form prescribed by the enforcement officer an d shall affix his signature or cause his signature to be affixed thereto.

(I) Upon approval of the application, both sets of plans and specifications and specifications shall be endorsed approved plans and specifications shall be

retained in the files of the building department and the other set shall be returned to the applicant together with the building permit and shall be kept by the applicant at the building site open to inspection by the building official or his authorized representative at all reasonable times.

(j) If the application together with the plans, specifications and other documents filed therewith describe proposed work which does not conform to all of the requirements of the applicable building regulations, the enforcement officer shall disapprove the same and shall return the plans and specifications to the applicant. Upon the request of the applicant, the enforcement officer shall cause such refusal, together with the reasons therefor, to be transmitted to the applicant in writing.

(k) Upon payment of fee as prescribed in the schedule of fees adopted herein, permits shall be issued by and bear the name and signature of the Code Enforcement Officer and shall specify:

(1) Activity or operation for which permit is issued;

(2) Address or location where activity or operation is to be conducted;

(3) Name and address of permitted;

(4) Permit number and date of issuance; and

(5) Period of permit validity.

(l) Permits shall not be transferable and any change in activity, operation, location, ownership, or use shall require a new permit.

(m) Consolidated permits. When more than one (1) permit is required for the same property or premises, a single permit may be issued listing all materials or operations covered. Revocation of a portion or portions of such consolidated permit, for specific hazardous materials or operations, shall not invalidate the remainder.

(n) The Code Enforcement Officer shall provide permit copies to all appropriate Town of Hanover department heads within 24 hours of issuance.

4-A.5a FEES: The Town of Hanover board may, by resolution, amend all required fees, including but not limited to building permit fees, inspection fees, review fees, appeal fees, permits, junk yard permits and planning board fees, including subdivision permit fees, together with such other and further fees as may from time to time be established.

4-A.6 VALIDITY PERIOD: All building permits shall expire one (1) year after date of issuance, unless extended by the code enforcement officer for an additional six (6) month period upon showing of good cause. Extension shall be at the discretion of the Code Enforcement Officer and may be conditioned upon such terms as may be reasonable and necessary.

4-A.7 DISPLAY OF PERMIT. Building permits shall be prominently displayed on the job site at all times during the progress of the work so as to be readily seen from adjacent thoroughfares.

4-A.8 REVOCATION/STOP ORDER.

(a) The Code Enforcement Officer may revoke a building permit theretofore issued in the following instances:

(1) Where he finds that there has been any false statement or misrepresentation as to a material fact in the application plans or specifications on which the building permit was based;

(2) Where he finds that the building permit was issued in error and should not have been issued in accordance with the applicable law;

(3) Where he finds that the work performed under the permit is not being prosecuted in accordance with the provisions of the application, plans or specifications; or

(4) Where the person to whom a building permit has been issued fails or refuses to comply with a stop order issued by the Code Enforcement Officer.

(b) Whenever the Code Enforcement Officer has reasonable grounds to believe that work on any building or structure is being prosecuted in violation of the provisions of the applicable building laws, rules or regulations, or not in conformity with the provisions of an application, plans or specifications on the basis of which a building permit was issued, or in an unsafe and dangerous manner, he shall notify the owner of the property, or the owner's agent, to suspend all work, and any such persons shall forthwith stop such work and suspend all building activities until the stop order has been rescinded. Such order and notices shall be in writing, shall state the conditions under which the work may be resumed and may be served upon a person to whom it is directed either by delivering it personally to him, or by posting the same upon a conspicuous portion of the building where the work is being performed and sending a copy of the same to him by certified mail at the address set forth in the application for permission for the construction of such building.

4-A.9 CERTIFICATE OF OCCUPANCY.

(a) APPLICABILITY.

(1) No building hereafter erected shall be used or occupied in whole or in part until a certificate of occupancy shall have been issued by the Code Enforcement Officer;

(2) No building hereafter enlarged, extended or altered, or upon which work has been performed which required the issuance of a building permit shall be occupied or used after the completion of the alteration or work unless a certificate of occupancy shall have been issued by the Code Enforcement Officer;

(3) No change shall be made in the nature of the occupancy of an existing building unless a certificate of occupancy authorizing such change shall have been issued by the Code Enforcement Officer; and

(4) The owner or his agent shall make application for a certificate of occupancy. Accompanying this application and before the issuance of a certificate of occupancy, there shall be filed with the Code Enforcement Officer an affidavit of the registered architect or licensed professional engineer who filed the original plans, or of the registered architect or licensed professional engineer who supervised the construction of the work, or of the superintendent of construction who supervised the work and who, by reason of his experience, is qualified to superintend the work for which the certificate of occupancy is sought. This affidavit shall state that the said individual has examined the approved plans o of the structure for which a certificate of occupancy is sought, that the structure has been erected in accordance with approved plans, and as erected complies with the law governing building construction or as varied by a variance which has been legally authorized. Such variances and qualifying conditions imposed therewith, if any, shall be specified in the affidavit.

(b) Inspection prior to issuance of certificate of occupancy before issuing a certificate of occupancy, the enforcement officer shall examine or cause to be examined all buildings, structures and sites for which an application has been filed for a building permit to construct, enlarge, alter, repair, or change the use or nature of occupancy, and he may conduct such inspections as he deems appropriate from time to time during and upon completion of the work for

which a building permit has been issued. There shall be maintained by the Code Enforcement Officer a record of all such examinations and inspections together with a record of findings of violations of the law.

(c) ISSUANCE OF CERTIFICATE OF OCCUPANCY

(1) When, after final inspection, it is found that the proposed work has been completed in accordance with the applicable building laws, rules and regulations; and also in accordance with the application, plans and specifications filed in connection with the issuance of the building permit, the Code Enforcement Officer shall issue a certificate of occupancy upon the form provided by him. If it is found that the proposed work has not been properly completed, the Code Enforcement Officer shall not issue a certificate of occupancy and shall order the work completed in conformity with the building permit and in conformity with the applicable building regulations;

(2) A certificate of occupancy shall be issued, where appropriate, within 10 days after written application therefore is made; and

(3) The certificate of occupancy shall certify that the work has been completed, and that the proposed use and occupancy is in conformity with the provisions of the applicable building laws, rules and regulations, and shall specify the use or uses and the extent thereof to which the building or structure or its several parts may be put.

4-A.10 REMOVAL OF DANGEROUS BUILDINGS OR STRUCTURES. A building or structure or part thereof which is an imminent danger to life and safety of the public as a result of a fire or explosion is hereby declared to be a public nuisance.

Whenever the Code Enforcement Officer finds a building or structure, or part thereof, to be an imminent danger to life and safety of the public as a result of a fire or explosion, the Code Enforcement Officer may secure it and petition a court of competent jurisdiction to cause it to be demolished and removed or may cause work to be done in and about the building or structure as may be necessary to remove the danger. The cost of any and all such work shall be charged to the owner of the premises.

The Code Enforcement Officer may require the occupants of any such building or structure, or part thereof, to vacate the premises forthwith. No person shall use or occupy such building or structure, or part thereof, until it is made safe.

Except for the owner, no person shall enter premises which have been ordered vacated unless authorized to perform inspections, repairs, or to demolish and remove such buildings or structures, or part thereof.

SECTION 5 - NON-CONFORMING BUILDINGS & USES

5.1 CONTINUANCE OF USE

(a) Any lawfully established use of a building or land, at the effective date of this Law or of amendments thereto, that does not conform to the use regulations for the district in which it is located, shall be deemed to be a legal non-conforming use and may be continued, except as otherwise provided herein.

(b) Any legal non-conforming building or structure may be continued in use provided there is not physical change other than necessary maintenance and repair except as otherwise permitted herein.

(c) Any building for which a permit has been lawfully granted prior to the effective date of the Law, or of amendments thereto, may be completed in accordance with the approved plans; provided construction is started within ninety (90) days and diligently prosecuted to completion. Such building shall thereafter be deemed a lawfully established building.

5.2 DISCONTINUANCE OF USE

(a) Whenever any part of a building, structure or land occupied by a non-conforming use is changed to or replaced by a use conformed to the provisions of this Law, such premises shall not thereafter be used or occupied by non-conforming use, even though the building may have been originally designed and constructed for the prior non-conforming use.

(b) Whenever a non-conforming use of a building or structure, or part thereof, has been discontinued for a period of twelve (12) consecutive months, or whenever there is evident a clear intent on the part of the owner to abandon a non-conforming use, such use shall not after being discontinued or abandoned, be re-established, and the use of the premises thereafter shall be in conformity with the regulations of the district.

(c) Where no enclosed building is involved, discontinuance of a non-conforming use for a period six (6) months shall constitute abandonment, and shall not thereafter be used in a non-conforming manner.

5.3 CHANGE OF NON-CONFORMING USE

USE OF NON-CONFORMING BUILDING. The non-conforming use of any building or portion thereof, which is designed or intended for a use not permitted in the district in which it is located, may be changed to another non-conforming use thereof but only if such use is permitted by Special Use Permit as authorized in Section 13.7.

5.4 TERMINATION AND REMOVAL OF NON-CONFORMING USES AND BUILDINGS. The period of time during which the following non-conforming uses of buildings, structures or land may continue or remain in all districts shall be limited to two (2) years from the effective date of this Law or of any amendment thereto which causes the use to be non-conforming. Every such non-conforming use shall be completely removed from the premises at the expiration of the two (2) year period.

(a) Any non-conforming use with a building or structure having an assessed valuation not in excess of five hundred and no/100 dollars ($500.00) on the effective date of this Law.

(b) All non-conforming signs, billboards, and outdoor advertising structures.

(c) Any non-conforming use of land where no enclosed building is involved; or where the only buildings employed are accessory or incidental to such use or where such use is maintained in connection with a conforming building.

5.5 REPAIRS AND ALTERATIONS

(a) Normal maintenance of a building or other structure containing a non-conforming use is permitted, including necessary non-structural repairs and incidental alterations which do not extend or intensify the non-conforming use.

(b) No structural alteration shall be made in a building or other structure containing a non-conforming use, except in the following situations:

(1) When the alteration is required by law.

(2) When the alteration will actually result in eliminating the non-conforming use.

(3) When a building containing residential non-conforming used may be altered in any way to improve livability, provided no structural alteration shall be made which would increase the number of dwelling units or the bulk of the building.

(4) A non-conforming light industrial use can be altered by an alteration of not more that fifty percent (50%) of the lot size for building, parking and plant facilities in the A-1 district.

5.6 DAMAGE AND DESTRUCTION. If a building or other structure containing a non-conforming use is damaged or destroyed by any means to the extent of fifty percent (50%) or more of its replacement value at that time, the building or other structure can be rebuilt or used thereafter only for a conforming use and in compliance with the provisions of the district. In the event the damage is less than fifty percent (50%) of its replacement value, based upon prevailing costs, the building may then be restored to its original condition and the occupancy or use of such building may be continued which existed at the time of such partial destruction. In either event, restoration started within a period of six (6) months from the date of damage or destruction and diligently prosecuted to completion.

5.7 ADDITIONS AND ENLARGEMENTS.

(a) [Excepting herein above set forth in paragraph 5.5(b) (4)] A non-conforming building may be enlarged or extended only if the entire building is thereafter devoted to a conforming use and is made to conform to all the regulations of the district in which it is located.

(b) No building partially occupied by a non-conforming use shall be altered in such a way as to permit the enlargement or expansion of the space occupied by such non-conforming use.

(c) No non-conforming use may be enlarged or extended in such a way as to occupy any required usable open space, or any land beyond the boundaries of the zoning lot as it existed at the effective date of this Law, or to displace any conforming use in the same manner or on the same parcel.

(d) A building or structure which is non-conforming with respect to yards, floor area ratio, or any other element of bulk regulations by this Law, shall not be altered or expanded in any manner which would increase the degree or extent of its non-conformity use with respect to the bulk regulation for the district in which it is located.

5.8 EXEMPTED BUILDINGS, STRUCTURES AND USES. Whenever a lawfully existing building or other structure otherwise conforms to the use regulations of this Law, but is non-conforming only in the particular manner hereinafter specified, the building and use thereof shall be exempt from the requirements of Sub-sections, TERMINATION AND REMOVAL AND REPAIRS AND ALTERATIONS:

(a) In any district, where a dwelling is non-conforming only as to the number of dwelling units it contains, provided no such building shall be altered in any way so as to increase the number of dwelling units therein.

(b) In any district, where an established building, structure or use is non-conforming with respect to the standards prescribed in this Law for any of the following reasons:

Yards - Front, side, rear or transitional
Off-street parking or loading
Lot area
Building height
Floor area

5.9 CONVERSION TO SPECIAL USE. Any existing non-conforming use may be made a special use by the granting of a special use permit as authorized by sub-section 13.7.

SECTION 6 - ZONING DISTRICTS

6.1 DISTRICTS. For the purpose and provisions of this Law, the Town of Hanover is hereby organized into six (6) districts. The minimum area that may constitute a separate or detached part of any zoning district shall be as follows:

SECTION	ZONING DISTRICT
7	A-1 Agricultural and Residential District
8	R-1 Residential District (Hanford Bay)
9	R-2 Residential and Recreational District (Sunset Bay)
10	R-3 Residential and Recreational District (Hamlet of Irving)
11	B-1 Business District
12	I Light Industry District

6.2 ZONING MAPS. The boundaries of the aforesaid zoning districts are hereby established as shown on the map entitled, "Zoning Map of the Town of Hanover, New York, dated, _____, which map accompanies and is made a part of this Law and shall have the same force and effect as if the Zoning Map, together with all notations, references and other information shown thereon, were fully set forth and described therein.

6.3 DISTRICT BOUNDARIES. When uncertainty exists with respect to the boundaries of the various districts as shown on the Zoning Map, the following shall apply;

(a) District boundary lines are intended to follow property lines or the extensions thereof, center lines of highways, streets, alleys or easements, banks of streams or creeks, corporation lines or other lines located on the map by appropriate descriptions or dimensions. Distances shown on the map are perpendicular, right angle or radial distances from the highway, street or alley centerlines measured back to the district boundary line, which lines, in all cases where distances are given, are parallel with or to the highway, street or alley centerline.

(b) In areas not subdivided in to lots and blocks, whenever a distance is indicated as a strip adjacent to and paralleling a highway, street or alley, the depth of such strips shall be in accordance with the dimensions shown on the map measured at right angles from the center line of the highway, street or alley, and the length of the frontage shall be in accordance with the dimensions shown on the map from lot or division lines, or center lines of highways, streets or alleys unless otherwise indicated.

(c) Where a lot held in one (1) ownership and of record at the effective date of this Law is divided by a district boundary line, the entire lot shall be construed to be within the less restricted district, provided that this determination shall not apply if it increases the less restricted portion of the lot by more than twenty-five (25) feet.

6.4 ZONING OF STREETS, ALLEYS, PUBLIC WAYS, WATERWAYS AND RIGHTS OF WAY. All streets, alleys, public ways, waterways, and railroad rights of way, if not otherwise specifically designated, shall be deemed to be in the same zone as the property immediately abutting upon such alleys, streets, public ways, waterways, or railroad right of way. Where the center line of a street, alley, public way, waterway or railroad right of way serves as a district boundary, the zoning of such areas, unless otherwise specifically designated, shall be deemed to be the same as that of the abutting property up to such center line.

6.5 EXCEPTIONS. The following uses are exempted by this Law and permitted in any district:

(a) Poles, towers, wires, cables, conduits, vaults, laterals, pipes, mains, valves or any other similar distributing equipment for telephone or other communications, electric power, gas, water and sewer lines provided that the installation shall conform when applicable with Federal Communications Commission and Federal Aviation Agency Rules and Regulations, and other authorities having jurisdiction.

6.6 DISTRICT BOUNDARIES DESCRIBED.

6.6-1 A-1 AGRICULTURAL AND RESIDENTIAL DISTRICT.

All areas in the Town of Hanover which have not been more particularly described in Sections 6.6-2, 6.6-3, 6.6-4, 6.6-5, and 6.6-6.

6.6-2 R-1 RESIDENTIAL DISTRICT (HANFORD BAY). The following areas shall be included in the R-1 Residential District (Hanford Bay) as shown on the Town of Hanover Tax Map Sections and Blocks:

1. Section No. 20, Blocks No. 1, 2, 3, 4, 5, and 6.

2. Section No. 21, Blocks No. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

3. Section No. 22, Blocks No. 8, 9, and 10, together with that portion of Block No. 5 that commences at the intersection of the center line of Moran Road and the northerly line of lands of CONRAIL; thence easterly along the northerly line of CONRAIL to its intersection with the centerline of Oneida Street; thence northerly along the center line of Oneida Street to the center line of Ohio Street; thence westerly along the center line of Ohio Street to the easterly line of Block 8; thence northerly along the easterly line of Block 8 to Lake Erie.

6.6-3 R-3 RESIDENTIAL AND RECREATIONAL DISTRICT (HAMLET OF IRVING).

The R-3 Residential and Recreational District (Hamlet of Irving) shall be bounded as follows:

North by the southerly bounds of the PENNDEL Company lands; east by the center line of Buffalo Road; south by the center line of N.Y. Route 5 and U.S. Route 20, and lands of the New York Thruway Authority; and west by the centerline of Mott Road and lands of the New York State Thruway Authority.

6.6-4 R-2 RESIDENTIAL AND RECREATIONAL DISTRICT (SUNSET BAY).

The following areas shall be included in the R-2 Residential and Recreational District (Sunset Bay) as shown on the following Town of Hanover Tax Map Sections and Blocks:

(a) All lands in Section 23 and 24, bounded on the south by the northerly line of lands of CONRAIL; on the east by the westerly bank of Cattaraugus Creek, and the North by Lake Erie.

(b) Bounded on the west by all lands east of the easterly limits of Section 6.6-2 Residential and Recreational (Hanford Bay) in Tax Map Section 22, Blocks 5 and 8.

6.6-5 B-1 The B-1 BUSINESS DISTRICT

(a) Commencing at the point of intersection of the easterly corporation line of the Village of Silver Creek and the center line of N.Y. Route 5; thence continuing easterly along said centerline of Route 5 and centerline of U. S. Route 20 to the westerly bank of Cattaraugus Creek; thence northerly along the westerly bank of Cattaraugus Creek to a point in the southerly line of lands of PENNDEL (Railroad) Company; thence westerly along the said southerly line of PENNDEL Company lands to its intersection with the easterly corporation line of the Village of Silver Creek; thence southerly along the easterly corporation line of the Village of Silver Creek to its intersection with the center line of N.Y. Route 5.

EXCLUDING any and all lands owned by the New York State Thruway Authority from the above described parcel. Also EXCEPTING from the afore described parcel the R-3 Residential and Recreational District (Hamlet of Irving) as set forth in Section 6.6-3.

(b) Commencing at the point of intersection of the easterly corporation line of the Village of Silver Creek and the center line of U.S. Route 20; thence continuing easterly along said centerline, to its intersection with the centerline of Buffalo Road; thence southerly along the centerline of Buffalo Road, to a point situate 500 feet south of the center line of Route 20 by perpendicular measurements; thence westerly, parallel to and 500 feet southerly from the centerline of Route 20, to a point in easterly corporation line of the Village of Silver Creek situate 500 feet southerly, by perpendicular measurement, from the center line of Route 20; thence northerly along the easterly corporation line of the Village of Silver Creek 500 feet to its intersection with the center line of Route 20.

EXCLUDING from the above described parcel any and all lands owned by the New York State Thruway Authority.

(c) Commencing at the point where the center lines of N.Y. Route 5 and 20 meet, said point being 2,382 feet easterly along the center line of Route 20 from its intersection with the easterly corporation line of the Village of Silver Creek; thence westerly along the center line of Route 20 to a point located 249 feet east of its intersection with the center line of Barone Drive; thence northerly, parallel with the center line of the northerly section of Barone Drive, 1,720 feet to a point in the center line of Adams Street; thence westerly along the center line of Adams Street 320 feet to a point in the easterly corporation line of the Village of Silver Creek; thence northerly along the said easterly corporation line of the Village of Silver Creek to its intersection with the center line of N.Y. Route 5; thence easterly along

the center line of Route 5 to its intersection with the center line of U. S. Route 20.

(d) Commencing at the intersection of the centerline of N.Y. Route 5 and U. S. Route 20, and the centerline of Buffalo Road; thence easterly along the centerline of Route 5 and 20 to the westerly bank of Cattaraugus Creek; thence southerly along the westerly bank of Cattaraugus Creek to a point in the westerly line of the lands of the Cattaraugus Indian Reservation; thence southerly along the westerly line of the Cattaraugus Indian Reservation to its intersection with the centerline of Buffalo Road; thence northerly, along the centerline of Buffalo Road to its intersection with the centerline of Route 5 and 20.

EXCLUDING from the above described parcel any and all lands owned by the New York State Thruway Authority.

SECTION 6 .6 – 6 – 1- LIGHT INDUSTRY DISTRICT

Commencing at a point in the centerline of U. S Route 20 situate 815 feet easterly from the intersection of the said centerline with the easterly corporation line of the Village of Silver Creek, said point being the extension of the easterly line of the lands owned by B & B Hanover Associates; thence easterly along the center line of Route 20 and the center line of N.Y. Route 5 to its intersection with the westerly line of lands of the New York State Thruway Authority Interchange No. 58; thence southerly along the westerly line of the Thruway lands to a point situate 1,500 feet southerly, at right angles to the center line of Routes 5 and 20; thence westerly, parallel with and 1,500 feet southerly by right angle measurement, from the said centerline of Route 5 and 20 to a point located 1,500 feet southerly, by right angle measurement, from the point of commencing; thence northerly 1,500 feet to the point of commencing in the center line of U. S. Route 20, including the present B-1 Business District and a portion of the A-1 Agricultural and Residential District.

Also, commencing at the intersection of the center line of Routes 5 and 20 and the center line of Buffalo Road; thence southerly along the center line of Buffalo Road to its intersection with the westerly line of lands of the Cattaraugus Indian Reservation; thence southwesterly along the westerly line of the Cattaraugus Indian Reservation to a point making the southeast corner of lands of the Niagara Mohawk Power Corporation; thence northerly and westerly along lands of Niagara Mohawk to a point situate 1,500 feet westerly, by right angle measurements, from the center line of Buffalo Road and its direct extension to the south; thence northerly, parallel with the center line of Buffalo Road, to the center line of Spears Road; thence westerly 65 feet along the center of Spears Road to a point in the easterly line of lands of the New York State Thruway Authority Interchange No. 58; thence northerly along the easterly line of lands of the Thruway Authority, in a direct extension northerly, to the center line of Route 5 and 20; thence easterly 1,920 feet along the center line of Route 5 and 20 to the point of commencing at the center line of

Buffalo Road.

EXCLUDING from the above described parcels any and all lands owned by the New York State Thruway Authority.

SECTION 7 - AGRICULTURAL AND RESIDENTIAL DISTRICT

7.1 AGRICULTURAL AND RESIDENTIAL DISTRICT.

7.1-1 PURPOSE.

(1) To separate by sufficient distance, residential uses in order to maintain a reasonable ground water level to individual wells and water supply systems under the majority of soil conditions;

(2) To provide adequate area for disposal of sanitary sewage waste under the majority of soil conditions; and

(3) To guide growth in such a manner that central municipal facilities will not be necessary until the demand for a higher pattern of density is such that an economic installation of municipal water and sewage systems is feasible, thereby preserving the physical and economic stability and preventing detrimental urban encroachment.

7.1-2 USE BY RIGHT. The following uses MAY BE USED AS OF RIGHT:

(1) Accessory uses;

(2) All uses commonly classed as agriculture, horticulture, or forestry, including crop and tree farming, truck farming, gardening, nursery operation, dairy farming, stock raising, domestic animal and poultry breeding and raising (not including raising of fur-bearing animals, or animal hospitals) and forestry operations, together with the operation of any machinery or vehicles incident to the above uses;

(3) Churches, rectories and parish houses;

(4) Golf courses, regulation size, commercially operated driving ranges or miniature golf courses; and provided that no club house or accessory building shall be located nearer than five hundred feet (500') to any dwelling;

(5) Home occupations;

(6) Off-street parking facilities as required or permitted in accordance with provisions of Section 12;

(7) One-family detached dwellings;

(8) Parks, forest preserves and recreational areas, when publicly owned and operated;

(9) Public utility facilities;

(10) Schools, elementary and high, and including playgrounds and athletic fields auxiliary thereto;

(11) Seminaries, convents, monasteries and similar religious institutions, including dormitories and other accessory uses required for operation;

(12) Signs, advertising the sale or rental of the property upon which the sign is located , or the sale of agricultural products grown or produced on the property;

(13) Temporary roadside stands for the display, sale or offering for sale of agricultural products grown or produced on the property. Provided that any stand or display of produce be set back thirty feet (30') from the edge of traveled part of the highways, with adequate off-street parking to accommodate all customers' vehicles; and

(14) Manufactured homes.

7.1-3 SPECIAL USES. The following uses may be allowed by Special Use Permit in accordance with the provisions of Section 13.7:

(1) Airports or aircraft land fields;

(2) Animal hospitals;

(3) Cemeteries, including crematories and mausoleums in conjunction therewith, if not located with five hundred feet (500') of any dwelling;

(4) Dog kennels;

(5) Filling of holes, pits, quarries, or lowland with non-combustible material free from refuse and food wastes;

(6) Fur-bearing animal farms;

(7) Gun clubs, if located not nearer than one thousand feet (1,000') to any residence other than that of the owner or lessee of the site, and if not so operated as to withdraw the land from its primary agricultural use;

(8) Light industry;

(9) Mining, loading and hauling of sand, gravel, topsoil or other aggregate, but not including equipment, buildings or structures for screening, crushing, mixing, washing, or storage, except as may be specifically authorized for a limited period of time;

(10) Multi-family residence;

(11) Private recreational area or camps only when the application is accompanied by plans approve by the New York State Department of Health for sanitary disposal of sewage;

(12) Public service uses:

(a) Filtration plant, pumping station, and water reservoir;

(b) Sewage treatment plant;

(c) Police and fire stations; and

(d) Other governmental uses;

(13) Radio and television towers, commercial;

(14) Railroad rights-of-way and tracks;
(15) Rest homes, nursing homes, hospitals and sanitariums, institutions for the aged and for children, for human beings only;

(16) Saw mills;

(17) Stable, livery;

(18) Theater, outdoor drive-in;

(19) Manufactured home park;

(20) Two-family dwelling; and

(21) Private clubs or lodges, except those the chief activity of which is a service customarily carried on as a business.

7.1-4 LOT SIZE. Every one-family detached dwelling hereafter erected shall be located on a tract of land having an area of not less than two (2) acres and a width with road frontage of not less than one hundred fifty feet (150') except as otherwise provided herein. If served by public water or public sewer, a one-family dwelling may be erected on a tract area having an area of not less than one (1) acre and not less than one hundred feet (100') of road frontage, except when serviced by public water and sewer, then a one-half (½) acre lot having a frontage of one hundred feet (100') shall be allowed.

All non-residential buildings and uses that are not accessory to residential uses and hereafter erected or established shall be on a tract of land having an area of not less than two (2) acres.

7.1-5 FRONT YARD: [Ag. & Res.]

No point of any building or structure hereafter erected shall be placed closer than fifty feet (50') from the edge of the right of way of any public street, road, or highway which abuts the subject property.

7.1-5- A REAR YARD: [Ag. & Res.]

No point of any building or structure hereafter erected shall be placed closer than thirty- five feet (35') from the rear established property line, however, that a one story accessory building, as defined in section 4.9 may be located no less than five (5) feet from the rear lot line.

7.1-6 SIDE YARD. On each lot upon which a dwelling is constructed, there shall be a side yard on each of not less than fifteen feet (15'), as measured from the closest point of such structure to the boundary of said lot.

7.1-7 DWELLING STANDARDS. Every one-story dwelling hereafter erected in any "A-1" agricultural and residential district shall have a total ground floor area of not less than eight fifty hundred (850) square feet measured from the outside of the exterior walls, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other open spaces that are not used frequently or during extended periods for living , eating or sleeping purposes. Every dwelling of more than one (1) story hereafter erected in any "A-1" agricultural and residential district shall have a total floor area, measured from the outside of the exterior walls, of not less than one thousand (1,000) square feet, including utility rooms but excluding cellars, basements, open porches, breezeways, garages and other spaces that are not used frequently or during extended periods for living, eating or sleeping purposes, except that enclosed space intended for habitable rooms, which are to be completed within a reasonable time, may be considered in completing such floor area. All dwellings hereafter place shall be completely immobilized and placed on a permanent foundation, including footer below the frost line, with a masonry or poured concrete curtain, which curtain shall be a minimum six (6) inches thick or eight (8) inches thick if load bearings. Such poured concrete or masonry curtain need not be load bearing and may be cosmetic in nature. If such curtain is load bearing, appropriate support beams must be installed. If such curtain is cosmetic in nature only, appropriate support piers must be installed. All installation must be in accordance with the provisions of this zoning law and the New York State Uniform Fire and Building Code. No floor area shall be below five hundred eighty-three (583) feet USGS. Manufactured homes shall comply with requirements of this section.

7.2-1 RECREATIONAL VEHICLES: Any recreational vehicle (pick-up camper, travel trailer, motor home, trailer camper) or any other type motor vehicle which is used as a residence for more than ten (10) days at one location outside of a licensed campsite is required to obtain a special use permit.

SECTION 8 - (R-1) RESIDENTIAL (HANFORD BAY)

8.1 ONE-FAMILY RESIDENTIAL DISTRICT

8.1-1 USES BY RIGHT. The following uses are USES BY RIGHT:

(1) One-family detached dwellings

(2) Schools, public denominational, private, elementary or high, including playgrounds and athletic fields, auxiliary hereto

(3) Churches, rectories and parish houses

(4) Public utility facilities

(5) Off-street parking facilities, as required or permitted in accordance with the provisions of Section 13.2-6

8.1-2 PERMITTED ACCESSORY USES. Located on the same lot with the permitted principal use:

(1) Private garages, with a roof peak a maximum twelve feet (12') in height, for the accommodation of not more than two (2) automobiles.

(2) Other customary accessory uses and buildings, provided such uses are clearly incidental to the principal use and do not include any activity commonly conducted as a business.

(3) There shall be not more than two (2) accessory buildings and one (1) principal use building on the same lot, or on lots adjacent or contiguous with one another when such lots are in a single ownership and only when such lots individually do not meet the lot size as set down in this section under 9.1-4, or when such contiguous or adjacent lots do not bound directly on a public street.

(4) A sign, advertising the sale or rental of the property upon which the sign is located. The sign shall be restricted to the words: For Sale, For Rent, or both: Name and telephone number of realtor, if any. Sign not to exceed two hundred eighty-eight (288) square inches.

8.1-3 SPECIAL USES. The following may be allowed by special use permit in accordance with the provisions of Section 13.7

(1) Recreation buildings or areas operated by membership clubs for the benefit of their members and not for gain.

(2) Public Service Uses

(1) Filtration plant, pumping stations and water reservoir;

(2) Sewage treatment plant;

(3) Police and fire stations;

(4) Telephone exchange or telephone booths for the public use;

(5) Electric sub-stations and booster stations; and

(6) Governmental uses.

8.1-4 LOT SIZES. When a tract of land is served by public water or by sanitary sewer system, or by a community water system or sanitary sewers system operated as a public utility, a one (1) family dwelling may be erected on a lot having an area of not less than six thousand five hundred (6,500) square feet, and width at the established building line of not less than sixty-five feet (65'). When a tract of land is served by both a community water system and a sanitary sewer system, a one (1) family dwelling may be erected on a lot having an area of not less than six thousand (6,000) square feet and a width at the established building line of not less than sixty feet (60') except as provided in Sub-Section 4.4 (lot area and dimension on lots of record).

8.1-5 MINIMUM LOT SIZES FOR SPECIAL USES shall be prescribed and conditions stipulated at the time a special use permit is authorized, but in no case shall any such lot have less area than fifteen thousand (15,000) square feet and be served by an approved system of water and, or sanitary facilities.

8.1-6 YARD AREAS. No building shall be erected or enlarged unless the following yards are provided and maintained.

(a) FRONT YARD. No point of any building or structure hereafter erected shall be placed closer than twenty-five feet (25') from the edge of the right of way of any public street, road, or highway which abuts the subject property.

(b) SIDE YARD. A side yard on each side of the zoning lot of not less than ten percent (10%) of the width of the lot, except where a side yard adjoins a street, the minimum width shall be not less than twenty-five feet (25').

(c) REAR YARD. No point of any building or structure hereafter erected shall be placed no closer than thirty-five feet (35') from rear established property line, however, that a one-story accessory building, as defined by Section 4.9 may be located no less than five feet (5') from rear of lot line.

(d) All minimum yard areas as set forth herein shall be measured from the most extended point of such structures or dwelling on that side to the boundary line of said lot.

8.1-7 DWELLING STANDARDS. Every one-story dwelling hereafter erected shall have a total ground floor area of not less than eight hundred fifty (850) square feet measured from the outside of the exterior walls, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other open spaces that are not used frequently or during extended periods of time for living, eating or sleeping purposes. Every dwelling of more than one (1) story hereafter erected shall have a total ground floor area, measured from the outside of the exterior walls, of not less than one thousand (1,000) square feet including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other spaces that are not used frequently for living, eating or sleeping purposes, except that enclosed space intended for habitable rooms which are to be completed within a reasonable time, may be considered in completing such floor area. All dwellings hereafter places shall be completely immobilized and placed on a permanent foundation, including footer below the frost line, with a masonry of poured concrete curtain, which curtain shall be a minimum six (6) inches thick or eight (8) inches thick if load bearings. Such poured concrete or masonry curtain need not be load bearing and may cosmetic in nature. If such curtain is load bearing, appropriate support beams must be installed. If such curtain is cosmetic in nature only, appropriate support piers must be installed. All installation must be in accordance with the provisions of this Zoning Law and the New York State Uniform Fire and Building Code. No floor area shall be below five hundred eighty-three (583) feet USGS. Manufactured homes shall comply with the requirements of this section.

8.1-8 HEIGHT OF BUILDING. The maximum height of buildings permitted shall be as follows:

(1) All residential structures and seasonal dwelling structures: Thirty (30) feet.

SECTION 9 - (R-2) RESIDENTIAL AND RECREATIONAL DISTRICT (SUNSET BAY)

9.1 RESIDENCE DISTRICT.

9.1-1 USES BY RIGHT. The following uses are USES BY RIGHT:

(1) One-family detached dwellings;

(2) Home occupations;

(3) Schools: Public, denominational or private; elementary and high, including playgrounds and athletic fields auxiliary thereto;

(4) Churches, rectories and parish houses;

(5) Parks, forest preserves and recreational areas, when publicly owned and operated;

(6) Temporary buildings for construction purposes for a period not to exceed such construction;

(7) Accessory Uses;

(8) A sign, advertising the sale or rental of the property upon which the sign is located. The sign shall be restricted to the words: For Sale, For Rent, or both; name and telephone number of the realtor, if any. Sign shall not exceed Two Hundred Eighty-Eight (288) square inches;

(9) Public utility facilities; and

(10) Off-street parking facilities, as required or permitted in accordance with the provisions of Section 12.

9.1-2 SPECIAL USES. The following uses may be allowed by special use permit in accordance with the provisions of Section 13.7:

(1) Filling of holes, pits or lowlands with non-combustible material free from refuse and food wastes;

(2) Public service uses:

(a) Filtration plant, pumping station and water reservoir;

(b) Sewage treatment plant;

(c) Police and fire stations;

(d) Telephone Exchange;

(e) Electric substations and booster stations;

(f) Other governmental uses;

(g) Schools, day or nursery, public or private;

(h) Private clubs or lodges, except those the chief activity of which is a service customarily carried on as a business; and

(I) Boat liveries, harbors and associated accessory businesses.

(j) Other business uses not specifically listed above, when found to have economic compatibility with the established uses on adjoining property.

9.1-3 LOT SIZES.

(a) When a tract of land is served by public water or by public sanitary sewer facilities, or by a community water system or sanitary sewer system operated as a public utility, a one-family dwelling may be erected on a lot having an area of not less than six thousand five hundred (6,500) square feet, and a width at the established building line of not less than sixty-five (65) feet. When a tract of land is served by both a community water system and a sanitary sewer system, a one-family dwelling may be erected on a lot having an area of not less than six thousand (6,000) square feet and with a width at the established building line of not less than sixty (60) feet except as provided in Sub-Section 4.4 (lot area and dimensions on lots of record).

(b) All non-residential principal uses as permitted in this section in this section shall be located on a tract of land having an area of not less than one (1) acre, with a minimum width of one hundred twenty (120) feet at the building line.

(c) Minimum lot sizes for special uses shall be prescribed and conditions stipulated at the time a special use permit is authorized, but in no case shall any such lot have less area than fifteen thousand (15,000) square feet and be served by an approved system of water or sanitary sewer facilities.

(d) When a tract of land is served by public water and sanitary sewer system operated as a public utility, a one-family dwelling may be erected on a forty (40) Foot wide lot of record, march 1983, which has a depth of at least one hundred (100) feet. This applies to that portion of the Town of Hanover north of the Conrail right-of-way, zoning R2 and R1.

9.1-4 YARD AREAS. No building shall be erected or enlarged unless the following yards are provided and maintained.

(a) FRONT YARD. No point of any building or structure hereafter erected shall be placed closer than twenty-five feet (25') from the edge of the right of way of any public street, road, or highway which abuts the subject property.

(b) SIDE YARD. A side yard on each side of the zoning lot of not less than ten percent (10%) of the width of the lot, except where a side yard adjoins a street, the minimum width shall be not less than twenty-five feet (25').

(c) REAR YARD. No point of any building or structure hereafter erected shall be placed no closer than thirty- five feet (35') from rear established property line, however, that a one-story accessory building as defined by Section 4.9 may be located no less than five feet (5') from the rear lot line.

(d) All minimum yard areas as set forth herein shall be measured from the most extended point of such structures or dwelling on that side to the boundary line of said lot.

9.1-5 DWELLING STANDARDS: Every one-story dwelling hereafter erected shall have a total ground floor area of not less than eight hundred fifty (850) square feet measured from the outside of the exterior walls, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other open spaces that are not used frequently or during extended periods for living, eating or sleeping purposes. Every dwelling of more than one (1) story hereafter erected in any shall have a total floor area, measured from the outside of the exterior walls, of not less than one thousand (1,000) square feet, including utility rooms, by excluding cellars, basements, open porches, breezeways, garages and other spaces that are not used frequently or during extended periods for living, eating or sleeping purposes, except that enclosed space intended for habitable rooms, which are to be completed within a reasonable time, may be considered in completing such floor area. All dwellings hereafter placed shall be completely immobilized and placed on a permanent foundation, including footer below the frost line, with a masonry or poured concrete curtain, which curtain shall be a minimum six (6) inches thick or eight (8) inches thick if it is load bearing. Such poured concrete or masonry curtain need not be load bearing and may be cosmetic in nature. If such curtain is load bearing, appropriate support beams must be installed. If such curtain is cosmetic in nature only, appropriate support piers must be installed. All installation must be in accordance with the provisions of this zoning law and the New York State Uniform Fire and Building Code. No floor elevation shall be below five hundred eighty-three (583) feet USGS. Manufactured homes shall comply with requirements of this section.

9.1-6 HEIGHT OF BUILDINGS. The maximum height of buildings permitted shall be as follows:

(1) All residential structures and seasonal dwelling structures: Thirty (30) feet, as measured from the 100 year flood benchmark elevation as may from time to time be established. By FEMA.

SECTION 10 - (R-3) RESIDENTIAL AND RECREATIONAL DISTRICT (HAMLET OF IRVING)

10.1 RESIDENCE AND RECREATIONAL DISTRICT.

10.1 PERMITTED USES.

(1) One and two-family residences;

(2) Manufactured homes;

(3) Home occupations;

(4) Schools: Public, denominational or private; elementary or high, including playgrounds and athletic fields auxiliary thereto;

(5) Churches, rectories and parish houses;

(6) Temporary buildings for construction purposes for a period not to exceed such construction;

(7) Accessory uses;

(8) A sign, advertising the sale or rental of the property upon which the sign is located. The sign shall be restricted to the words: For Sale, For Rent, or both; name and telephone number of realtor, if any. Sign shall not exceed Two Hundred Eighty-Eight (288) square inches;

(9) Public utility facilities; and

(10) Off-street parking facilities, as required or permitted in accordance with the provisions of Section 13.7.

10.1-2 SPECIAL USES. The following uses may be allowed by special use permit in accordance with the provisions of Section 13.7:

(1) Filling of holes, pits or lowlands with non-combustible material free from refuse and food wastes;

(2) Automobile service stations and sales;

(3) Garages, for automotive repairs;

(4) Public service uses:

(a) Filtration plant, pumping station and water reservoir;

(b) Sewage treatment plant;

(c) Police and fire stations;

(d) Telephone Exchange;

(e) Electric substations and booster stations;

(f) Other governmental uses;

(g) Schools, day or nursery, public or private; and

(h) Private clubs or lodges, except those the chief activity of which is a service customarily carried on as a business.

(5) Amusement establishments - bowling alleys, pool halls, dance halls, skating rinks, and other similar places of recreation;

(6) Automobile motor repair and service shop;

(7) Automobile washing, including the use of mechanical conveyors, blowers and steam cleaning;

(8) Manufactured home sales;

(9) Outdoor amusement establishments, fair grounds, carnivals, and other similar amusement centers and including places of assembly devoted thereto, such as stadiums and arenas;

(10) Manufactured home buildings;

(11) Lumber yards;

(12) Other business uses not specifically listed above, when found to have economic compatibility with the established uses on adjoining property;

10.1-3 LOT SIZES. When a tract of land is served by public water or by public sanitary sewer facilities, or by a community water system or sanitary sewer system operated as a public utility, a one-family dwelling may be erected on a lot having an area of not less than six thousand five hundred (6,500) square feet, and a width at the established building line of not less than sixty-five (65) feet. When a tract of land is served by both a community water system and a sanitary sewer system, a one-family dwelling may be erected on a lot having an area of not less than six thousand (6,000) square feet, and with a width at the established building line of not less than sixty (60) feet, except as provided in Sub-Section 4.4 (lot area and dimensions on lots of record).

All non-residential principal uses as permitted in this section shall be located on a tract of land having an area of not less than one (1) acre, with a minimum width of one hundred twenty (120) feet at the building line.

Minimum lot sizes for special uses shall be prescribed and conditions stipulated at the time a special use permit is authorized, but in no case shall any such lot have less area than fifteen thousand (15,000) square feet and be served by an approved system of water or sanitary sewer facilities.

10.1-4 YARD AREAS. No building shall be erected or enlarged unless the following yards are provided and maintained:

(a) FRONT YARD. No point of any building or structure hereafter erected shall be placed closer than thirty feet (30') from the edge of the right of way of any public street, road, or highway which abuts the subject property.

(b) SIDE YARD. A side yard on each side of the zoning lot of not less than ten percent (10%) of the width of the lot, except where a side yard adjoins a street, then minimum width shall be not less than twenty-five (25) feet; and

(c) REAR YARD. No point of any building or structure hereafter erected shall be placed closer than thirty-five feet (35') from rear established property line, however, that a one story accessory building, defined by Section 4.9 may be located on no less than five feet (5') from the rear lot line.

(d) All minimum yard areas as set forth herein shall be measured from the most extended point of such structure or dwelling on that side to the boundary line of said lot.

10.1-5 DWELLING STANDARDS. Every one-story dwelling hereafter erected shall have a total ground floor area of not less than eight hundred fifty (850) square feet measured from the outside of the exterior walls, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other open spaces that are not used frequently or during extended periods for living, eating or sleeping purposes. Every dwelling of more than one (1) story hereafter erected in any "a-1" agricultural and residential district shall have a total floor area, measured from the outside of the exterior walls, of not less than one thousand (1,000) square feet, including utility rooms, but excluding cellars, basements, open porches, breezeways, garages and other spaces that are not used frequently for living, eating or sleeping purposes, except that enclosed space intended for habitable rooms, which are to be completed within a reasonable time, may be considered in completing such floor area. All dwellings hereafter placed shall be completely immobilized and placed on a permanent foundation, including footer below the frost line, with a masonry or poured concrete curtain, which curtain shall be minimum of six (6) inches thick or eight (8) inches thick if load bearing. Such poured concrete or masonry curtain need not be load bearing and may be cosmetic in nature. If such curtain is load bearing, appropriate support beams must be installed. If such curtain is cosmetic in nature only, appropriate support piers must be installed. All installations must be in accordance with the provisions of this zoning law and the New York State Uniform Fire and Building Code. No floor area shall be below five hundred eighty-three (583) feet USGS. Manufactured homes shall comply with requirements of this section.

10.1-6 HEIGHT OF BUILDINGS. The maximum height of buildings permitted shall be as follows:

(1) All residential structures and seasonal dwelling structures: Thirty (30) feet.

10.1-7 BOUNDARIES. The boundaries of this R-3 Zone are defined on Hanover Tax Map 26 as follows:
The R-3 Residential and Recreational District (Hamlet of Irving) shall be bounded as follows:
North by the southerly bounds of the PENNDEL Company lands; east by the center line if Buffalo Road; south by the center line of N.Y. Route 5 and U.S. Route 20, and lands of the New York State Thruway Authority; and west by the centerline of Mott Road and lands of the New York State Thruway.

10.1-8 EXCEPTION - HAMLET OF IRVING.

FRONT YARD:

No building or structure hereafter erected shall be placed closer than thirty (30) feet from the edge of any public street, road or highway upon which the subject property abuts. No building or structure hereafter erected shall have a first floor elevation of less than 589.0 NGVD 29.

*Page Amended

SECTION 11 - (B-1) BUSINESS DISTRICT

11.1-1 USES BY RIGHT. The following retail business uses, provided they are conducted entirely within a building, except for off-street parking and loading facilities:

1. Agricultural implement sales and services;
2. Auto accessory store, where there is no driveway entrance across the sidewalk into the main building;
3. Automobile sales and services;
4. Bakery shops, including the baking and processing of food products when prepared for retail use on the premises only;
5. Banks and financial institutions;
6. Barber shops, beauty parlors, chiropody massage or similar service shops;
7. Boat showroom;
8. Book and stationary stores;
9. Building materials, sale;
10. Candy and ice cream shops;
11. China and glassware stores;
12. Contractor's offices and shops, where no fabricating is done on the premises and where all storage of material and equipment is within a building;
13. Department stores;
14. Drug stores;
15. Dry cleaning and pressing establishments;
16. Electrical appliance stores and repairs, but not including appliance assembly or manufacturing;
17. Feed and seed store, wholesale;

18. Florist shops and conservatories for retail trade on the premises only;

19. Food, meat and fruit stores;

20. Frozen food stores and food lockers;

21. Furniture stores;

22. Garden supply and seed storage;

23. Greenhouse, wholesale growers;

24. Hardware stores;

25. Household appliance stores and repair shops;

26. Interior decorating shops;

27. Jewelry and watch repair shops;

28. Laundries, automatic self-service or hand types;

29. Leather goods and luggage stores;

30. Live bait stores;

31. Monument sales, but not including the cutting or grinding of stones;

32. Off-street parking and loading facilities as permitted or required in accordance with Section 12;

33. Offices, business and professional, including medical clinic;

34. Paint and wallpaper stores;

35. Photography studios, including the development of film and pictures when done as a part of the retail business on the premise;

36. Plumbing and heating and roofing supply shops;

37. Postal substations;

38. Public utility collection offices;

39. Restaurants and taverns;

40. Restaurants, tea room or cafe, when the establishment is not of the drive-in type where food is served to occupants remaining in motor vehicles;

41. Shoe and hat stores, and repairing when done as a part of the retail business;

42. Signs, as regulated by this section;

43. Sporting goods stores;

44. Storage and warehousing and wholesale; and

45. Theater, indoor.

11.1-2 SPECIAL USES. The following uses may be allowed by special use permit in accordance with the provisions of Section 13.7:

1. Amusement establishments - bowling alleys, pool halls, dance halls, skating rinks, and other similar places of recreation;

2. Automobile motor repair and service shop;

3. Automobile washing, including the use of mechanical conveyors, blowers and steam cleaning;

4. Light industry;

5. Motels;

6. Other business uses not specifically listed above, when found to have economic compatibility with the established uses on adjoining property;

7. Outdoor amusement establishments, fair grounds, carnivals, and other similar amusement centers and including places of assembly devoted thereto, such as stadiums and arenas;

8. Outdoor theaters, (drive-in); and

9. Manufactured home parks, provided that public or private sewer and water facilities are available for each trailer, and that each trailer site contains no less than five thousand (5,000) square feet of area, including parking space, but not including roadways.

11.1-3 YARD AREAS. No building OR USE shall be erected or enlarged unless the following yards are provided and maintained in connection with such building or use (See definition of yards in Section 3.2):

(a) FRONT YARD. No point of any building or structure hereafter erected shall be placed closer than fifty feet (50') from the edge of the right of way of any public street, road, or highway which abuts the subject property.

(b) SIDE YARD.

(1) If the side yard abuts residential, Agricultural/residential, or residential/recreational districts--fifteen (15) foot;

(2) If the side yard abuts a federal, state or County highway/road--sixty (60) foot from the right of way;

(3) If the side yard abuts a town road or public Street--no less than fifteen (15) foot from the right of way; and

(4) If the side yard abuts the flood plain districts--fifteen (15) foot.

(c) REAR YARD. Not less than thirty-five (35) feet provided, however, that a one-story accessory building, as defined in section 4.9 may be located no less than five (5) feet from the rear lot line.

(d) All minimum yard areas as set forth herein shall be measured from the most extended point of such structure or dwelling on that side to the boundary line of said lot.

(e) MINIMUM LOT WIDTH: One hundred (100) feet.

(f) MINIMUM LOT AREA: One (1) acre.

(g) MAXIMUM BUILDING HEIGHT: Forty (40) feet.

(h) MINIMUM LOT SIZES: Minimum lot sizes (of record January 1, 1971) for special uses shall be prescribed and conditions stipulated at the time that a special use permit is authorized. However, in no case shall any such lot have less area than twenty-one thousand five hundred (21,500) square feet. It shall be served by an approved water system and sewer facilities. This subsection applies only to lots of less than one (1) acre that are not expandable due to natural barriers, railroad property, highways, and other peculiar situations that are a hardship to overcome.

11.1-4 SIGNS. The following signs shall be permitted:

(a) Signs that have been sited prior to august 11, 1981 and satisfy all other requirements of this section will be permitted with the following added requirements:

(1) No off-premise sign shall be closer than five hundred (500) feet to another sign; and

(2) A permit from New York State Department of Transportation has been presented to the Hanover Building Inspector.

(b) For integrated shopping centers in single ownership and management, or under unified control, one additional sign may be erected not exceeding one hundred (100) square feet in area, advertising only the name and the location of the integrated shopping center.

(c) Such sign shall be placed so as to be entirely within the property lines of the premises upon which the sign is located and the bottom edge of such sign shall be at least six (6) feet from the bottom of the sign to the top of the road shoulder level or at least thirty (30) feet from any highway right-of-way. A sign must not obscure a drivers view of approaching, merging or intersection traffic and be mounted on unobstructing permanent standards.

(d) No sign shall be painted, pasted or similarly posted directly on the surface of any wall. Nor shall any sign be permitted to be placed on any wall, fence or standard facing the side of any adjoining lot located in any Residential District.

(e) Signs, clocks or other advertising devices erected upon standards or separate supports shall be placed so as to be entirely within the property lines of the premises upon which it is located, and no part of the sign or standard shall have a total height greater than forty (40) feet above the level of the street upon which the sign faces, or above the adjoining ground level if such ground level is above the street level, nor shall the surface of any such sign exceed an area of one hundred (100) square feet.

(f) No illuminated sign shall be of the flashing or intermittent type. Signs which may be in conflict with public traffic signals shall not be permitted.

(g) Traffic and directional signs designating entrance, exits and conditions of use of parking facilities accessory to the main use of the premises may be maintained provided they are located within the property lines of the

subject lot.

(h) Signs that have fallen or the legend obscured by time or lack of corrective maintenance shall be restored to acceptable condition and readability and compliance with all subparagraphs of this section or the entire structure removed. Removal within thirty days of written notice from CEO.

(I) Signs that advertise products or services no longer produced nor in business shall be removed after cessation of an active business.

(j) All signs in the A-1, R-1, and FP shall meet the requirements of section 10.1-4 and amendments to section 10.1-4 of the Hanover Zoning Law.

SECTION 12 - (I) LIGHT INDUSTRY

12.1 CLASSIFICATIONS:

Commencing at a point in the centerline of U.S. Route 20 situate 815 feet easterly from the intersection of the said centerline with the easterly corporation line of the Village of Silver Creek, said point being the extension of the easterly line of the lands owned by B & B Hanover Associates; thence easterly along the center line of Route 20 and the center line of N.Y. Route 5 to its intersection with the westerly line of lands of New York State Thruway Authority Interchange No. 58; thence southerly along the westerly line of the Thruway lands to a point situate 1,500 feet southerly, at right angles to the center line of Route 5 and 20; thence westerly, parallel with and 1,500 feet southerly by right angle measurements, from the said centerline of Route 5 and 20 to a point located 1,500 feet southerly, by right angle measurement, from the point of commencing; thence northerly 1,500 feet to the point of commencing in the center line if U.S. Route 20, including the present B-1 Business District and a portion of A-1 Agricultural; and Residential District.
Also, commencing at the intersection of the center line of Route 5 and 20 and the center line of Buffalo Road; thence southerly along the center line of Buffalo Road to its intersection with the westerly line of lands of the Cattaraugus Indian Reservation; thence southwesterly along the westerly line of the Cattaraugus Indian Reservation to a point making the southeast corner of lands of the Niagara Mohawk Power Corporation; thence northerly and westerly along lands of Niagara Mohawk to a point situate 1,500 feet westerly, by right angle measurements, from the center line of Buffalo Road and its direct extension to the south; thence northerly, parallel with the center line of Buffalo Road, to the center line of Spears Road; thence westerly 65 feet along the center line of Spears Road to a point in the easterly line of lands of the New York State Thruway Authority Interchange No. 58; thence northerly along the easterly line of lands of the Thruway Authority, in a direct extension northerly, to the center line of Route 5 and 20; thence easterly 1,920 feet along the center line of route 5 and 20 to the point of commencing at the center line of Buffalo Road.

EXCLUDING from the above described parcels any and all lands owned by the New York State Thruway Authority.

NOTES:

12.1-1 PURPOSE. The purpose of this light industry classification is to provide space for a new and expanding non-noxious industry in such a way as to protect nearby residential and commercial uses.

12.1-2 USES BY RIGHT.

1. The newly designated area will retain by right, all of the uses permitted in the agriculture-residential zone per section 7.1-2 permitted uses and 7.1-3 special uses. Also all of the uses permitted in section 10.1-1 permitted uses and 10.1-2 special uses on the business district.

2. Light industry usually denotes contemporary one (1) or two story buildings, attractively landscaped, rarely exhibiting the industrial process they house. By definition, the manufacture, preparation, processing, milling or repair of any article, substance, commodity, and which involves no dangerous or toxic product or emissions. Additionally, noise, odors, or other nuisances incidental to productions and processing shall be limited to level which does not effect the uses or enjoyment of property outside of the light industry classified area.

12.1-3 GENERAL DEVELOPMENT CONDITIONS.

A. PURPOSES. Development conditions shall be attached to permits or variances when necessary or advisable to reduce or eliminate conflicts between uses or to promote the health, safety and general welfare.

B. AREA OF CONCERN. The following checklist shall be considered by the planning board and administrators in their reviews of request for building permits, special use permits and variances. The checklist is not intended to be all inclusive and does not limit the areas of concern over which conditions may be imposed:

1. TRAFFIC - Safety of ingress/egress from roadway, intersection visibility, level of anticipated traffic generation in relation to existing road capacity and traffic, adequacy of off-street parking and loading, pedestrian safety, and/or location of structures in relation to all of the above;

2. SAFETY - Trash disposal, steep slopes, open pits, toxic and/or flammable fluids;

3. HEALTH - Sewers/water, sunlight, air movement, junk vehicles and/or trash storage;

4. CHARACTER OF NEIGHBORHOOD - Development density, traffic volume, lot sizes, compatible uses, and/or buffers;

5. PUBLIC COSTS - Road damage, need for new roads, and/or need for new utilities;

6. ENVIRONMENTAL PROTECTION - Flood plain, wetlands, and/or natural features;

7. NUISANCES - Noise, odor, dust, lights, hours of operation, lot size, buffers, and/or nuisance location;

8. LAND USE PRESERVATION - Agriculture, and/or open space; and

9. AESTHETICS - Restoration, appearance, scenic views, and/or buffers.

C. FAILURE TO COMPLY. Applicants who have received variances or special use permits with conditions attached shall be responsible for

continual compliance with the specified conditions. Noncompliance with any condition shall result in revocation of the variance/special use permit and continuance of the use shall only be allowed after reapplication for the variance/special use permit.

ADULT ENTERTAINMENT FACILITIES LAW

A local law amending the Zoning Law of the Town of Hanover, BY ADDING A NEW SECTION 12 A – ADULT ENTERTAINMENT FACILITIES, Local Law No. 1 of the year 2005.

Section One – Purpose:

12 A (1) It is the purpose of this Local Law and new Article 12 A to regulate sexually oriented businesses in order to promote the health, safety, morals and general welfare of the citizens of the Town of Hanover, and to establish reasonable and uniform regulations to prevent the deleterious location and concentration of sexually oriented businesses within the Town. The provisions of this law have neither the purpose nor effect of imposing a limitation or restriction on the content of any communicative materials, including sexually oriented materials. Similarly, it is not the intent nor effect of this Local Law to restrict or deny access by adults to sexually oriented materials protected by the First Amendment, or to deny access by the distributors and exhibitors of sexually oriented entertainment to their intended market. Neither is it the intent nor effect of this law to condone or legitimize the distribution of obscene materials. The Board does therefore desire to enact a new Section 12 A – Adult Entertainment Facilities.

Section Two – Findings

12 A (2) Based on evidence concerning the adverse secondary affects of adult uses on the community presented in hearings and in reports made available to the Town Board and on findings incorporated in the cases of City of Renton v. Playtime Theaters, Inc. 475 U.S. 41 (1986), Young v. American Mini-Theaters 426 U.S. 50 (1976), F.W./PBS, Inc. v. City of Dallas 493 U.S. 215 (1990), City of Erie v. Pap's A.M., 120 Supreme Court 1382 (2000), and on studies in other communities including, but not limited to, Phoenix, Arizona; Minneapolis/St.Paul, Minnesota; Houston, Texas; Indianapolis, Indiana; Amarillo, Texas; Garden Grove, California; Los Angeles, California; Whittier, California; Austin, Texas; Seattle, Washington; Oklahoma City, Oklahoma; Cleveland, Ohio; Beaumont, Texas; Dallas Texas; Newport News, Virginia; Bellevue, Washington; New York, New York; and St. Croix County, Wisconsin. The Town Board finds:

A.) Sexually oriented businesses lend themselves to ancillary unlawful and unhealthy activities that are presently uncontrolled by the operation of the establishments. Further, there is presently no mechanism to make the owners of these establishments responsible for the activities that occur on their premises.

B.) Certain employees of sexually oriented businesses defined in this law as adult theaters and adult cabarets engage in higher incidents of certain type of illicit sexual behavior than employees of other establishments.

C.) Sexual acts, including masturbation, and oral and anal sex, occur at sexually oriented businesses, especially those which provide private or semi-private booths or cubicles for viewing films, videos, or live sex shows.

D.) Offering and providing such space encourages such activities, which creates unhealthy conditions.

E.) Persons frequent certain adult theaters, adult arcades, and other sexually oriented businesses for the purpose of engaging in sex within the premises of such sexually oriented businesses.

F.) At least 50 communicable diseases may be spread by activities occurring in sexually oriented businesses, including, but not limited to, syphilis, gonorrhea, human immunodeficiency virus infection (HIV-AIDS), genital herpes, hepatitis B, Non A, Non B amebiasis, salmonella infections and shigella infections.
G.) That here in Chautauqua County we have, in recent years, had an HIV-AIDS outbreak, which has caused the County to become very aware of the inherent problems.
H.) The development and proliferation of adult entertainment facilities without regulations as to citing, concentration and location may result in the deterioration of residential neighborhoods and business districts. In addition, if these types of businesses are located near schools, churches and/or other youth related facilities, they may adversely affect the public welfare and morals of minors and others residing in the Town of Hanover.
I.) The findings noted in Subsections (a) through (h) raise substantial governmental concerns.
J.) Sexually oriented businesses have operational characteristics, which should be reasonably regulated in order to protect those substantial governmental concerns.

Section Three – Definitions

12 A (3) Adult Book/Video/Media Store – An establishment having as its stock-in-trade, books, magazines, videos and other periodicals which are distinguished or relating to specified sexual activities or specified anatomical areas, as defined herein, or an establishment with a segment or section devoted to the sale or display of such material, and/or offers for sale sexual devices related to and/or connected with specified sexual activities and/or specified anatomical areas.
Adult Entertainment Facilities – Means and refers to "adult new-racks", "adult/video/media stores", "adult motion picture/video theaters" and "exotic cabarets".
Adult Motion Picture/Video Theater – An enclosed building used for presenting material distinguished or characterized by an emphasis on matter depicting, describing or relating to specified sexual activities or specified anatomical areas, as defined herein, for observation by persons within the use.
Adult News Rack – Any machine or device, whether coin operated or not, which dispenses material which is distinguished or characterized by emphasis depicting, describing or relating to the "specified sexual activities" or "specified anatomical areas" defined herein.
Exotic Cabaret – A nightclub, bar or restaurant or similar commercial establishment which regularly features 1) persons who appear nude or semi-nude; or 2) live performances which are characterized by the exposure of "specified anatomical areas" or 3) films, motion pictures, video cassettes, slides or other photographic reproductions which are characterized by the exhibition or display of "specified sexual activities" or "specified anatomical areas".
Specified Sexual Activities – a) human genitals in a state of sexual stimulation or arousal; b) acts of human masturbation, sexual intercourse or sodomy; c) fondling or other erotic touching of human genitals, public region, buttocks or female breasts.
Specified Anatomical Areas – a) less than completely and opaquely covered human genitals, pubic region, buttocks and female breasts below a point immediately above the areola; b) human male genitals in a discernibly turgid state, even if completely and opaquely covered.

The above definitions are also added to Section 3.2 of the Town of Hanover Zoning Law.

Section Four – Location

12 A (4) The following provisions shall apply to the location of adult entertainment facilities in the Town of Hanover: a) adult entertainment facilities shall be permitted only in the Town of Hanover District 1 – Light Industry District upon approval of a Special Use Permit by the Zoning Board of Appeals; b) no adult entertainment facilities shall be permitted within 1000 feet of any lot with a residential use; c) no adult entertainment facilities shall be permitted within 1000 feet of any:

1. School
2. Religious institution
3. Public park or public recreation facility
4. Hospital or medical facility
5. Day Care – Family Center

Section Five – Additional Sign Requirements

12 A (5) The following provisions shall apply to signs erected or maintained in connection with adult entertainment facilities: a) no off-site signs shall be permitted.

Section Six – Public Display of Certain Matter Prohibited

12 A (6) Materials offered for sale from "adult news-racks" shall not be displayed or exhibited in any manner which exposes to the public view any picture or illustration depicting any "specified sexual activity" or any "specified anatomical area". Materials offered for sale or viewing at any adult entertainment facility shall not be displayed or exhibited in a manner which exposes any depiction of "specified sexual activity" or "specified sexual activity" to the view of persons outside the building or off the premises on which such store or theater or use is located.

Section Seven – Restrictions Cumulative in Nature

12 A (7) The restrictions set forth in this law are in addition to any other applicable provision of the Zoning Law of the Town of Hanover. In the event of any conflict between any such provisions, the more restrictive provisions shall be applied. ,

Section Eight – Prohibition

12 A (8) No adult entertainment facilities as such are defined in this local law shall be permitted to exist, operate, transact business, or otherwise be maintained in the Town of Hanover, except in accordance with the provisions of this local law.

Section Nine – Penalty

12 A (9) Any violation of this local law shall be deemed a violation of the Town of Hanover Zoning Law and shall be subject to the same penalties and enforcement provisions as contained therein and/or as contained in Section 268 of the Town Law of the State of New York as from time to time amended.

Section Ten – Severability

12 A (10) Each section and provision of this law are hereby declared to be independent divisions and subdivisions and not withstanding any other evidence of legislative intent, it is hereby declared to be the controlling legislative intent that if any provision of this law or the application thereof to any person or circumstances held to be invalid, the remaining sections or provisions and the application of such sections and provisions to any person or circumstances other than those to which it is held invalid shall not be affected thereby, and it is hereby declared that such sections and provisions would have been passed independently of such section, or provisions so known to be invalid.

Section Eleven – Effective Date

12 A (11) This Local Law shall take effect immediately upon filing with the Secretary of State of the State of New York.

12.1-4 YARD AREAS.

1. When a tract of land is served by public water or by public sanitary sewer facilities, or by a community water system or sanitary sewer system operated as a public utility, a one-family dwelling may be erected on a lot having an area of not less than six thousand five hundred (6,500) square feet, and a width at the established building line of not less than sixty-five (65) feet. When a tract of land is served by both a community water system and a sanitary sewer system, a one-family dwelling may be erected on a lot having an area of not less than six thousand (6,000) square feet, and with a width at the established building line of not less than sixty (60) feet, except as provided in Sub-Section 4.4 (lot area and dimensions on lots of record).

SECTION 13 - OFF STREET-PARKING AND LOADING

13.1 PURPOSE. The purpose of this section is to alleviate or prevent congestion of the public streets and so promote the safety and welfare of the public, by establishing minimum requirements for the off-street parking and loading and unloading of motor vehicles in accordance with use to which property is put.

13.2 GENERAL PROVISIONS - PARKING AND LOADING.

13.2-1 PROCEDURE. An application for a building permit for a new or enlarged building, structure or use shall include therewith a plot plan, drawn to scale, and fully dimensioned showing any parking and loading facilities to be provided in compliance with requirements of this Ordinance.

13.2-2 EXTENT OF CONTROL. The off-street parking and loading requirements of this Ordinance shall apply as follows:

1. All buildings and structures erected and land uses initiated after the effective date of this Ordinance shall provide accessory off-street parking or loading facilities as required hereinafter for the use thereof, except that a building or structure for which a building permit has been issued prior to the effective date of this Ordinance shall not be required to furnish parking or loading facilities if construction is begun thereon within six (6) months of the effective date of this Ordinance and diligently prosecuted to completion;

2. When a building or structure erected prior to or after the effective date of this Ordinance shall undergo any decrease in number of dwelling units, gross floor area, seating capacity, number of employees, or other unit of measurement specified hereinafter for required parking or loading facilities, and further, when said decrease would result in a requirement for fewer total parking or loading spaces through application of the provisions of this Ordinance thereto, parking and loading facilities may be reduced accordingly, provided that existing parking or loading facilities shall be so decreased only when the facilities remaining would at least equal or exceed the parking or loading requirements resulting from application of the provisions of this Ordinance to the entire building or structure as modified; and

3. When a building or structure shall undergo any increase in the number of dwelling units, gross floor area, seating capacity, or other unit of measurement specified, hereinafter for required parking or loading facilities, and further, when said increase would result in a requirement for additional total parking or loading spaces through application of the provisions of this Ordinance thereto, parking and loading facilities may be increased accordingly, provided that existing parking or loading facilities shall be so increased that the facilities would at least equal or exceed the parking or loading requirements resulting from application of the provisions of this Ordinance to the entire building or structure as modified.

13.2-3 EXISTING PARKING OR LOADING SPACES. Accessory off-street parking and loading spaces in existence on the effective date of this Ordinance may not be reduced in number unless already exceeding the requirements of this section for equivalent new construction; in which event, said spaces shall not be reduced below the number required herein for such equivalent new construction.

13.2-4 DAMAGE OR DESTRUCTION. Any building, structure or use which is in existence and is a conforming use on the effective date of this Ordinance and which subsequently shall be damaged or destroyed by fire, collapse, explosion or other cause may be reconstructed, re-established or repaired with or without off-street parking or loading facilities equivalent to any maintained at the time of such damage or destruction shall be restored or continued in operation. However, it shall not be necessary to re-store or maintain parking or loading facilities in excess of those required by this Ordinance for equivalent new construction.

13.2-5 DESIGN AND MAINTENANCE.

1. PARKING SPACE - DESCRIPTION. A required off-street parking space shall be an area of not less than one hundred and sixty-two (162) square feet not less than eight and one-half (8½) feet wide by nineteen (19) feet long, exclusive of access drives or aisles, ramps, columns, or office and work areas, accessible from the streets or alleys or from private driveways or aisles leading to streets or alleys and to be used for the storage or parking of passenger automobiles or commercial vehicles under one and one-half (1½) ton capacity. Aisles between vehicular parking spaces shall not be less than twelve (12) feet in width when serving automobiles parked at forty-five (45) degree angle in one direction not less than twenty (20) feet in width when serving automobiles parked perpendicular to the aisles and accommodating two-way traffic;

2. ACCESS. Parking facilities shall be designed with appropriate means of vehicular access to a street or alley in such a manner as will least interfere with the movement of traffic. No driveway or curb cut in any district shall exceed twenty-five (25) feet in width; and

3. SURFACING. All open off-street parking areas, excepting those accessory to a single family dwelling, shall be surfaced with all-weather dustless materials.

13.2-6 SCHEDULE OF PARKING REQUIREMENTS.

1. For one (1) and two-family dwellings - one (1) parking space for each family dwelling unit;

2. For hotels and clubs - one (1) parking space for each four (4) guests or one (1) parking space for each sleeping room or suite, plus one additional space as shall be deemed necessary by the Building Inspector because of any supplementary parking - generative activities such as bars, ballrooms, dining rooms, night club facilities and the like;

3. For tourist homes, cabins, motels - one (1) parking space for each guest or sleeping room or suite, plus one (1) additional parking space for the owner or manager of the premises;

4. For private clubs or lodges (without sleeping rooms) - parking spaces equal in number to the to twenty-five percent (25%) of the total membership;

5. For sanitariums, convalescent homes, or homes for the aged - one (1) space for each six (6) patient beds, plus one (1) additional space for each staff or visiting doctor;

6. For mortuaries or funeral parlors - Ten (10) parking spaces for each room used as a chapel or parlor, plus one (1) space for each funeral vehicle maintained on the premises, plus one (1) space for each family residing on the premises;

7. For bowling alleys - two (2) parking spaces for each alley, plus one (1) parking space for each three hundred (300) feet of floor area devoted to affiliated uses such as bars, restaurants and the like;

8. For convention halls, dance halls, skating rinks, assembly halls, exhibition halls, or other places of assembly - one (1) parking space for each one hundred (100) square feet of floor area used for assembly;

9. For church, high school, auditoriums - one (1) parking space for each twelve (12) seats provided in said buildings or structures;

10. For banks, business or professional offices, or public administration buildings - one (1) parking space for each four hundred (400) square feet of floor area;

11. For establishments handling the sale and consumption on the premises of alcoholic beverages, food or refreshments - one (1) parking space for each

four hundred (400) square feet of floor area;

12. For retail stores and service shops (individual or in groups) under one (1) roof - one (1) parking space for each one hundred (100) square feet of retail floor area; and

13. For furniture and appliance shops, motor vehicles sales, wholesale stores, household equipment or furniture repair shops, machinery sales, OR LIGHT INDUSTRY - one (1) parking space for each two hundred (200) square feet of floor area.

13.2-7 OFF-STREET LOADING AND UNLOADING FACILITIES. In all districts where property uses include the unloading and loading of material or merchandise from vehicles, off-street loading and loading facilities shall be provided in accordance with the following requirements:

1. For all buildings containing bowling alleys, taverns, restaurants, LIGHT INDUSTRY, or any retail shops and having ten thousand (10,000) to one hundred thousand (100,000) square feet of gross floor area, one (1) off-street loading and unloading space, plus one (1) additional space for each additional one hundred thousand (100,000) square feet of gross floor area or fraction thereof in excess of one hundred thousand (100,000) square feet.

SECTION 13-A - POLITICAL SIGNS:

(a) Political signs are permitted in all zoning districts provided that they comply with the conditions and restrictions of this local law.

(b) Political signs advertising a candidate or candidates for public office shall be permitted not earlier than thirty (30) days prior to a general , state, national, local, or special election and shall be removed not later than seven (7) days after said election.

SECTION 14 - ADMINISTRATION

14.1 ADMINISTRATIVE OFFICERS

14.1-1 THE ZONING OFFICER

(a) The enforcement of this Law is hereby vested in the Zoning Officer of the Town of Hanover.

(b) POWERS AND DUTIES. The Zoning Officer shall enforce this Law and in addition thereto and in furtherance of said authority he shall:

1. Examine and approve an application pertaining to the use of land, buildings and structures when the application conforms with the provisions of this Law.

2. Issue all Zoning Permits and keep permanent records thereof.

3. Issue all Certificates of Occupancy and keep permanent records thereof.

4. Conduct such inspections of buildings, structures and uses of land as are necessary to determine compliance with the terms of this Law.

5. Receive, file and forward for action all applications for special uses, variations and amendments to this Law which may be filed in the zoning office.

6. Maintain permanent and current records of the Law, including all maps, amendments, special uses and variations.

7. Provide and maintain a public information bureau relative to all matters arising out of this Law.

14.1-2 THE ZONING BOARD OF APPEALS

(a) CREATION AND MEMBERSHIP. A Zoning Board of Appeals is hereby created, such Board to consist of seven (7) members appointed by the Town Board of Hanover. The word "Board" when used in this Section shall be construed to mean the Zoning Board of Appeals. All members shall be residents of the Town of Hanover. No member of the Board of Appeals shall hold other elective or appointive office in the Village or Town governments.

(b) TERMS OF OFFICE. The members of the Zoning Board of Appeals shall be appointed for the following terms:

One for a term of one year
One for a term of two years
One for a term of three years
One for a term of four years
One for a term of five years

Thereafter, as their terms expire, each new appointment shall be for a term of five years.

If a vacancy occurs, by resignation or otherwise, among the members of the Board, the Town Board shall appoint a member for the unexpired term. The Town Board shall also have the power to remove any member of the Zoning Board of Appeals for cause, after a public hearing.

(c) OFFICERS. The Town Board shall name one of the members of the Zoning Board of Appeals as the Chairman upon his appointment, and in the case of a vacancy, shall name a new chairman.

(d) QUORUM. A majority of members of the Zoning Board of Appeals shall constitute a quorum. No action of the Board is official, however, unless authorized by a majority of the Board.

(e) COMPENSATION. The Town Board shall set the salary for the members of the Zoning Board of Appeals.

(f) RULES AND PROCEDURE. The Zoning Board of Appeals shall adopt such rules concerning the filing of appeals and applications for amendments, variances and special uses, giving of notice and conduct of hearings as shall be necessary to carry out their duties as defined herein. The Board shall keep minutes of its proceedings, keep records of its examinations and other official acts, and shall record the vote on all actions

taken. All minutes and records shall be filed in the office of the Board and shall be a public record.

All meetings of the Board shall be held at the call of the Chairman and at such other times as the Board may determine. There shall be at least five (5) days but not more than thirty (30) days notice of the time and place of the notice published in a paper of general circulation in the Town of Hanover; said notice to contain a statement of the particular purpose of such meeting and a brief description of the location of the property or properties under consideration at such meeting. All meetings of the Board shall be opened to the public.

(g) POWERS AND DUTIES. The Zoning Board of Appeals shall:

1. Hear and determine appeals from and review any order, requirement, decisions or determinations made by the Zoning Officer charged with the enforcement of this Law.

2. Hear and decide all matters referred to it, or upon which it is required to pass under this Law.

3. Hear and pass upon applications for variations when a property owner or his agent shows that a strict application of the terms of this Law relating to the use, construction or alteration of buildings, structures, or the use of land imposes upon him practical hardships or particular difficulties.

4. Hold public hearings, and approve or disapprove each application for a special use received in compliance with the provisions of this Law.

5. No re-hearing shall be held on a denied appeal or application for variance or special use or on a recommendation to deny a proposed amendment to the law for a period of twelve (12) months from the date of said denial or recommendation to deny.

(h) JURISDICTION. The concurring vote of three (3) members of the Zoning Board of Appeals shall be necessary to reverse any order, requirement, decision or determination of the Zoning Officer, or to decide in favor of the applicant any matter upon which it is authorized by this Law to render decisions.

(I) JUDICIAL REVIEW. All decisions and findings of the Zoning Board of Appeals on appeals, application for variations, special uses or amendments, shall, after a hearing, be subject to review by court as by law, may be provided.

14.2 ZONING CERTIFICATES

(a) Except as hereinafter provided, no permit pertaining to the use of land or buildings shall be issued by an officer, department or employee of the Town of Hanover, unless the application for such permit has been examined by the Zoning Officer and has affixed to it a certificate of his office that the proposed building or structure and use thereof complies with all the provisions of this Law.

(b) Any permit, zoning certificate or certificate of occupancy issued in conflict with the provisions of this Law shall be null and void.

(c) PLATS. Every application for a building permit shall be accompanied by:

1. A plat of the piece or parcel of land, lot or lots, block or blocks, or parts or portions thereof, drawn to scale, showing the actual dimensions and certified by a Land Surveyor licensed by the State of New York as a true copy of the piece or parcel, lot or lots, block or blocks, or portions thereof, according to the registered or recorded plat of such land; and

2. A plat drawn to scale in such form as may, from time to time, be prescribed by the Zoning Officer, showing the ground area, height, and bulk of the building or structure, the building lines in relation to lot lines, the use to be made of the building or structure or land and such other information as may be required by the Zoning Officer for the proper enforcement of this Law.

Each of the two plats shall be attached to the application for a building permit when it is submitted for a zoning certificate and shall be retained by the Zoning Officer as a public record.

(d) 1. When property to be developed fronts on a State or County highway and access to the highway is desired, an approved permit from the applicable agency for the development of such highway access shall be presented.

2. When property is to be developed for human habitation and use, such application shall be accompanied by a plan and construction details for waste disposal approved by the applicable State, County or Town health agency.

14.3 CERTIFICATE OF OCCUPANCY

SCOPE OF PERMITS.

(a) No building or addition thereto, constructed after the effective date of this Law and no addition to a previously existing building shall be occupied, and no land vacant on the effective date of this Law shall be used for any purpose, until a certificate of occupancy had been issued by the office of the Zoning Officer. No change in use to the production, processing or storage of goods or materials, and no change in use from the production, processing or storage of one kind of materials or goods to another kind shall be made until a certificate of occupancy has been issued by the office of the Zoning Officer. Every certificate of occupancy shall state that the use or occupancy complies with all the provisions of this Law.

(b) APPLICATION FOR OCCUPANCY CERTIFICATE. Every application for a building permit shall be deemed to be an application for an occupancy certificate. Every application for an occupancy certificate for new use of land where no building permit is required shall be made directly to the office of the Zoning Officer.

(c) ISSUANCE OF OCCUPANCY CERTIFICATE. No occupancy certificate shall be issued until construction has been completed or the use established and has been inspected by the Zoning Officer to be in compliance with all the provisions of this Law provided that pending the issuance of an occupancy certificate, a temporary occupancy certificate may be issued to be valid for a period not to exceed six (6) months from its date during the completion of any addition or during the partial occupancy of the premises.

An occupancy permit shall be issued or written notice shall be given to the applicant stating the reasons why a certificate cannot be issued not later than fifteen (15) days after the office of the Zoning Officer is notified in writing that the building or premises is ready for occupancy.

14.4 VARIANCE.

14.4-1 PURPOSE.

(a) This law authorizes the zoning board of appeals to vary or modify an application of the regulations as set forth herein where the literal enforcement would result in practical difficulties for an area variance of unnecessary hardship for a use variance. It is acknowledged that an area variance requires a lesser standard of proof than a use variance.

(b) USE VARIANCE: In determining whether an "unnecessary hardship" is present, the zoning board of appeals shall consider the extent to which the following conditions have been evidenced:

1. That there are particular physical surroundings, shape, or topographical conditions of the specific property involved and that the land in question cannot yield a reasonable return if used only for a purpose allowed in that zone;

2. That the plight of the owner is due to unique circumstances and not to the general conditions in the neighborhood which may reflect the unreasonableness of the zoning law itself;

3. That the unnecessary hardship claim as a grounds for a variance has not been created by the owner or by a predecessor in interest. Where all other required findings are made, the purchase of a zoning lot subject to the restrictions sought to be varied shall not itself constitute a self-created hardship;

4. That the variance, if granted, will not alter the essential character of the neighborhood or district in which the zoning lot is located; will not substantially impair the appropriate use of development adjacent property; and will not be detrimental to the public welfare or substantially diminish or impair property values within the neighborhood.

(c) AREA VARIANCE: In determining whether "practical difficulties" are present, The Zoning Board of Appeals shall consider the extent to which the following conditions have been evidenced:

1. How substantial the variance is in relation to the requirement;

2. That the variance, if granted, will not alter the essential character of the neighborhood or district in which the zoning lot is located; Will

not substantially impair the appropriate use of development adjacent property; and will not be detrimental to the public welfare or substantially diminish or impair property values within the neighborhood.

3. A consideration of the need, the harm created by the granting of a variance, and the alternative solutions.

(d) The Board of Appeals may impose such conditions and restrictions upon the premises benefited by a variance as may be necessary to prevent injurious effect therefrom upon other property in the neighborhood and to effectively carry out the general intent of this law.

14.5 APPEALS

14.5-1 SCOPE OF APPEAL. An appeal may be taken to the Zoning Board of Appeals by any person, firm or corporation, or office, department, board or bureau affected by a decision of the office of the Zoning Officer. The appeal shall specify the ground thereof and shall be filed within such time and in such form as may be prescribed by the Board by general rule. The Zoning Officer shall upon request of the Zoning Board of Appeals, transmit to it all documents, plans and papers constituting the record of the action from which an appeal was taken.

14.5-2 HEARING OF APPEAL. The Zoning Board of Appeals shall fix a reasonable time for the hearing of appeal. Public notice shall be given of the hearing and due notice shall be given additionally to the interested parties.

The Board may require the party taking the appeal to assume the cost of public notice and due notice to interested parties.

At the hearing, any party may appear in person, by agent or by attorney.

14.5-3 DECISION ON APPEAL. In exercising its powers, the Zoning Board of Appeals may, upon the concurring vote of three (3) members reverse or affirm, wholly or partly, or may modify the order, requirement, decision or determination appealed from as in its opinion ought to be done in the premises, and to that end shall have all the powers of the Zoning Officer.

14.6 AMENDMENTS

14.6-1 GENERAL PROVISIONS. The Town Board may from time to time on its own motion, or on petition, or on recommendation of the Town Planning Board, after proper public notice and public hearing, amend, supplement or repeal the regulations, provisions or boundaries of this Law.

14.6-2 PROVISIONAL AMENDMENTS. In the case of a proposed amendment which involved the reclassification or transfer of any area to a less restrictive district, the Town Board may require the petitioner to submit a development plan showing the extent, location and character of proposed structures and uses. The Town Board may require that such plan be modified to meet the objections raised at any public hearing thereon, or subsequent thereto and may qualify its approval of may such amendment. No building permit or certificate of zoning compliance shall be issued for any property within the area described by said amendment except in accordance with the zoning regulations applicable prior to said reclassification action. Unless application for a building permit for such special development is made within six (6) months from the Town Board's approval and unless development of the area included in such development is commenced within a period of one (1) year after the Town Board's approval, said approval shall be void and the zoning classification shall be as it was when the petition for amendment was filed.

14.6-3 PROCEDURE FOR FILING OF PETITION. A petition to amend, change or supplement the text of this Law or any zoning district designated on the zoning map established herein, shall be filed with the Town Clerk on forms obtained from his/her office and shall be transmitted by him/her to the Town Board.

14.6-4 REHEARING ON PETITION. The disposition of a petition for amendment by the Town Board shall be final and disapproval or denial of the proposed amendment shall void the petition. No new petition for an amendment which has previously been denied by the Town Board shall be considered by it, except for a vote to table or to receive and file, and no public hearing shall be held on such amendment within a period of one (1) year from the date of such previous denial, unless the Town Board shall find that there have been substantial changes in the situation which would merit a rehearing.

14.7 SPECIAL USES

14.7-1 PURPOSE. The formulation and enactment of a comprehensive law is based on the division of the entire Town into districts in each of which are permitted specified uses that are mutually compatible. In addition to such permitted, compatible uses, however, it is recognized that there are other uses which it may be necessary or desirable to allow in a given district but which on account of their potential influence upon neighboring uses or public facilities need to be carefully regulated with respect to location or operation for the protection of the community. Such uses are classified in this Law as "Special Uses" and fall into three (3) categories:

(a) Uses either municipally operated or operated by publicly regulated utilities, or uses traditionally affected by public interest; and

(b) Uses entirely private in character which, on account of their peculiar locational need, the nature of the service they offer to the public, and their possible damaging influence on the neighborhood, may have to be established in a district or districts in which they cannot reasonably be allowed as an unrestricted permitted use under the zoning regulations.

(c) Non-conforming uses which as Special Uses can be made more compatible with their surroundings.

14.7-2 APPLICATION FOR SPECIAL USE. An application for Special Use shall be filed with the Zoning Officer upon such form and accompanied by such information as shall be established from time to time by the Zoning Board of Appeals or Planning Board, as the case may be. The Zoning Officer shall forward to the Zoning Board of Appeals without delay a copy of each special use permit proposed for authorizing a special use.

14.7-3 AUTHORIZATION. Special uses shall be authorized by Special Use Permit granted by the Zoning Board of Appeals or Planning Board, as the case may be, in the same manner and for the same purposes as variance; provided, that no application for special use shall be acted upon until after the Zoning Board of Appeals has notified and held a public hearing, and prepared and filed a finding of fact thereon.

(a) No Special Use shall be granted by the Zoning Board of Appeals unless the Special Use:

1. Is necessary for the public convenience at that location or, in the case of existing non-conforming uses, a special use permit will make the use more compatible with its surroundings.

2. It is so designated, located and proposed to be operated that the public health, safety and welfare will be protected.

3. Will not cause substantial injury to the value of other property in the neighborhood in which it is located.

14.7-4 AREAS OF CONCERN. The following areas of concern shall be considered by the Zoning Board of Appeals/Planning Board in the review of requests for special permits for multiple dwellings. Conditions which deal with these areas may be attached to permits variances in order to reduce health, welfare and safety-related problems. Areas of concern:

1. TRAFFIC SAFETY - Ingress/egress from roadway, buildings setbacks, corner visibility, off-street parking, off-street loading.

2. SAFETY - Trash disposal, steep slopes, open pits, toxic or flammable fluids.

3. HEALTH - Sewer/water, sunlight, air movement, junk vehicles and trash storage.

4. CHARACTER OF NEIGHBORHOOD - Development density, traffic volume, lot sizes, compatible uses, buffers.

5. PUBLIC COSTS - Road damage, need for new roads, need for new utilities.

6. ENVIRONMENTAL PROTECTION - Flood plain, wetlands, natural features.

7. NUISANCES - Noise, odor, dust, lights, hours of operation, lot size, buffers, nuisance location.

8. LAND USE PRESERVATION - Agriculture, open space.

9. AESTHETICS - Restoration, appearance, scenic views, buffers.

This list of areas of concern must not be considered all inclusive, other related and unrelated conditions may be imposed in accordance with this law.

14.8 FEES. Any application for Amendment, Variation or Special Uses filed by, on behalf of, the owner or owners of the property affected shall be accompanied by a fee. As is established from time to time by the Town Board. See Addendum A for current Schedule of Fees as adopted by resolution.

14.9 ENFORCEMENT PROCEEDINGS AND PENALTIES

PENALTIES. A person who violates, disobeys, omits, neglects or refuses to comply with or resists the enforcement of any of the provisions of this law shall be guilty of an offense and subject to a penalty in an amount not to exceed fifty and no/100 dollars ($50.00). Each day such a violation or failure to comply is permitted to exist after notification thereof shall constitute a separate offense.

14.9-1 REMEDIES CUMULATIVE TO OTHER PROCEDURES. Not withstanding the availability of other remedies for enforcement of the provisions contained in the codes, local laws, ordinances and regulations of the Town of Hanover, and in any other state or local law, ordinance or regulation enforced by the Code Enforcement Officer/Zoning Officer, the following remedies and enforcement procedures as set forth in this section are made available to enforce the provisions of the aforesaid enumerated codes, local laws, ordinances and regulations, and shall be deemed cumulative to other enforcement procedures and remedies.

14.9-2 ENFORCING OFFICER; RIGHT OF ENTRY.

(a) Notwithstanding the powers of other Town Officers to enforce the provisions of the various codes, local laws, ordinances and regulations of the Town of Hanover as set forth therein, the provisions of this section for the enforcement of the codes, local laws, regulations and ordinances of the Town of Hanover and of any other state or local laws, ordinances or regulations enforced by Town of Hanover shall be enforced by the Town of Hanover Code Enforcement Officer/Zoning Officer.

(b) The Town Code Enforcement Officer/Zoning Officer, in enforcing the provisions of the codes, local laws, ordinances and regulations of the Town of Hanover and of any other state or local laws, ordinances or regulations enforced by him pursuant to this section, shall have the power to enter, examine and inspect or cause to be examined and inspected and to investigate or cause to be investigated vacant lots, yards, courts and buildings in this town to determine which are in violation of any code, local law, ordinance and regulations and/or threaten the safety, health, comfort and general welfare of the inhabitants of the town.

14.9-3 PENALTIES FOR OFFENSES.

(a) Any person who, having been served with a notice or order to remove any violation of either the code, local laws, ordinances or regulations of the Town of Hanover, or any nuisance, fails to comply therewith within the time fixed by the Code Enforcement Officer/Zoning Officer, shall be guilty of any offense punishable either:

(1) By the imposition of a fine not exceeding $350 or imprisonment for a period not exceeding six months, or both, for conviction of a first offense; for a conviction of a second offense, both of which were committed within a period of five years, by a fine of not less than $350 nor more than $700 or imprisonment for a period not exceeding six months, or both, and, for conviction of a third or subsequent offense, all of which were committed within a period of five years, by a fine of not less than $700 nor more than $1,000 or imprisonment for a period not exceeding six months; or

(2) By the imposition of a civil penalty in the above amounts, which said penalty may be assessed and recoverable against the violator in a small claims proceeding instituted by the town in the Town Justice Court, pursuant to the provisions of Article 18 of the Uniform Justice Court Act.

(b) Each week's continued violation shall constitute a separate, additional violation for which separate and additional fines or civil penalties in the above amounts may be imposed or recovered.

(c) The term "person" as used in this section shall include the owner, occupant, mortgagee or vender in possession, operator, assignee of rents, receiver, executor, trustee, lessee, agent or any other person, firm or corporation, directly or indirectly, in control of the premises or part thereof.

(d) Amendment. This section expressly amends and supersedes any inconsistent provisions of any zoning law, rule or offense theretofore adopted by the Town of Hanover, Chautauqua County, New York, and also any inconsistent provision of Article 16 of the Town Law of the State of New York.

14.9-4 PROCEDURE FOR ENFORCEMENT.

(a) When nuisance or violation declared:

(1) Whenever the Code Enforcement Officer/Zoning Officer shall declare that any property, including the buildings, structures, signs or other appurtenances thereon, shall be in violation of any of the codes, rules, regulations, ordinances or local laws of the Town of Hanover or constitute a nuisance, he shall issue a notice of violation of an appearance ticket to the property owner or occupier in control of or in possession of such property, specifying the code, rule, regulation, ordinance or local law being violated and the facts constituting such violation.

(b) When nuisance or violation is not removed:

(1) If such nuisance or violation is not removed by the owner or the occupier in control of or in possession of such property, such violator shall be prosecuted in the Town Court of the Town of Hanover.

(2) If the violator or any other person or party interferes with or causes delay to the taking of corrective action by the town, the Code Enforcement Officer/Zoning Officer may cause such property, including the buildings, structures, sign or other appurtenances thereon, in whole or in part, to be vacated and sealed or vacated and demolished, but only after such permission shall have been granted by the Supreme Court upon proper notice to the owner or occupier of such property and any others deemed appropriate parties to receive such notice.

(c) When removal of nuisance or violation ordered:

(1) If the Code Enforcement Officer/Zoning Officer proceeds to execute a notice or order issued by him or by the court for the removal of a nuisance or violation, the Code Enforcement Officer/Zoning Officer may select contracts therefor. The cost of executing such notice or order or orders, whether or not carried out pursuant to court order, may be met from any appropriations made therefor, or if such appropriation has not been made or is insufficient, from the proceeds of the sale of obligations pursuant to the Local Finance Law. The Code Enforcement Officer/Zoning Officer shall keep a record of such notices and orders together with the acts done and items of cost incurred in their execution.

(2) The cost of executing such notice or order or orders for the removal of a nuisance or violation shall be assessed to the owner of record of said premises.

(3) Notwithstanding the foregoing and in addition to any other remedy available, the Code Enforcement Officer/Zoning Officer may maintain an action against the owner to recover the cost of executing such notice or order or orders.

(d) The term "owner" as used in this section shall include any person, firm or corporation, directly or indirectly, in control of the property or any buildings thereon or part thereof.

14.9-5 SERVICE OF NOTICE AND ORDERS. Any notice, order or appearance ticket issued pursuant to this section shall be served upon the alleged violator in person, or upon a person of suitable age and discretion on such property, and if not in person, such notice, order or appearance ticket shall be posted in a conspicuous place upon the premises affected and a copy thereof mailed to the alleged violator or party to be charged by first class mail on the same day, to the affected premises or, if not appropriate, then to the last known address of the party to be charged.

14.9-6 ORDERS TO DEMOLISH: FAILURE TO COMPLY. Whenever the Code Enforcement Officer/Zoning Officer shall determine, pursuant to Section 14.9-4 hereof that any property or building thereon constitutes a nuisance, and after having followed the provisions of said section, determines that the removal of the nuisance requires grading of filling of the property or the demolition of any building, or part of any building thereon, the Code Enforcement Officer/Zoning Officer shall cause to be issued a second order which would require grading, filling or demolition of same, addressed to the property owner and served in the manner pursuant to Section 14.9-5 of this section. If the owner fails to comply with such order or demolition within fifteen (15) days after service upon him of said order, upon notice to the property owner, mortgagees, tenants and lienors, the Town Attorney, Deputy Town Attorney or attorney retained by the town shall present said order to grade, fill or demolish and the records and papers of all prior proceedings upon which said order is based before the Justice holding a special term of the Supreme Court for the County of Chautauqua for review of said determination and confirmation thereof, at which time the court may either annul or confirm, wholly or partly, or modify the determination reviewed.

14.9-7 PROVISIONS CUMULATIVE TO OTHER TOWN LAWS. The provisions of this section shall not be deemed to modify or otherwise affect or be in substitution for any provision of any law or other provisions of the code of the Town of Hanover but shall be cumulative thereto.

SECTION 15 - SITE PLAN REVIEW AND APPROVAL.

Prior to the issuance of a SPECIAL USE permit in the Business (B-1, B-2, and R-3) Districts, the Zoning Officer shall require site plan approval by the Planning Board pursuant to this section. The Zoning Officer shall notify an applicant for a zoning permit where site plan approval is required of the provisions of this section.

15.1 SKETCH PLAN. A sketch plan conference may be held between the Planning Board and the applicant prior to the preparation and submission of a formal site plan. The intent of such a conference is to enable the applicant to inform the Planning Board of his/her proposal prior to the preparation of a detailed site plan; and for the Planning Board to review the basic site design concept, advise the applicant as to potential problems and concerns and to generally determine the information to be required on the site plan. In order to accomplish these objectives, the applicant should provide the following:

(a) A statement and rough sketch showing the locations and dimensions of principal and accessory structures, parking areas, access signs (with descriptions), existing and proposed vegetation, and other planned features; anticipated changes in the existing topography and natural features; and, where applicable measures and features to comply with flood hazard and flood insurance regulations;

(b) A sketch or map of the area which clearly shows the location of the site with respect to nearby streets, rights-of-way, properties, easements and other pertinent features; and

(c) A topographic or contour map of adequate scale and detail to show site topography.

15.2 APPLICATION FOR SITE PLAN APPROVAL. An application for site plan approval shall be made in writing to the Chairman of the Planning Board and shall be accompanied by information contained on the following check list. Where the sketch plan conference was held, the accompanying information shall be drawn from the following check list as determined necessary by the Planning Board at said sketch plan conference.

(a) Site plan checklist:

(1) Title of drawing, including name and address of applicant and person responsible for preparation of such drawing;

(2) North arrow, scale and date;

(3) Boundaries of the property plotted to scale;

(4) Existing watercourses;

(5) Grading and drainage plan, showing existing and proposed contours;

(6) Location, design, type of construction, proposed use and exterior dimensions of all buildings;

(7) Location, design and type of all parking and truck loading areas, showing access and egress;

(8) Provisions for pedestrian access;

(9) Location of outdoor storage, if any;

(10) Location, design and construction materials of all existing or proposed site improvements including drains, culverts, retaining walls and fences;

(11) Description of the method of sewage disposal and location, design and construction materials of such facilities;

(12) Description of the method of securing public water and location, design and construction materials of such facilities;

(13) Location of fire and other emergency zones, including the location of fire hydrants;

(14) Location design and construction materials of all energy distribution facilities, including electrical, gas and solar energy;

(15) Location, size and design and type of construction of all proposed signs;

(16) Location and proposed development of all buffer areas, including existing vegetative cover;

(17) Location and design of outdoor lighting facilities;

(18) Identification of the location and amount of building area proposed for retail sales or similar commercial activity;

(19) General landscaping plan and planting schedule;

(20) An estimated project construction schedule;

(21) Record of application for and approval status of all necessary permits from state and county officials;

(22) Identification of any state or county permits required for the project's execution; and

(23) Other elements integral to the proposed development as considered necessary by the planning board.

15.3 REVIEW OF SITE PLAN. The Planning Board's review of the site plan shall include, as appropriate, but it is not limited to, the following general considerations:

(a) Location, arrangement, size, design and general site compatibility of buildings, lighting and signs;

(b) Adequacy and arrangement of vehicular traffic access and circulation, including intersections, road widths, pavement surfaces, dividers and traffic controls;

(c) Location, arrangement, appearance and sufficiency of off-street parking and loading;

(d) Adequacy and arrangement of pedestrian traffic access and circulation, walkway structures, control of intersections with vehicular traffic and overall pedestrian convenience;

(e) Adequacy of storm water and drainage facilities;

(f) Adequacy of water supply and sewage disposal facilities;

(g) Adequacy, type and arrangement of trees, shrubs, and other landscaping constituting a visual and/or noise buffer between the applicant's and adjoining lands, including the maximum retention of existing vegetation;

(h) Adequacy of fire lanes and other emergency zones and the provision of fire hydrants; and

(I) Special attention to the adequacy and impact of structures, roadways and landscaping in areas with susceptibility to ponding, flooding and/or erosion.

15.4 PLANNING BOARD ACTION ON SITE PLAN. Within forty-five (45) days of the receipt of an application for site plan approval, the planning board shall render a decision, file said decision with the Town Clerk, and mail such decision to the applicant with a copy to the Zoning Officer. The time within which a decision must be rendered may be extended by mutual consent of the applicant and planning board.

(a) Upon approval of the site plan and payment by the applicant of all fees and reimbursable costs due to the town, the planning board shall endorse its approval on a copy of the final site plan and shall forward a copy to the applicant, Zoning Officer, Town Assessor, and file same with the Town Clerk.

(b) Upon disapproval of a site plan, the planning board shall so inform the Zoning Officer and the Zoning Officer shall deny a zoning permit to the applicant. The Planning Board shall also notify the applicant in writing of its decision and its reasons for disapproval. Such disapproval shall be filed with the Town Clerk.

15.5 REIMBURSABLE COSTS. Cost incurred by the Planning Board for consultation fees or other extraordinary expenses in connection with the review of a proposed site plan shall be charged to the applicant.

15.6 PERFORMANCE GUARANTEE. No certificate of occupancy shall be issued until all improvements shown on the site plan are installed or a sufficient performance guarantee has been posted for improvements not yet completed. The sufficiency of such performance after consultations with the Planning Board, Zoning Officer, Town Attorney, and other appropriate parties.

15.7 INSPECTION OF IMPROVEMENTS. The Zoning Officer shall be responsible for the overall inspection of site improvements including coordination with the Planning Board and other officials and agencies, as appropriate.

15.8 INTEGRATION OF PROCEDURES. Whenever the particular circumstances of proposed development require compliance with either the special use procedure in the Zoning Law or other requirements of the town, the Planning Board shall attempt to integrate, as appropriate, site plan review as required by this section with the procedural and submission requirements for such other compliance.

SECTION 16 - TELECOMMUNICATIONS LAW.

Section 1 - Intent

The Town of Hanover recognizes the increased demand for wireless communication transmitting facilities and the need for the services they provide. Often, these facilities require the construction of a communications tower and/or similar facilities. The intent of this Local Law is to regulate the location, construction, and modification of Telecommunication facilities in accordance with the guidelines of the Telecommunications Act of 1996 and other applicable laws by:

A. Accommodating the need for telecommunication towers/antennas while regulating their location and number in the community.

B. Minimizing adverse visual impacts of these towers/antennas through proper design, siting and screening.

C. Preserving and enhancing the positive aesthetic qualities of the built and natural environment in the Town of Hanover.

D. Providing for the health, safety, and welfare of the community by avoiding potential damage to adjacent properties from tower failure, falling, ice, etc., through engineering and proper siting.

E. Requiring the joint use of towers when available, and encouraging the placement of antennas on existing structures, to reduce the number of such structures in the future. No new tower may be established if there is a technically suitable space available on an existing communications tower or structure within the search area that the new call site is to serve.

Section 2 - Definitions

A. TELECOMMUNICATION FACILITIES - Towers and/or Antennas and Accessory Structures together used connection with the provision of cellular telephone service, personal communications services, digital and/or data communication services, paging services, radio and television broadcast services, and similar broadcast services.

B. TOWER - A structure designed to support antennas. It includes without limit, free-standing towers, guyed towers, monopoles and similar structures which *or which do not* employ camouflage technology.

C. ANTENNA - A system of electrical conductors that transmit or receive frequency signals. Such signals shall include but not be limited to radio, television, cellular,

paging, personal communication services (PSC) and microwave communications.

D. ACCESSORY STRUCTURE- A non-habitable accessory facility or structure serving or being used in conjunction with a communications tower and/or similar facility, and located on the same lot as the communications tower. Examples of such structures include utility or transmission equipment, storage sheds or cabinets.

Section 3 - Where Permitted, Approvals and Bulk Requirements

No Telecommunications Facility shall be sited, located, constructed, erected or modified without issuance of a building permit and such permits or approvals as are prescribed in this Law.

A. Co-located/Existing Structure Antennas: An antenna that is to be attached to and existing communications tower, smoke stack, water tower, or other existing structure is permitted in all zoning districts, except as hereafter stated. The antenna is permitted as of right upon issuance of a building permit. The building permit application will include a structural analysis/report (Certified by a N.Y. State licensed Professional Engineer Architect) verifying the ability of the structure to handle the antenna, and certification by a qualified Radio Frequency Engineer that the cumulative emissions from the site meet federal guidelines. The height of the new antenna shall not extend above the height of the existing structure by more than 50 feet, in no event shall the entire structure, including antenna, exceed 300 feet.

Co-location on the telecommunication tower presently situate on Town of Hanover property off Southerland Road shall not be permitted due to prior commitment by the Town Board.

The antenna and any mounting structure and related equipment shall be integrated into said structure in such a manner as to minimize its visual impact to the greatest extent practicable.

B. Non-Co-located/New Structure Antennas: an antenna that will not be mounted on an existing structure as defined above, or is more than 50 feet higher than the existing structure on which it is mounted is permitted in accordance with the following regulations.

General Requirements

No application for a non-co-located or a new site for a Telecommunications Facility shall be considered complete unless and until the applicant shall have submitted a report, which establishes to the satisfaction of the Board the following:

(I) That the applicant is required to provide service to locations which it is not able to serve through existing Facilities which are located either within or outside of the Town, showing the specific locations and/or areas applicant is seeking to serve.

(II) The report shall set forth an inventory of existing Facilities and/or structures within or outside of the Town, which might be utilized or modified in order to provide coverage to the locations applicant is seeking to serve and include a report on the possibilities and opportunities for co-location as an alternative to a new site.

(III) The applicant must demonstrate that the proposed Facility cannot be accommodated on any such existing Facility or structure either within or outside of the Town due to one or more of the following reasons:

(a) The proposed equipment would exceed the existing and reasonably potential structural capacity of existing Facilities or structures within or outside of the Town considering existing and planned use for those Facilities or structures.

(b) The existing or proposed equipment would cause interference with other existing or proposed which equipment could not reasonably be mitigated or prevented.

(c) Said existing Facilities or structures do not have space on which the proposed equipment can be placed so it can function effectively and reasonably, and/or the applicant has not been able, following good faith efforts, to reach an agreement with the owner(s) of such facilities or structures.

(d) Other reasons which make it impracticable to locate or place the proposed equipment on said Facilities or structures.

Zoning Districts, Approvals and Bulk Requirements

1) Municipal or Government owned property and Light Industry Zoned areas: Site plan application per Zoning Law Requirements and Section 4A3 of this Article. All towers must be set back a minimum of the height of the tower, plus 100 feet from any residentially zoned property or front yard line. If the tower is to be setback less than the height of the proposed tower to any residential district then the application will require a Tower Special Permit per Section 4 and site plan

approval. All Towers shall be setback a minimum of 1000 feet from any residential dwelling, school or historic structure.

2) Agricultural/Residential Zoning Districts: Site plan review and a Tower Special Permit as forth in Section 4.

Site plan application per Zoning Law Requirements and Section 4A3 of this Article. All towers must be set back a minimum of the height of the tower, plus 100 feet from any residentially zoned property or front yard line. If the tower is to be setback less than the height of the proposed tower to any residential district then the application will require a Tower Special Permit per Section 4 and site plan approval. All Towers shall be setback a minimum of 1000 feet from any residential dwelling, school or historic structure.

Towers exceeding 175 feet in height shall be treated as Type I Actions under the State Environmental Quality Review Act (SEQRA).

Towers shall not be allowed on any other districts except as specifically set forth herein.

3) All Permitted Districts: Maximum height of tower shall not exceed 300 feet.

Section 4 - Tower Special Permit Application Materials

A. All Applicants for Tower Special Permit shall make written application to the Town Board, through the Town Planning Department. This Application shall include:

1) Tower Special Permit Application Form.

2) Applicable Fees.

3) Site Plan Application Forms including a Long Form EAF.

4) Site Plan, in form and content acceptable to the Town, prepared to scale and sufficient detail and accuracy showing at a minimum:

(I) The exact location of the proposed tower together with guy wires and guy anchors, if applicable.

(II) The maximum height of the proposed Tower.

(III) A detail of Tower type (Monopole, Guyed, Freestanding, or other).

(IV) The color or colors of the Tower.

(V) The location, type and Intensity of any lighting on the Tower.

(VI) The property's boundaries *(a copy of a property survey must also be provided).*

(VII) Proof of the landowner's consent if the applicant will not own the property. *(A copy of a lease agreement must also be provided if the applicant will not own the property).*

(VIII) The location of all structures on the property and all structures on any adjacent property within *(50) fifty feet* of the property lines, together with the distance of these structures to the Tower.

(IX) The names of adjacent landowners.

(X) The location, nature and extent of any proposed fencing and landscaping or screening.

(XI) The location and nature of proposed utility easements and access road, if applicable.

(XII) *Building elevations of accessory structures or immediately adjacent buildings.*

5) "Before" and "after" propagation studies prepared by a qualified Radio frequency Engineer demonstrating existing signal coverage contrasted with the proposed signal coverage resulting from the proposed Telecommunications Facility.

6) A "search ring" prepared by a qualified Radio Frequency Engineer and overlaid on an appropriate background map demonstrating the area within which the Telecommunications Facility needs to be located in order to provide the proper signal strength and coverage to the target cell. The applicant must be prepared to explain to the Planning Board why it selected the proposed site, discuss the availability (or lack of availability) of a suitable structure within the search ring which would have allowed for Co-located Antenna(s), and to what extent the applicant explored locating the proposed

Tower in a more intensive use district. Correspondence with other telecommunication companies concerning Co-location is part of this requirement.

7) The Town staff/advisory committees and Planning Board, upon reviewing the application, may request reasonable additional visual and aesthetic information as it deems appropriate on a case by case basis. Such additional information may include, among other things, enhanced landscaping plans, line-of-sight drawings, and/or visual stimulation's from viewpoints selected by the Town staff/advisory committees. Line-of-sight drawings and visual simulations are mandatory for Applications in Residential and Neighborhood Commercial Zoning Districts.

8) In Historic Districts and important preservation/conservation areas the Town may require additional site plans and Tower Special Permit requirements. These requirements can include specially designed towers, additional screening, greater setbacks and improved landscaping.

In siting, these areas should be avoided to the maximum extent possible.

Section 5 - Telecommunications Facility Special Permit Standards

The following criteria will be considered by the Town prior to the approval/denial of a request for a Tower Permit, the criteria listed may be used as a basis to impose reasonable conditions on the applicant. All denials shall be in writing and supported by substantial evidence contained in a written record. Town Special Permits are non-assignable and non-transferable.

A. Siting Preferences - The Town may express a preference that the proposed Telecommunications Facility be located in a higher intensity use district or on higher intensity use property, provide there is a technologically feasible and available location. A guideline for the Town's preference, from most favorable to least favorable districts/property, is as follows:

1) Property with an existing structure suitable for co-location.

2) Municipal or government owned property.

3) Light Industrial.

4) Agricultural/Residential.

Any request by the Town for information on a preferred alternate site shall not unreasonably delay the application.

B. Aesthetics - Telecommunications Facilities shall be located and buffered to the maximum extent, which is practical and technologically feasible to help ensure compatibility with surrounding land uses. In order to minimize any adverse aesthetic effort on neighboring residences to the extent possible, the Planning Board may impose reasonable conditions on the applicant, including the following:

1) (Tower height, location and design are matters of primary public concern). The Planning Board may require a monopole or guyed Tower (if sufficient land is available to the applicant) instead of a freestanding Tower. *Monopoles are a preferred design.*

2) The Planning Board will require reasonable landscaping consisting of trees or shrubs to screen the base of the Tower and/or to screen the Tower to the extent possible from adjacent residential property. Existing on-site trees and vegetation shall be preserved to the maximum extent possible.

3) The Town will require the applicant to show that it has made good faith efforts to Co-locate on existing Towers or other available and appropriate structures and/or to construct new towers near existing Towers in an effort to consolidate visual disturbances. However, such request shall not unreasonably delay the application.

4) Towers should be designed and sited so as to avoid, whenever possible, application of FAA lighting and painting requirements. Towers shall not be artificially lighted except as required by the Federal Aviation Administration (FAA) or the Town. Towers shall be of a non-reflective finish; color subject to Board approval, unless otherwise required by the FAA. *Any lighting which may be required by (FAA) shall not consist of strobe lights, unless specifically mandated by (FAA).*

5) No Tower shall contain any signs or advertising devices. Not withstanding the foregoing, the Board may require appropriate signage indicating ownership of the facility and phone numbers to call in case of emergency.

6) The applicant must submit a copy of its policy regarding co-location on the proposed Tower with other potential future applicants. Such policy should allow co-location under the following conditions: (I) the new Antenna(s) and equipment do not exceed structural loading requirements, interfere with Tower space used or to be used by the applicant nor pose any technical or radio frequency interference with existing equipment, (II) the party desiring to co-locate pays the applicant an appropriate and reasonable sum to co-locate, and (III) the party desiring to co-locate has a similar policy of co-location for the applicant.

7) All other uses ancillary to the antenna/tower and associated equipment (including a business office, maintenance depot, vehicle storage, etc.) are prohibited from the site unless otherwise permitted in the particular Zoning District.

C. Radio-Frequency Effect - The Planning Board may impose a condition on the applicant that the communication antennas be operated only at Federal Communications Commission (FCC) designated frequencies and power levels and/or Environmental Protection Agency (EPA) technical exposure limits, and that the applicant provide competent documentation to support that maximum allowable frequencies, power levels and exposure limits for radiation will not be exceeded.

D. Traffic, Access and Safety

1) A road turnaround and one parking space shall be provided to assure adequate year round emergency and service access. Maximum use of existing roads, public or private, shall be made. The use of public roadways or road right-of-ways for the siting of a Tower or Antenna(s) Accessory structures is prohibited.

2) All Towers and guy anchors, if applicable, shall be enclosed by a fence not less than eight (8) feet in height or otherwise sufficiently protected from trespassing or vandalism. Fence must be placed around guy wires so that a minimum of a 12 feet clearance from outside fence to top guy wire at that point.

3) The applicant must comply with all applicable State and Federal regulations including but not limited to FAA and FCC regulations.

4) There shall be no permanent climbing pegs within thirty (30) feet of the ground on any Tower.

E. Removal of Tower - The applicant shall agree to remove the Tower if the Telecommunications Facility becomes obsolete or ceases to be used for its intended purpose for twelve consecutive months. The Planning Board, in its discretion, shall require the applicant to provide a demolition bond for purposes of removing the Telecommunications Facility in case the applicant fails to do so as required above. The sufficiency of the demolition bond shall be confirmed at least every five (5) years by an analysis and report of the cost of removal and property restoration to be performed by a New York State licensed professional engineer, the cost of same to be borne by the applicant. If the said analysis and report determines that the amount of the bond on force is insufficient to cover the removal, disposal and restoration costs, the bond shall be increased to the amount necessary to cover such costs, within ten (10) days of applicant's receipt of such report.

F. Structural Safety - During the application process, the applicant shall provide a certification from a qualified, licensed engineer, certifying that the Tower meets applicable structural safety standards. The owner shall also have a structural inspection performed every two years by a Licensed Professional Engineer. A report shall be submitted to the Town describing the structural integrity of the Facility, maintenance issues and repairs needed or made, if any. Structural deficiencies shall be remedied within a reasonable time.

G. Maintenance of Telecommunications Facility - All Telecommunications Facilities shall be maintained in good order and repair.

Section 6 - Exemptions

A. Tower and Antenna(s) may be repaired and maintained without restriction.

B. Antennas used solely for residential household television and radio reception.

C. Satellite Antennas measuring two (2) meters or less in diameter and located in commercial districts, and Satellite Antennas one (1) meter or less diameter regardless of location.

Section 7 - Procedure

A. The Town Board may waive or vary any requirements in this Article for good cause shown.

B. In the event of any conflicts or inconsistencies between this local law and

any other local law, including the Zoning Law, this local law is meant to control telecommunications towers and similar facilities in the Town unless otherwise specifically referenced in this law.

C. Tower Special Permits authorized by this Article shall only be issued by the Town Board after referral and recommendation by the Planning Board, and after holding a public hearing that has been advertised in the same manner as for an amendment to the zoning code.

Section 8 - Violations/Penalties

This Local Law is adopted pursuant to the zoning and planning powers granted to the Town under applicable law. In the event of any violation of this law or any permit(s) issued hereunder, the Town may seek enforcement under any available authority, including, but not limited to, Town Law Section 268.

Any facility receiving a Tower Special Permit that subsequently does not meet the re-requirements and/or conditions of that permit shall have its permit revoked, and the tower and other facilities shall be removed within 90 days of notification by the Town.

Section 9 - Permit Fees

The Town Board shall establish such fees as are necessary for the issuance of permits in accordance with the Zoning Ordinance of 1971 and the amendments thereto.

Section 10 - Effective Date

This Local Law shall become effective upon filing with the Department of State

SECTION 17 MANUFACTURED HOME COURTS

17.1 DEFINITIONS. The following definitions shall apply to the interpretations of this Ordinance.

(a) ACCESSORY STRUCTURE. A Structure, the use of which is incidental to use of the mobile home, and which is attached thereto or located on the same mobile home lot. Accessory structures include, but are not limited to portable, de-mountable or permanent enclosures, shade structures, and carports.

(b) APPROVED. Written approval by the Administrative Officer under the regulation of this Ordinance Law or written approval by an authority designated by law or this Ordinance.

(c) COMMUNITY AREA. An area or space within a mobile home court, including fences, walls and other minor structures, which is designated for joint use of occupants.

(d) COMMUNITY STRUCTURE. A structure within a mobile home court providing laundry, toilet, recreation, parking or other house or mobile home courts or related thereto, recognized or accepted as authorized.

(e) HABITABLE SPACE. Space used for living, sleeping, eating or cooking purposes, bathrooms, toilet rooms, storage space and enclosures for equipment installations.

(f) MECHANICAL SYSTEMS AND EQUIPMENT. Mobile homes electrical, plumbing, heating, ventilating, air conditions systems and equipment used for living purposes, including cooking and refrigeration equipment.

(g) MANUFACTURED HOME. A movable living unit equipped with a chassis primarily designed for and which is used as the permanent living abode or habitation of one or more persons at the time in question, and without regard as to whether or not such vehicles may be presently equipped to travel.

(h) MANUFACTURED HOME COURT. A parcel of land on which two or more manufactured homes are located.

(I) MANUFACTURED HOME DISTRICT. That area designated in the Ordinance for zoning of the Town of Hanover in which a manufactured home, manufactured home courts and trailers may be located.

(j) OWN. Holding title to real property in fee simple and as respects manufactured homes and trailers, possession pursuant to the terms of an installment sales contact or any greater interest in same.

(k) PERSON. Any natural individual, firm, trust, partnership, association corporation.

(l) TRAILER. A movable living unit equipped with a chassis, the occupants of which maintain another permanent abode at the time in question.

17.2 PERMIT.

(a) No person shall locate or maintain a manufactured home court in any part of the Town of Hanover without first securing a permit hereinafter provided.

(b) APPLICATION FOR SPECIAL USE. An application for special use shall be filed with the Zoning Officer upon such form and accompanied by such information as shall be established from time to time by the Zoning Board of Appeals. The Zoning Officer shall forward to the Zoning Board of Appeals without delay a copy of each special use permit proposed for authorizing a special use.

(c) Special uses shall be authorized by Special Use Permit granted by the Zoning Board of Appeals in same manner and for the same purposes as variance; provided that no application for special use shall be acted upon until after the Zoning Board of Appeals has notified and held a public hearing, and prepared and filed a finding of fact thereon.

17.3 LOCATION. From and after the effective date of this Ordinance, permits for the initial location or establishment of a manufactured home court shall be limited to sites within the Agricultural-Residential Zone and Business Zone of the township, as such zone is established by Ordinance.

17.4 REGULATIONS. The following regulation shall apply to manufactured home court.

(a) MECHANICAL SYSTEMS AND EQUIPMENT.

(1) PLUMBING.

(a) A manufactured home shall contain: Kitchen sink, flush type water closet, bathtub or shower and lavatory.

(b) Hot and cold water supply shall be provided at kitchen sink, bathtub or shower and lavatory. Cold water shall be supplied to water closet.

(c) Plumbing system shall be designed and arranged so as to facilitate connecting to approved exterior water supply and sewage disposal systems,. Provide adequate water supply to all plumbing fixtures and dispose of all liquid wastes therefrom.

(b) LAYOUT AND DESIGN.

(1) DOUBLE ACCESS. All manufactured home courts containing twenty (20) or more manufactured home lots shall have access from two (2) points along a single public street or highway, or bordering on two (2) streets, access can be one for each street, such access points being separated at least one hundred (100) feet.

(2) BUFFER ZONE. There shall be provided a buffer area between the right-of-way line of adjacent public highway and any portion of a manufactured home of at least fifty (50) feet. There shall also be provided a buffer area between any portion of a manufactured home and all other boundaries of the manufactured home court of at least forty (40) feet. Such buffer area shall be primarily clear of obstruction other than tees and other natural landscape material and shall not be used for any above ground structures, excepting, however, that twenty-five percent (25%) of said buffer area may be used for sale of manufactured homes provided that a special permit has been issued for this activity by the Board of Appeals.

(3) OTHER PRINCIPAL STRUCTURES. Private conventional residences and commercial establishments may be located within the manufactured

home court. If located with frontage on the public highway, such structures shall be located in that portion of the buffer zone allocated for sales areas. If located in an area not considered a buffer zone, lot location and minimum distances shall be fixed by the Zoning Board of Appeals after due consideration of each case.

(4) BLOCK LENGTHS. Manufactured Home Courts - The layout of interior roadways or driveways shall be such that no block is longer than five hundred (500) feet, provided however, that this may be extended to seven hundred and fifty (750) feet if an interior walkway is provided for pedestrian access across the center of the block.

(5) STREET (OR) DRIVEWAY WIDTHS. All streets shall have a minimum width of forty (40) feet which is completely clear of obstructions.

(6) STREET GRADES. The maximum street grade shall be seven percent (7%). Entrance gradients shall be less than three percent (3%) for a distance of seventy-five (75) feet from the edge of the right-of-way of the highway.

(7) MINIMUM RADIUS. The minimum radius of curvature for any street shall be one-hundred (100) feet.

(8) ALIGNMENT. Streets shall be laid out so as to intersect as nearly as possible at right angles, and in no case shall any angle or intersection be less than seventy-five (75) degrees.

(9) STREETS AND PARKING AREAS. Street or driveway pavement shall be located in the center of the street clear zone. If provision is made within the street, such parking area may be off the pavement and the clear zone (street width) shall be increased proportionately to provide therefor. If parking provision is made in parking areas for three or more vehicles in nodes throughout the court, such areas shall be located off of the pavement considered to be the street or driveway and in such manner as not to encroach upon the area considered to be the manufactured home lot. Provisions shall be made for the parking of three (3) motor vehicles for each two (2) manufactured home lots.

(10) AUXILIARY PARKING. Central auxiliary parking area shall be provided at a ratio of two hundred (200) square feet per mobile home lot in a location which is not contiguous with the lot serviced, such area being screened from lots and public highways by a coniferous hedge or other effective vegetation. Auxiliary parking areas are to be provided for

parking trucks, maintenance equipment, boat trailers, and utility trailer.

(11) MANUFACTURED HOME LOT SIZE. All lots in manufactured home courts shall be a minimum of five thousand (5,000) square feet, if rectangular or trapezoidal, and shall have a minimum width of fifty (50) feet.

(12) CORNER LOTS. Corner lots in manufactured home courts shall be one and one-half (1½) times the width and area of regular lots. If a street makes a turn of ninety degrees (90°), the lot on the inside shall be considered a corner lot and the lots on the outside shall be considered radial lots, wherein the width shall be measured at the distance of ten (10) feet from the street line.

(13) DOUBLE FRONTAGE LOTS. Double frontage shall be avoided. If there is a situation where only one manufactured home can be located between streets, then a buffer strip of at least ten (10) feet shall be created and suitably planted.

(14) WALKING WAYS. Walkways shall be laid out so as to connect all patios with the street and connect service building, drying yards, and storage lockers with the streets. Walkways shall connect access to the recreation areas if such areas are not located adjacent to a street. Additional walkways can also be placed along the rear of each lot.

(15) RECREATION SPACE. Recreation space shall be provided in a central location and at a ratio of five hundred (500) feet per lot. Such space shall be enclosed with shrubs or evergreen hedges placed not farther than ten (10) feet apart.

(16) PUBLIC TELEPHONE. If public telephones are provided within a manufactured home court, they shall be located directly adjacent to service buildings.

(17) MAILBOXES. Mailboxes shall be located at a location suitable to the local post office, but shall not be placed in any location where they constitute a safety hazard to pedestrians or vehicles.

(18) TREES. All existing trees in manufactured home courts shall be preserved insofar as possible in the design of the court.

(c) SITING OF MANUFACTURED HOMES.

(1) The following minimum distance shall be maintained where providing

specific locations of manufactured homes as related to each other within the court:

(a) LATERALLY. (Side of manufactured home facing the side of the next) Thirty (30) feet.

(b) LONGITUDINALLY. (End of manufactured home facing the end of another) Thirty (30) feet.

(c) PERPENDICULARLY. (End of manufactured home facing the side of another) Twenty (20) feet. In cases of non-rectangular or non-trapezoidal design, these minimum distances may be reduced if the final configuration of manufactured homes does not interfere with the provisions of space for patios, walkways or storage; but in no case shall two manufactured homes be closer than thirty (30) feet from each other.

(2) The following minimum distance shall be maintained when providing specific locations of manufactured homes within the court and with respect to service or storage buildings:

(a) LATERALLY. (Side of manufactured home and buildings) Twenty-five (25) feet.

(b) LONGITUDINALLY. (End of manufactured home and building) Fifteen (15) feet.

(3) The minimum setback from the street line shall be twenty (20) feet.

(4) No occupied travel or vacation trailer or other form of temporary type living units shall be permitted in a manufactured home court.

(5) The perimeter of a manufactured home shall be skirted with a fire retardant material.

(d) REQUIRED IMPROVEMENTS.

(1) WATER SUPPLY SYSTEM. All water supply systems shall be installed as per plans approved by the Town/Chautauqua County Board of Health. Such systems shall be designed to provide a sufficient supply of potable water, under adequate pressure, to outlets serving manufactured homes, community structures, drinking fountains, hose connection, hydrants and so on. Where a public water supply systems is not available, an adequate private water supply system, approved by the Chautauqua County Department of Health or Local Health Department having jurisdiction,

shall be provided.

(2) SEWAGE DISPOSAL SYSTEM. All sewage disposal systems shall be installed in accordance with plans approved by the Chautauqua County Board of Health. Such systems shall provide each mobile home and community structure containing plumbing fixtures with an adequate and safe method of sewage disposal. Where a public sewage disposal system is not available, an adequate private sewage disposal system approved by Chautauqua County Health Board, shall be provided.

(3) SEWAGE TREATMENT FACILITIES. All sewage treatment facilities shall be installed as per plans approved by the Chautauqua County Board of Health. No sewage from a plumbing system shall be disposed of into the waters of the State of New York, except where specially approved by the authority having jurisdiction in accordance with Article 12 of the New York State Public Health Law.

(4) ELECTRICAL SYSTEMS. The electrical system shall be designed to provide adequate capacity to supply the connected load without exceeding the allowable current carrying capacity of the conductors. Each manufactured home lot shall be provided with a conductor and terminal capable of carrying a minimum current on one hundred (100) amperes. Service in manufactured home courts shall be underground to meet all applicable regulations. An electrical connection receptacle or terminal box of an approved weatherproof type shall be provided at each mobile home lot. The receptacle shall be of the polarized type with ground conductors and shall have four prong attachment for 120-240 volts. All electrical work shall comply with the Electrical Code of the Town of Hanover.

(5) LIGHTING. Artificial lighting shall be provided to illuminate walks, driveways and parking spaces for the safe movement of pedestrians and vehicles as follows:

(a) Overhead street lighting standards shall be placed no farther than one hundred (100) feet apart, have a minimum clearance above the pavement of twelve (12) feet and shall have a capacity of 100 watts.

(b) Alternate side street lighting (post lamps) shall be placed not farther than sixty (60) feet apart, as measured along the center line of the street one hundred twenty (120) feet on one side of the street, have a minimum height of four (4) feet and a maximum height of seven (7) feet and shall have a capacity of 60 watts, or equivalent.

(c) Service building shall have sufficient exterior lighting fixtures so as to properly illuminate entrances and drying yards connected therewith.

(d) Street and service buildings shall be illuminated during all hours of darkness and according to the following schedule:

Streets	Dark to Dawn
Overhead	100 Watts
Side Lights	60 Watts

Service Building	Dark to Dawn
Entrances	50 Watts

(e) Wires will be located underground.

(6) GAS PIPING SYSTEM. All gas piping systems in manufactured home courts, if installed, shall be designed to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure at the connection to the manufactured home furthest from the source of supply. gas connections shall provide a suitable tight connection to the manufactured home.

(7) REFUSE DISPOSAL. Each manufactured home shall be provided with at least one twenty gallon metal garbage can with a tight fitting cover. The cans shall be kept in a sanitary condition at all times. It shall be the responsibility of the court owner to insure that garbage and rubbish shall be collected and properly disposed of outside of the manufactured home court as frequently as may be necessary to insure that garbage cans do not overflow. Exterior property areas shall be maintained free from organic and inorganic material that might become a health, accident or fire hazard.

(8) COMMUNITY FUEL STORAGE. A manufactured home court shall be provided with facilities for the safe and efficient storage of required fuels. liquefied petroleum gas storage containers having a capacity exceeding one hundred twenty-five (125) gallons shall be located not less than one hundred (100) feet from the nearest manufactured home, structure, building and lot line and shall not be subject to damage from moving vehicles. Fuel oil and other flammable materials shall be stored so as not to be a fire hazard.

(9) STREET PAVING. All streets within a manufactured home court shall be paved for a minimum width of twenty-two (22) feet.

(10) PARKING AREA PAVING. Areas for motor vehicle parking shall be surfaced with uniform sized gravel or crushed stone to a minimum depth of eight (8) inches in the absence of fully hard surface paving.

(11) WALKWAYS. All walkways shall be a minimum width of three (3) feet and thickness of four (4) inches and of concrete.

(12) MANUFACTURED HOME STAND. Each manufactured home court lot shall contain a manufactured home stand capable of containing a manufactured home in a fixed position. The manufactured home stand shall be graded with an impenetrable material at least six (6) inches in thickness. It may be surfaced with a layer of uniform sized crushed stone or gravel to a depth of nine (9) inches in lieu of paving. The entire area of each manufactured home stand shall be so improved. The topographic change of the manufactured home stand shall not exceed one and one-half (1½) feet. The elevation, distance and angle of the manufactured home stand in relation to the access way shall be such as to facilitate the safe and efficient placement and removal of the manufactured home.

(13) STORM WATER DRAINAGE. Manufactured home courts shall have adequate facilities for drainage of surface and subsurface water. The entire manufactured home court shall be graded to facilitate the safe and efficient drainage of surface water and to permit to pending areas where water will stand for lengths of time so as to constitute a health or other hazard. Drainage ditches shall be provided where necessary to provide for the removal of surface drainage. Such ditches shall be provided in such a way as not to constitute a hazard to pedestrians. Gutters, culverts, catch basin, drain inlets, storm water sewers, approved combined storm and sanitary sewers, or other satisfactory drainage systems shall be utilized where deemed necessary and shall be of a size specified by the Town Engineer.

(14) SERVICE BUILDINGS.

(a) Service buildings shall be located in such a way as to prohibit primary access directly adjacent to a manufactured home lot. If such buildings contain laundry facilities, they shall be located no farther than four hundred (400) feet from any manufactured home lot which they serve unless adequate parking space is provided.

(b) Service buildings housing sanitation and laundry facilities or any other facilities shall be permanent structures complying with the New York State Building Code and the New York State Sanitary

Code and/or all other applicable ordinances and statutes regulating building, electrical installations, and plumbing and sanitation systems.

(c) Service building shall be well lighted at all times from dusk to dawn, shall be well ventilated with screened openings, shall be constructed of such moisture proof material, including painted woodwork, as shall permit repeated cleaning and washing, and shall be maintained at a temperature of at least 68 degrees Fahrenheit during the period of October 1 to June 1. The floors of such buildings shall be of water impervious material and supplied with drains.

(15) MANUFACTURED HOME COURT OWNER OBLIGATIONS. In general, manufactured home courts shall be properly maintained so as to insure the desirable residential character of the property. Specifically, the following shall apply:

(a) YARD MAINTENANCE. Manufactured home courts shall be maintained reasonably free from holes and excavations, sharp protrusions, and other objects or conditions which might be a potential cause of personal injury. Walks, steps, driveways, that contain holes or tripping hazards shall be filled, repaired or replaced as the need indicates. Trees, or limbs of trees, that constitute a hazard shall be removed.

(b) NOXIOUS WEEDS. Ragweed and other noxious weeds considered detrimental to health such as poison ivy, poison oak, and poison sumac shall be completely eliminated from all areas of the manufactured home courts. Open areas shall be maintained free of heavy undergrowth of any description.

(c) ACCESSORY STRUCTURES. All accessory buildings or structures shall be kept in good repair, free from health, fire and accident hazards. They shall be of durable construction and appropriate for intended use and location, exterior wood surfaces of all structures that are not inertly resistant to deterioration shall be periodically treated with a protective coating of paint or other suitable preservative.

(d) GRAVEL AREAS. All areas surfaced with gravel shall be kept clear of all forms of vegetation.

(e) INFESTATION. All area grounds and structures shall be maintained

free of insect, vermin and rodent harborage and infestation. Methods used for purposes of extermination shall conform with generally accepted practice.

(17) Vehicular access to a Township, County or State Highway shall be approved by the respective official involved.

(18) FIRE PROTECTION AND CONTROL.

(a) Every manufactured home court shall be equipped at all times with a fire equipment in good working order in conformance with those standards duly adopted as applicable in the fire district within which the court is located.

(b) No open fire other than cooking fires shall be permitted at any place within the court.

(19) REGISTER OF OCCUPANTS. It shall be the duty of each manufactured home court permittee to keep a register containing a record of all manufactured home owners and occupants located within the court. The register shall contain the following information:

(a) The name and legal address of all occupants.

(b) The name and address of the owner of each manufactured home.

(c) The make, type, model, year and license number of each manufactured home and motor vehicle, as well as the registration number of each manufactured home and the state and year in which registered.

(d) The date of arrival and departure of each manufactured home.

(e) Forwarding address of each occupant. The court owner or his agent shall keep the register available for inspection at all times by law enforcement officers, public health officials and other officials whose duties necessitate acquisition of the information contained in the register. The register record for each occupant registered shall not be destroyed for a period of three (3) years following the date of departure of the registrant from the area.

17.5 SUPERVISION.

(a) This Ordinance shall be enforced by the Zoning Officer and said officer or his inspectors shall be authorized and have the right to in the performance of their duties, to enter any premises during normal business hours and in emergencies whenever necessary to protect the public interest.

(b) Owners, agents, operators and occupants shall be responsible for providing access to all parts of the premises within their control to the Zoning Officer or his inspectors, acting in the performance of their duties.

(c) The Zoning Officer and his inspectors shall be free from personal liability for acts done in good faith on the performance of their official duties.

(d) It shall be the duty of the Zoning Officer:

(1) To cause periodic inspections of all licensed premises not less than once each year and inspect premises in pending applications of permits.

(2) To investigate all complaints made under this Ordinance.

(3) To make a written order for remedy of violations of any provisions of this Ordinance and to allow a reasonable time in such order for compliance. Such order shall be served by registered mail directed to the Licensee at the address of licensed premises and such notification shall be deemed sufficient legal notice under this Ordinance.

(4) To request the chief legal officer to take appropriate legal action on all violations of this Ordinance.

(e) The licensee, or permittee, and the duly authorized attendant or caretaker if there is one, shall be responsible at all times to keep the manufactured home court, its facilities and equipment in a clean, orderly and sanitary condition. The attendant or caretaker shall be answerable with the licensee or permittee to the licensing agent or agency for the violation of any provisions of the Ordinance to which the licensee or permittee is subject. The manufactured home owner is responsible for infractions to this Ordinance occurring within his manufactured home and for any of his property or uncontained refuse that may be located externally.

17.6 FEES. The fee to be paid by the applicant, upon the issuance of a permit, as here in above provided shall be as follows:

(a) MANUFACTURED HOME COURT.

(1) INITIAL PERMIT. As is established from time to time by the Town Board. See Addendum A for current Schedule of Fees as adopted by resolution.

(2) RENEWAL PERMIT. As is established from time to time by the Town Board. See Addendum A for current Schedule of Fees as adopted by resolution.

17.7 All provisions of the present Trailer and Trailer Court local law and all amendments thereof, and all ordinances of the Town of Hanover or parts thereof, inconsistent with the terms and provisions of the Ordinance are hereby replaced.

17.8 PENALTIES. Any person violating provisions of any section or subdivision thereof of the foregoing Ordinance, shall be subject to a penalty not exceeding One Hundred Dollars ($100) for each violation. Each day that such violation is permitted to exist, shall constitute a separate offense. That penalty herein provided for shall be in addition to any and all additional penalties which the Town of Hanover shall have pursuant to law.

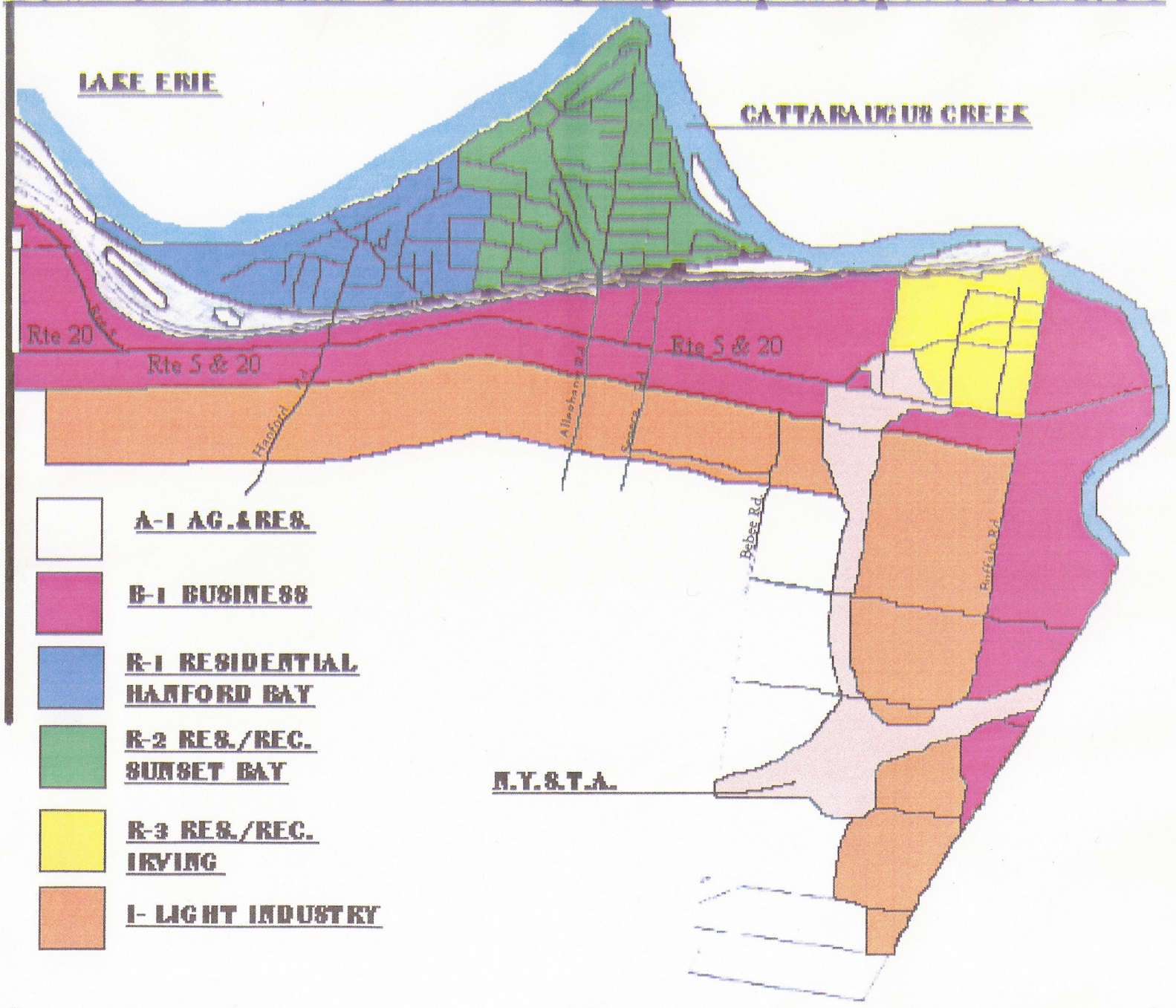
17.9 VALIDITY OF ORDINANCE. If any section, provision or part of this Ordinances held to be invalid in whole or in part, such determination of invalidity shall not affect the validity of any of the remaining sections, provisions or parts of this Ordinance.

SECTION 18 - SEPARABILITY. It is hereby declared to be the intention of the Town Board of the Town of Hanover that the several provisions of Zoning Law of the year 1998 are separable, in accordance with the following:

(a) If any court of competent jurisdiction shall declare any provision of this Law to be invalid, such ruling shall not affect any other provisions of this Law not specifically included in the said ruling; and

(b) If any court of competent jurisdiction shall declare invalid the application of any provisions of this Law to a particular property, building or other structure, such ruling shall not affect the application of said provision to any other property, building or structure not specifically included in said ruling.

Town of Hanover Official Zoning Map Adopted 03/23/98



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Property Value Analysis

Real Estate Consulting Report
of
Influence of Wind Farms
On Residential Real Estate Values
Proposed Noble Ball Hill Windpark
Towns of Hanover and Villenova
Chautauqua County, New York

For
Noble Environmental Power
7294 Centerville Road
Bliss, New York 14024

Prepared By
Darrel R. Lloyd Jr.
Klauk, Lloyd & Wilhelm Inc.
247 Cayuga Road
Buffalo, New York 14225
KLW File: 5679-02

Klauk, Lloyd & Wilhelm, Inc.

Real Estate Appraisers and Consultants

June 3, 2008

Kristin Hawley
Environmental Project Manager
Noble Environmental Power
7294 Centerville Road
Bliss, New York 14024

Re: Real Estate Consulting Report
Influence of Wind Farm on Residential Real Estate Value
Proposed Noble Ball Hill Windpark
Towns of Hanover and Villenova, Chautauqua County, New York

Dear Ms. Hawley:

The purpose of the assignment is to determine if wind farm development impacts residential real estate values in the surrounding market area.

Real estate values are influenced by many factors external to the property itself. These factors are divided into four major categories: social trends, economic trends, governmental controls and regulations and environmental conditions. Social trends consist of population characteristics which could influence property values due to sudden shifts in population and household size dictating demand to specific locations and size of dwellings. Economic trends consider relationships between supply and demand and the economic base of the region. Governmental controls and regulation consider zoning, building codes, utilities, as well as local, state and federal policies. Environmental forces which could influence property values include climate conditions, topography, noise, surrounding land uses as well as other factors. It is fundamental to this type of analysis to understand all of the value-influencing forces which effect property values.

The primary conditions specific to wind farms which may impact surrounding property values include the view shed, noise and shadow flicker from the blades.

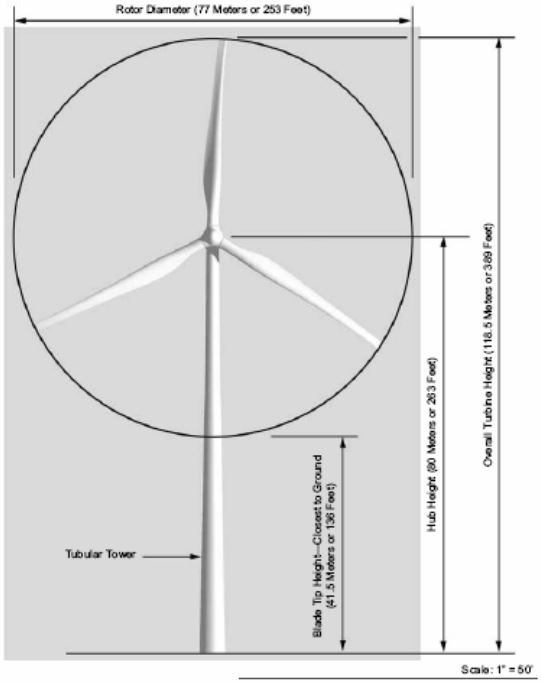
For the purpose of this report four wind farms within New York State were considered in this analysis. Two of the wind farms are located in Madison County, New York and two are located in Wyoming County, New York. Three of these wind farms have been operational for over 5 years. Additionally, the recently completed wind farm known as Noble Bliss Windpark in Wyoming County was analyzed, however due to its recent completion date (Spring 2008) only limited sales data was available.

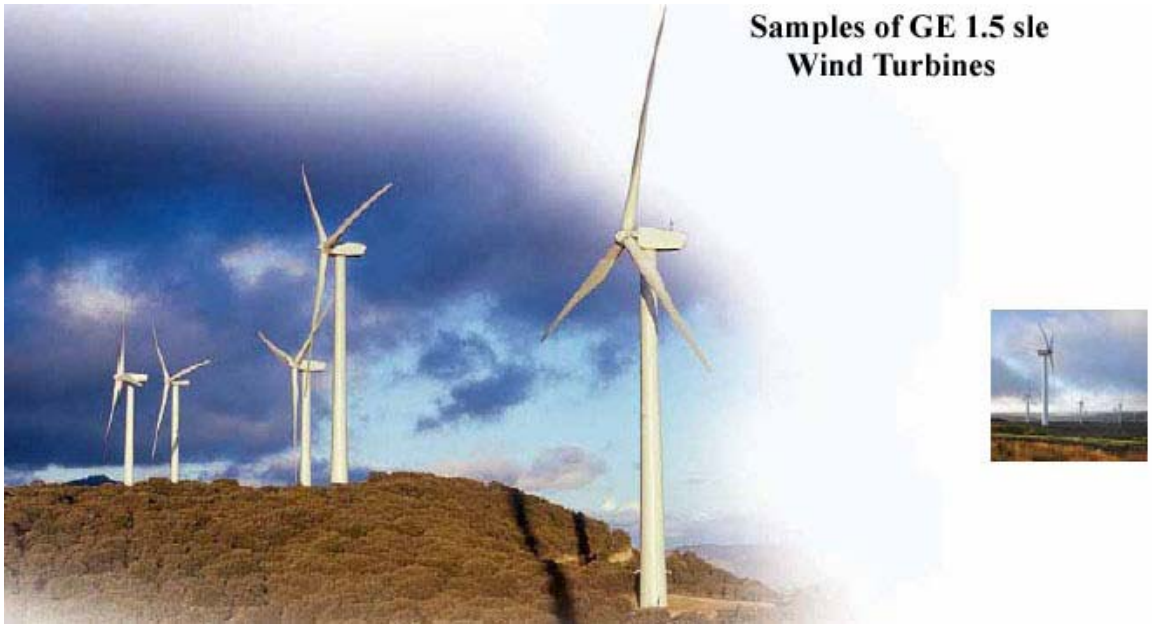
247 Cayuga Road • Buffalo, New York • 14225
Phone (716) 632-2100 • Fax (716) 632-1062
E-Mail klwgroup@klwgroup.com

Project Description:

The Noble Ball Hill Windpark is an approximately 90 megawatt wind energy project proposed for an area located within two towns in the northeastern portion of Chautauqua County, New York. The proposed project will consist of a total of 60 turbines located on approximately 5,569 acres (includes all easements and setbacks necessary for project construction). Of the 60 wind turbines, 11 turbines are proposed to be located in the Town of Hanover, with the remaining 49 wind turbines to be located in the Town of Villenova. Construction of the Noble Ball Hill Windpark is anticipated to begin in March 2009.

The proposed GE 1.5sle wind turbines will be mounted on 3 section monopole supports approximately 260 feet high and 18 feet in diameter. Each turbine will have a 3 blade rotor with a blade length of approximately 123 feet. The operating range of rotor speed will be approximately 17 to 22 rpm. The turbines will be lighted in accordance with FAA standards. The turbines will be anchored by a 2,500 square foot reinforced concrete mat foundation, approximately 4 feet thick, topped by a 16 foot diameter reinforced concrete pier about 4 feet high. The foundation will be backfilled such that about 1 foot of the pier will project above grade. The color of the blades, nacelle and tower will be white or off-white.





Proposed Site Plan:

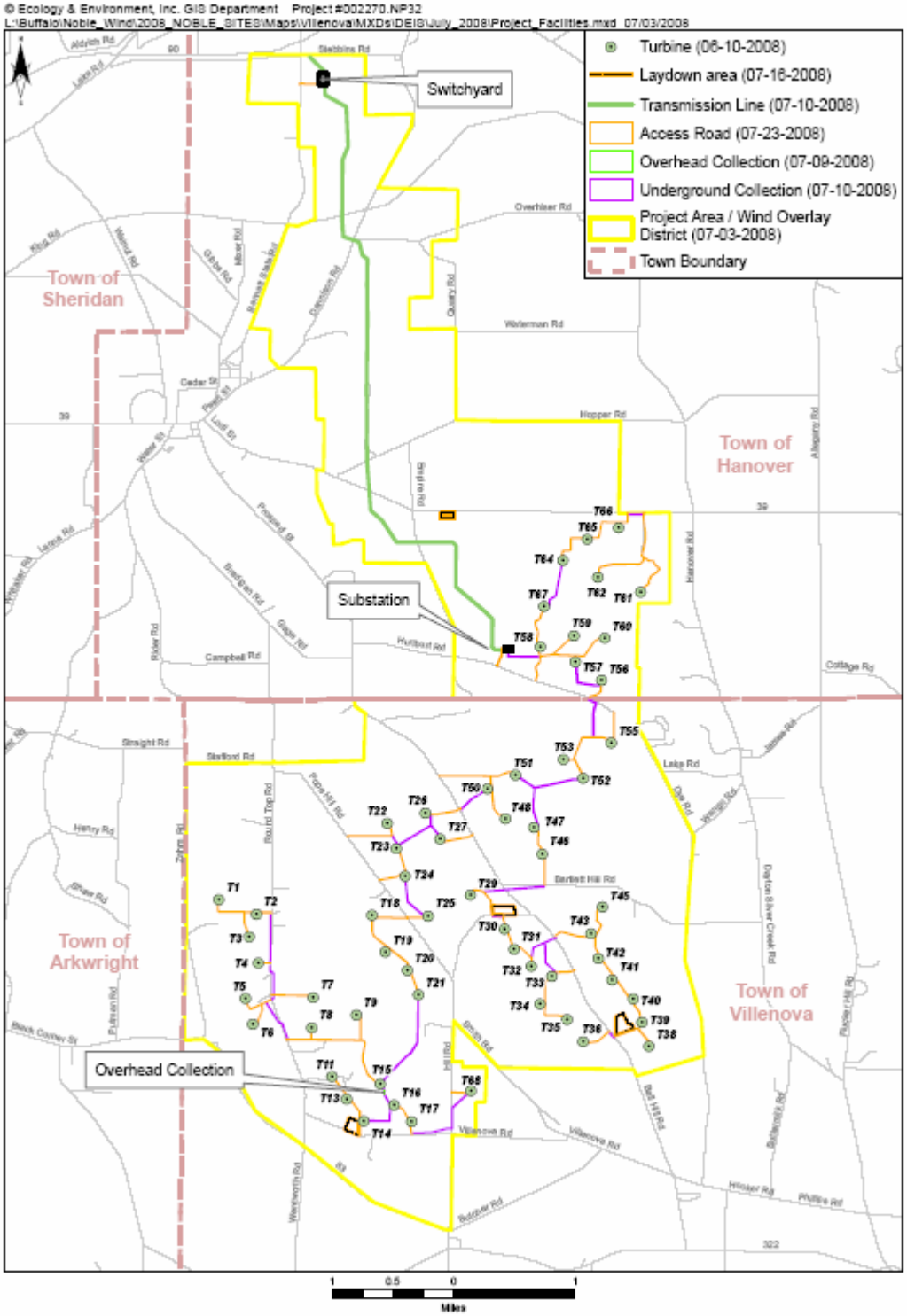


Figure 1.1-2 Noble Ball Hill Project Facilities
Noble Ball Hill Windpark

Area Data – Chautauqua County

Chautauqua County is located in the southwestern-most portion of New York State on the eastern/southern shore of Lake Erie. Located on the western/northern shore of Lake Erie, across the lake, is Canada. Chautauqua County is bordered by Erie County, NY to the northeast, Cattaraugus County, NY to the east, Warren County, PA to the south, and Erie County, PA to the southwest. West of Chautauqua County on the western boundary of Erie County, PA is the State of Ohio.

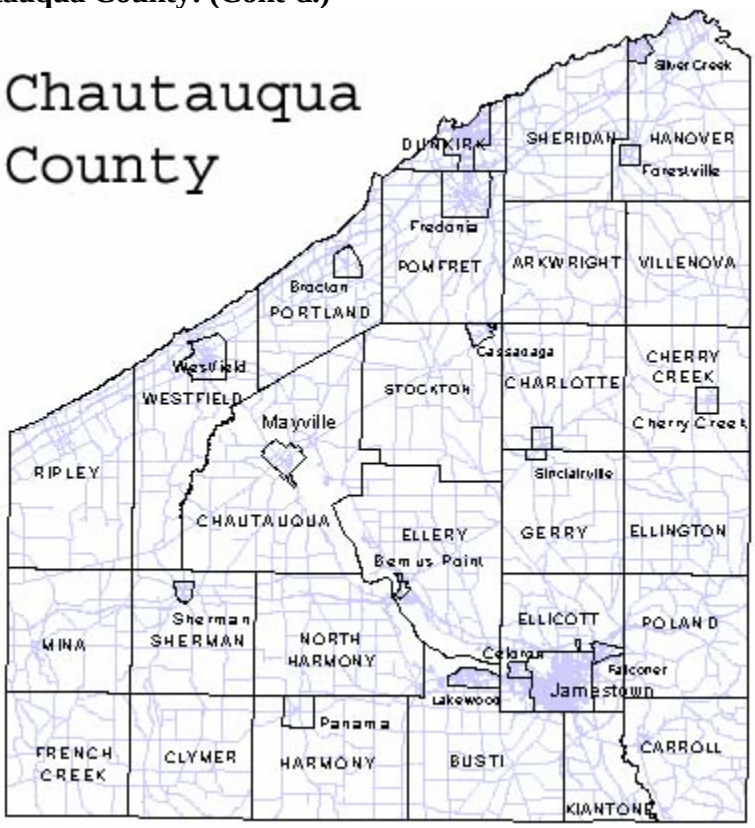
Chautauqua County contains approximately 1,065± square miles of area with elevations from 573 feet above sea level to 2,190 feet. The topography of the region conforms to four major features. The first is the Lake Erie Plain. This area forms the northern border of Chautauqua County and extends inland distances varying from 3 to 9 ½ miles from Lake Erie. This area is relatively flat with an elevation above sea level of approximately 573-900± feet. Immediately to the south and east is the Allegany Escarpment; a long steep series of hills which ascends from the Lake Erie Plain. The Allegany Plateau is the third feature, and consists of rolling hills that are deeply gored by valleys containing the Cassadaga and Conewango Creeks and Chautauqua Lake. This area makes up approximately 80% of the county. Chautauqua Lake, which is centrally located, is the most prominent geographic feature in the county as well as the center of recreation. The lake is approximately 20 miles long with 50 miles of shoreline. Chautauqua County has a total of six lakes and approximately 50 miles of Lake Erie shoreline.

Land use in the County is broken down as follows:

- Active agricultural - 35.7%
- Woodlands/forests - 24.8%
- Brush land - 23%
- Non-productive - 5.4%
- Transportation - 4.4%
- Lakes - 3.7%
- Wetlands - 3%.

The County has two major urban areas; with Jamestown in the south and Dunkirk-Fredonia in the north. The balance of development is spread throughout 27 rural towns and 15 villages. The map below illustrates the municipal boundaries of the cities, towns, and villages in the county.

Area Data – Chautauqua County: (Cont'd.)



Chautauqua County is located within 500 miles of the northeast's major metropolitan areas. The chart below shows the approximate distance from Chautauqua County to the major metropolitan areas in New York State.

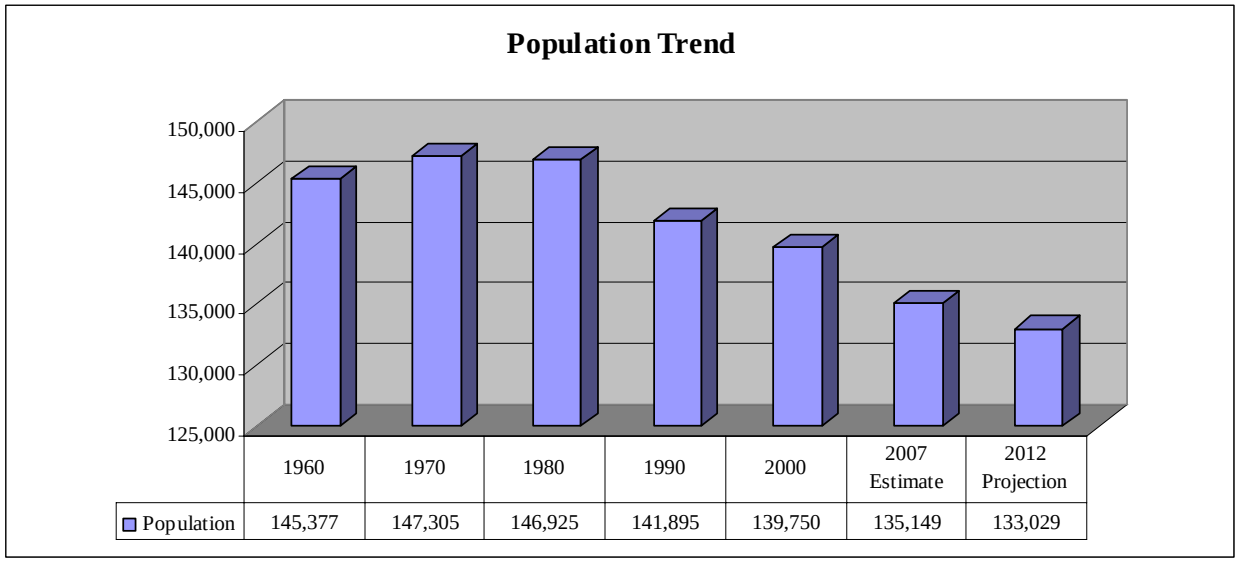
Distance to New York Cities

Buffalo	60 miles
Rochester	114 miles
Syracuse	175 miles
Albany	300 miles
Binghamton	180 miles
New York City	350 miles

Area Data – Chautauqua County: (Cont'd.)

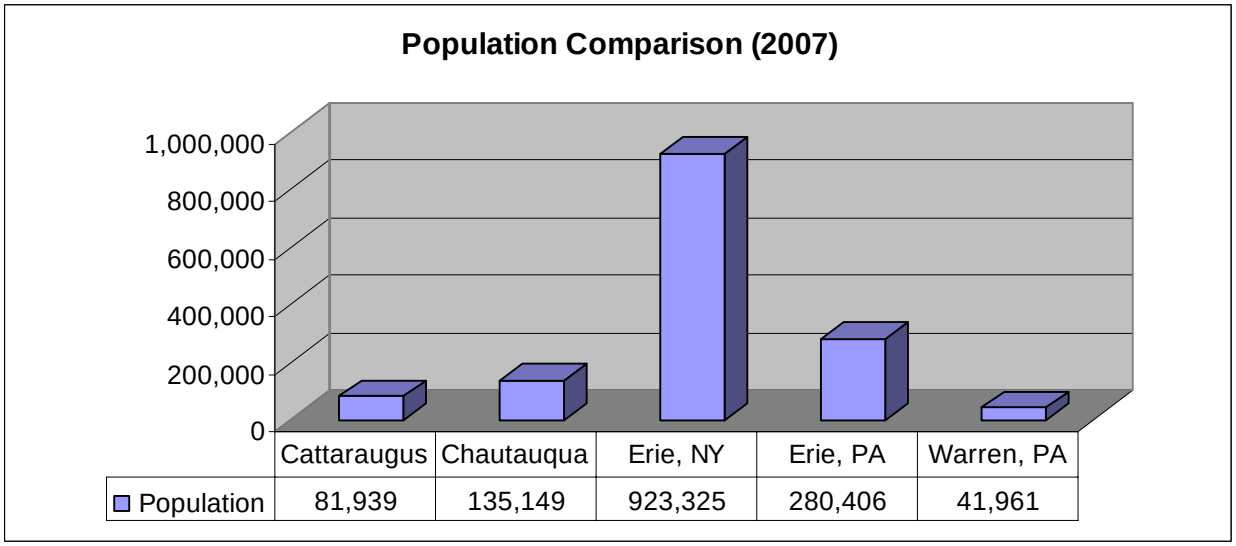
Population:

According to the 2007 population estimates, Chautauqua County was home to 135,149 persons. The county population peaked in 1970 with 147,305 residents. Since the peak, the population has slowly declined. The 2007 population is 12,156 (8.25%) persons lower then the peak population level in 1970.



Source: Demographicsnow.com

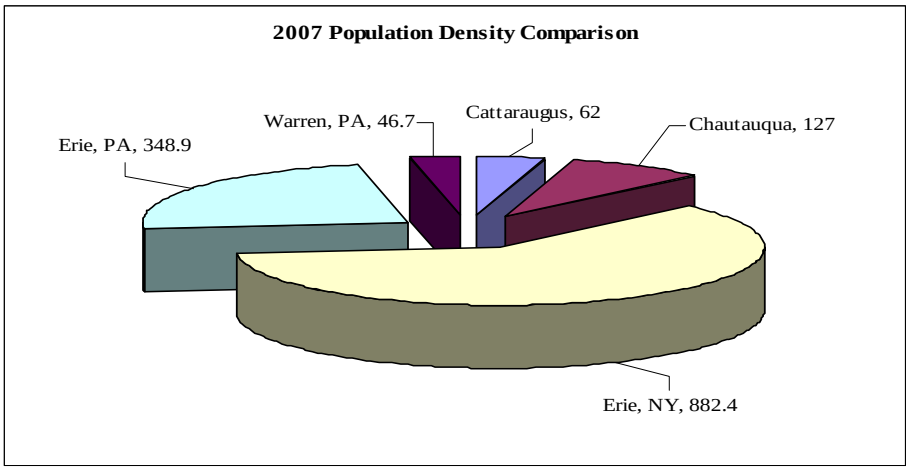
Chautauqua County has the third largest population in Western New York, ranking behind Erie and Niagara counties to the north. The following graph shows the population of Chautauqua County as well as bordering counties.



Source: Demographicsnow.com

Area Data – Chautauqua County: (Cont'd.)

The population of Erie County, NY is larger then the combined population of the remaining counties listed in the graph. The large population of Erie County, NY can be attributed to the City of Buffalo which is located within the county. The City of Buffalo is the largest metropolitan area in the region. Chautauqua County ranks third in population as compared to neighboring counties behind Erie County, PA. The City of Erie is located in Erie County, PA and makes up a large percentage of the counties population. The following chart illustrates the 2007 population density of Chautauqua County and surrounding counties.

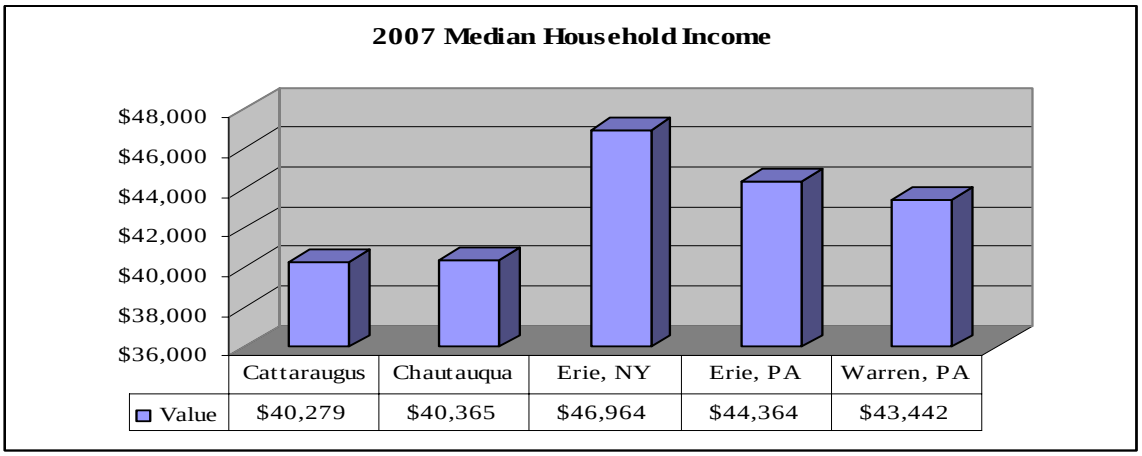


Source: Demographicsnow.com

As one would expect, the graph of the population density looks similar to the population graph with Erie County, NY have the largest number of persons per square mile. Erie, PA is the second most densely populated county and Chautauqua County ranks third in relation to surrounding counties.

Buying Power:

The median household income for Chautauqua County is reported at $40,365 as of 2007. The following shows the median household income comparisons for the county's residents in relation to the neighboring counties.



Source: Demographicsnow.com

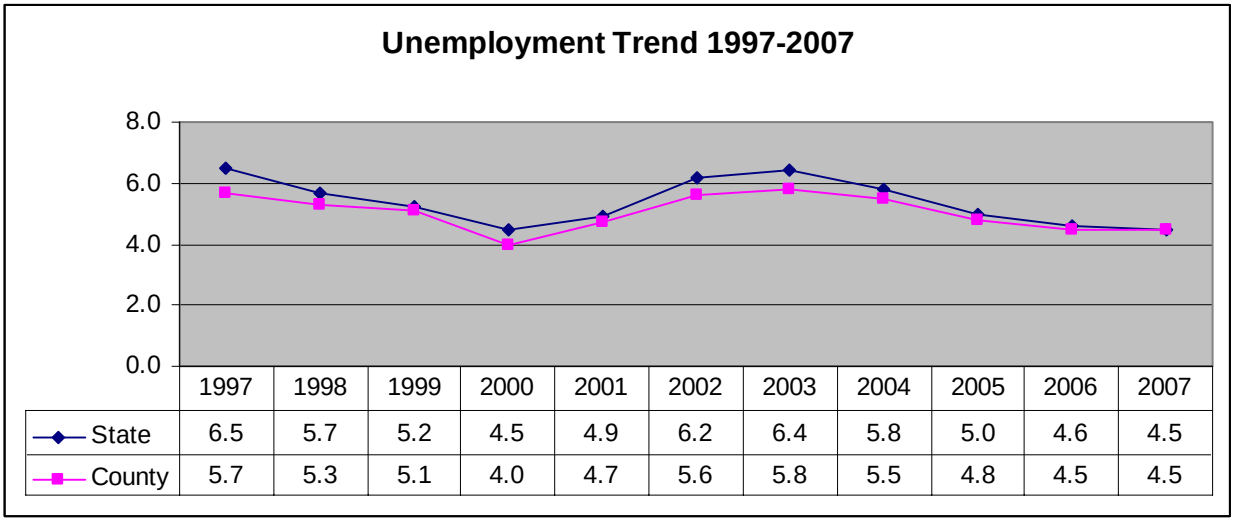
Area Data – Chautauqua County: (Cont'd.)

Local Economy/Employment:

Agriculture plays a significant role in Chautauqua County's economy with approximately $100 million in farm sales generated annually. The economic impact of agriculture is much greater when considering the food processing industry and revenue generated by agro-tourism.

Chautauqua County is also known for its grape farms. The primary varieties of grapes grown are Concord and Niagara, which are used for products such as juice, jams, jellies and wine. Chautauqua County is the largest grape juice-producing county outside of California with nearly 20,000± acres producing 121,600 tons annually. Chautauqua is also home to more than seven wineries.

The following chart compares the unemployment rate for Chautauqua County and New York State over the past ten years.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
State	6.5	5.7	5.2	4.5	4.9	6.2	6.4	5.8	5.0	4.6	4.5
County	5.7	5.3	5.1	4.0	4.7	5.6	5.8	5.5	4.8	4.5	4.5

Source: http://recenter.tamu.edu

A diverse business community provides the backbone of Chautauqua County's economy. Based on statistics provided by the NYS Department of Labor, there are approximately 5,399 firms in Chautauqua County providing 60,352± jobs.

The food processing industry alone employs 2,100 people. Food processing and food related manufacturers produce ice cream, canned fruit, canned vegetables, preserves, chocolate and cocoa products, cookies, milk, and frozen foods for institutional and restaurant use.

Non-food manufacturers and other industries provide furniture, plastic products, glass products, tool & die, machining, metal stamping, steel and iron, automotive products, refractory's, bearings, lumber products, precision measuring, metal, hardware, machinery and electronics. Chautauqua County has four separate industrial parks, covering 397± acres, all of which are ready for additional growth.

Area Data – Chautauqua County: (Cont'd.)

Communications, technology, health care, education, retail, tourism and other service related fields support Chautauqua County's economy and continue to grow as well. Rounding out the economy are hundreds of locally owned and operated small to medium size companies.

As the seventh largest employer in Chautauqua County, the State University of New York at Fredonia has a $164 million economic impact on Chautauqua County and employs 725± people. SUNY Fredonia has 5,301± undergraduate and graduate students (per SUNY Fredonia website).

Chautauqua County's tourism industry generates approximately $100 million annually in local visitor spending. Considering multiplier effects, tourism impacts the economy by $145 to $160 million annually and employs approximately 6,000 persons.

The following table shows the total non-agricultural employment, in factors of 1,000 for Chautauqua County since 1998, as recorded by the New York State Department of Labor:

Sector	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Mining and Construction	1.7	1.7	1.8	1.8	1.7	1.6	1.6	1.3	1.3
Manufacturing	14	13.7	13.8	13	12	11.6	11.7	11.3	11.4
Transportation & Utilities	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.6	1.6
Wholesale Trade	1.5	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5
Retail Trade	7	7.1	7.1	6.9	6.8	6.6	6.8	6.5	6.9
Information	0.9	1	1	1	0.9	1	0.9	0.9	0.9
Financial Activities	1.3	1.4	1.3	1.4	1.5	1.5	1.5	1.4	1.5
Professional Services	3.6	3.5	3.5	3	3	2.9	3.2	3	3.3
Education & Health Services	7.6	7.3	7.3	7.4	7.5	7.8	8	8.3	8
Government	10.6	11.1	11.5	11.6	11.6	11	10.7	11.3	11
Other services	3.2	3.4	3.4	3.4	3.4	3.5	3.5	3.4	3.5
Leisure & Hospitality	5.6	5.7	5.8	5.9	6	5.9	5.8	3.4	5.9
Total Employment	**58.7**	**59**	**59.6**	**58.5**	**57.5**	**56.6**	**56.6**	**55.8**	**57**

Although the manufacturing sector employment has declined over the past several years it still remains the largest employment sector in the county. The largest manufacturing employers in the county are MRC Bearings, Bush Industries and Cummins, Inc. In the service area, the largest employers are WCA Hospital in Jamestown, Chautauqua County, Jamestown Public Schools, Quality Markets, Inc., SUNY College at Fredonia and Jamestown Community College.

The following table is based on 2000 Census data and lists the major employment sectors and approximate number of employees.

Area Data – Chautauqua County: (Cont'd.)

Subject	Number	Percent
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	1,718	2.7
Construction	3,340	5.3
Manufacturing	13,401	21.3
Wholesale trade	1,840	2.9
Retail trade	7,301	11.6
Transportation and warehousing, and utilities	3,019	4.8
Information	1,317	2.1
Finance, insurance, real estate, and rental and leasing	1,994	3.2
Professional, scientific, management, administrative, and waste management services	2,791	4.4
Educational, health and social services	15,329	24.3
Arts, entertainment, recreation, accommodation and food services	5,402	8.6
Other services (except public administration)	3,239	5.1
Public administration	2,338	3.7

Source: 2000 Census

Transportation:

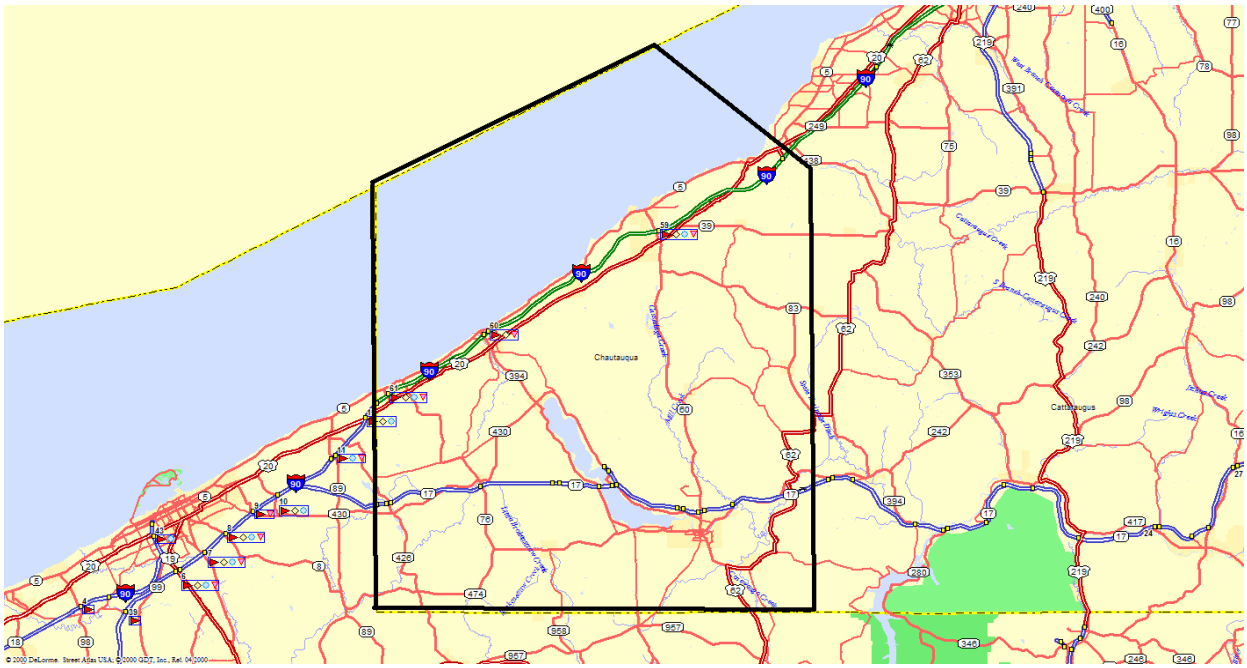
Air transportation needs are met predominantly by the Buffalo Niagara International Airport located approximately 44 miles north of Dunkirk and 71 miles north of Jamestown. Chautauqua County has two smaller regional airports located in Jamestown and Dunkirk. The Jamestown Airport has commuter service affiliated with major airlines to Buffalo and other larger cities in the area. Charter service and aircraft rental is also available.

This facility has very few direct flights other than to nearby major cities (Buffalo, Rochester, Erie, and Pittsburgh). The Dunkirk/Chautauqua County Airport provides a limited amount of commercial airline service primarily on a charter basis.

- Rail – CSX, Norfolk Southern & Western New York and Pennsylvania Rail Road.
- Bus - Niagara Scenic; Jamestown Area Regional Transit System (JARTS); Chautauqua Area Regional Transit System (CARTS)
- Taxicabs - eight companies.
- Limousine services - five companies.
- Trucking - eleven companies.
- Shipping - Port of Buffalo-Niagara: Great Lakes Transportation (28th largest of all U.S. ports, 7th largest in Great Lakes; includes Foreign Trade Zone 23).

Area Data – Chautauqua County: (Cont'd.)

Major Highways in the county include the New York State Thruway (I-90), Southern Tier Expressway (I-86 and N.Y.S. Route 17), U.S. Route 20, N.Y.S. Routes 5, 60, 394, 430, 474 and 76. Traffic moves at 65 mph on the Interstates and 55-mph elsewhere. Interstate 90 runs in a southwest-northeast direction from points west, to Buffalo and areas to the east, and parallels Lake Erie in the northern portion of the county. The recently federally designated I-86 comprises most of the former NYS Route 17. This is an east-west route across the southern portion of the county, eventually connecting with New York City to the east and the I-90 and Erie, Pennsylvania to the west. Major U.S. highways include Route 20, an east-west route in the northern portion of the county and Route 62, a north-south thoroughfare connecting Buffalo and Warren, PA. More people enter New York State by way of Chautauqua County, via the I-90 and I-86 than any other entry point.



Health Care:

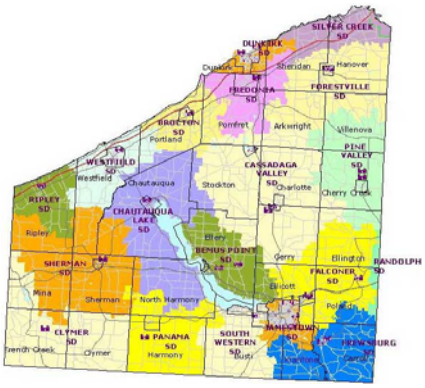
Health care needs are met at four acute care hospitals, totaling 545 beds. The largest is WCA Hospital in Jamestown, with 337 beds. Brooks Memorial Hospital in Dunkirk has 157 beds. Two others, Lakeshore Health Care Center and Westfield Memorial Hospital have significantly fewer beds, with the Lakeshore facility being oriented more towards long term care. In addition to acute care hospitals, there are nine licensed nursing homes in Chautauqua County with a total of 1,270± beds. Three of these facilities are located in the Dunkirk/Fredonia area. The balance is in the southern portion of the county. There are also numerous licensed companies and agencies that provide skilled nursing or medical care in homes under physician supervision.

Area Data – Chautauqua County: (Cont'd.)

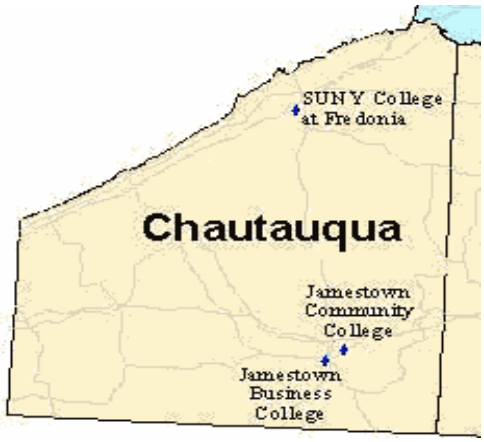
Education:

There are 19 public school systems located within Chautauqua County, as well as many private and parochial schools. In addition, the Board of Cooperative Educational Services (BOCES) offers a wide range of educational, administrative and support services to the community with two technical schools located in Ashville and Fredonia. Higher educational needs are supplied by the State University of New York College at Fredonia (four year), Jamestown Community College (two year), and Jamestown Business College. Fredonia State is the most important educational influence in the area, offering baccalaureate degree programs in education, liberal arts, music and technology to over 5,000 students. Jamestown Community College currently has enrollment of 4,000 (both full and part time) and is part of the State University of New York system. Jamestown Business College is authorized by the New York State Board of Regents to confer a two-year degree. The two maps below identify the schools and location in Chautauqua County.

CHAUTAUQUA COUNTY SCHOOLS K-12



CHAUTAUQUA COUNTY COLLEGES



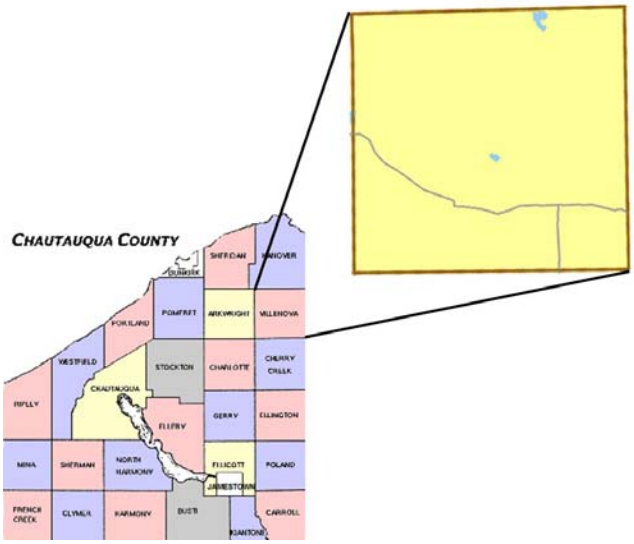
Conclusion:

Overall, the county of Chautauqua is characterized as a rural area. Over 90% of its area is devoted to agricultural and productive forestland. The two largest population centers are widely spaced and are dependent to some degree on other larger nearby metropolitan areas for services. Both population and employment numbers are expected to stabilize and possibly show a modest increase this decade. There appears to be little demand for additional real estate development, residential, commercial or industrial. At present, demand and supply are in balance with property values are generally stable. New development that may occur will primarily be for owner occupancy.

Area Data – Town of Villenova:

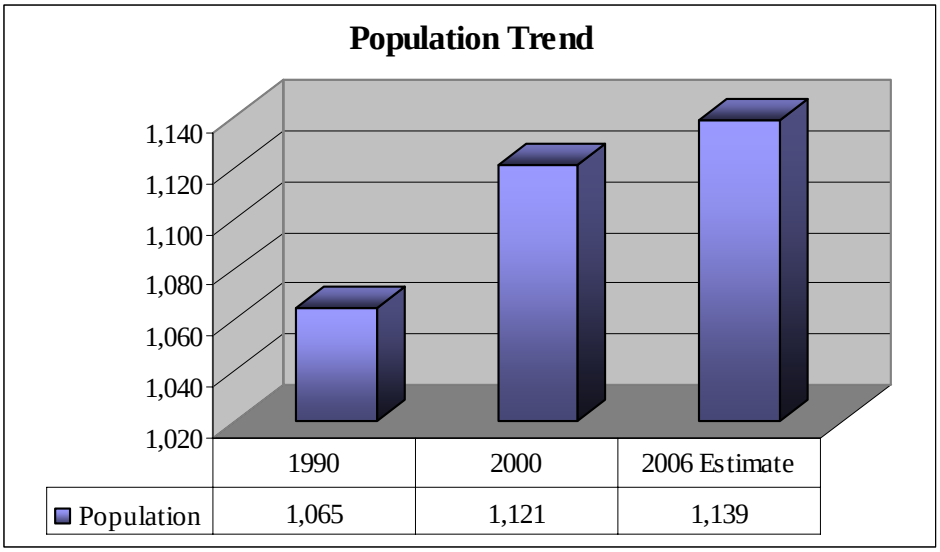
Location:

The Town of Villenova is located on the eastern border of Chautauqua County and is southeast of the City of Dunkirk**,** New York. It has a land area of 36.1 square miles. Villenova is proximate to the Jamestown-Dunkirk-Fredonia metro area. The east town line is shared with the Town of Dayton in Cattaraugus County and the Town of Arkwright is to the west. To the north is the Town of Hanover, and the Town of Cherry Creek is to the south.



Population:

The 2006 population estimate for the Town of Villenova according to the Department of Census was approximately 1,139. The town's population has been increasing slightly over the past 16 years. The following shows the population trend since 1990.

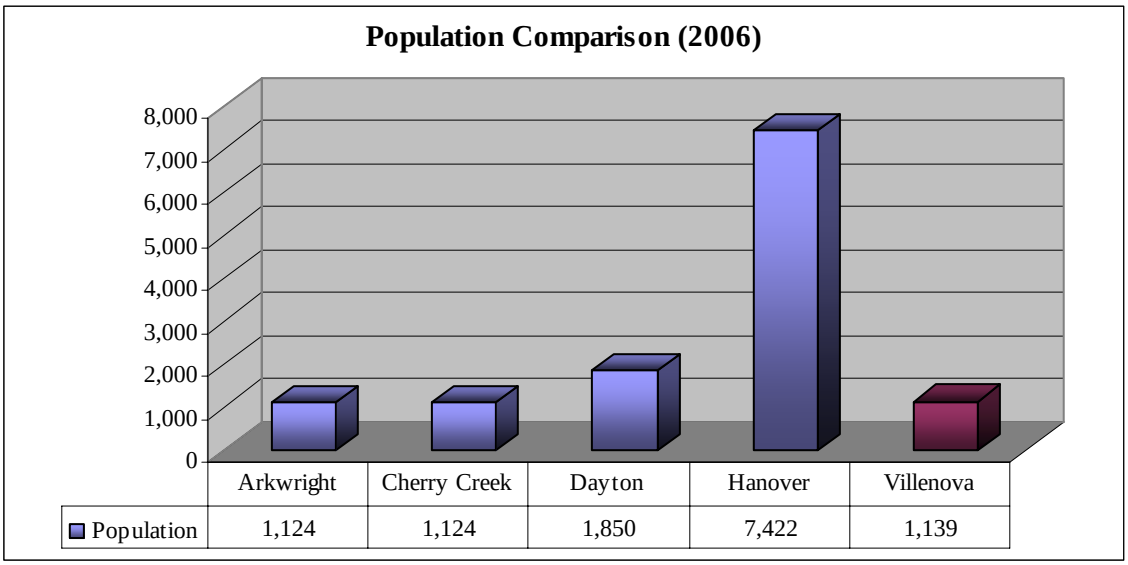


Source: U.S. Census Bureau

The Town of Villenova is a rural town with very little population. It has experienced a growth of 74 people (6.95%) since 1990. Villenova's location in Chautauqua County places it close to other towns with similar population statistics. The following graph represents the population for Villenova when compared to that of neighboring communities.

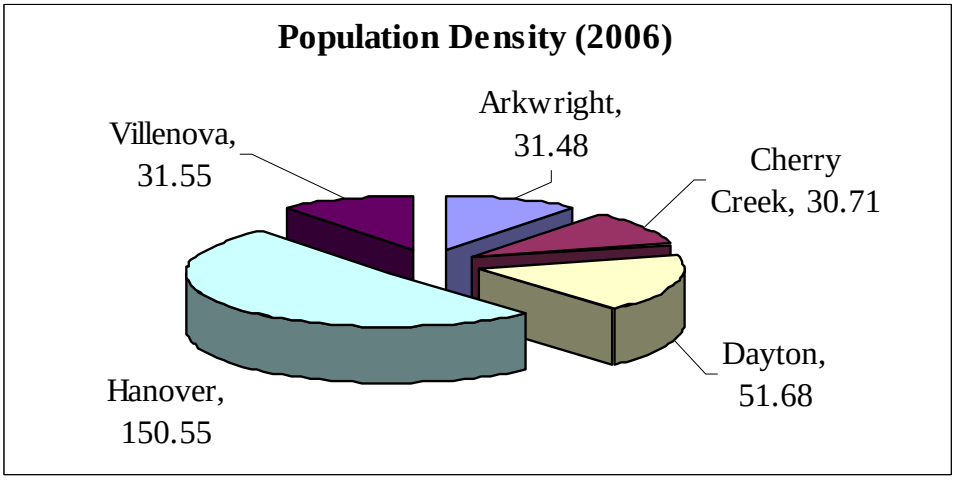
Area Data – Town of Villenova: (Cont'd.)

Population: (Cont'd.)



Source: U.S. Census Bureau

The Town of Hanover has a population that far exceeds that of the surrounding towns and includes the population of the Villages of Silver Creek and Forestville which make up nearly half the population. The Town of Dayton has the second largest population, followed by the remaining towns which are nearly the same. The Town of Villenova has a population density of 31.46 people per square mile. The following graph represents a comparison between Villenova and its surrounding municipalities.



Source: U.S. Census Bureau

Hanover has the highest population density of the surrounding municipalities. Villenova is on the lower end with the Town of Arkwright and Cherry Creek being just slightly below.

Area Data – Town of Villenova: (Cont'd.)

Employment:

The following is based on 2000 Census data and shows the percentage of workers from the town of Villenova and the business sector they are employed in.

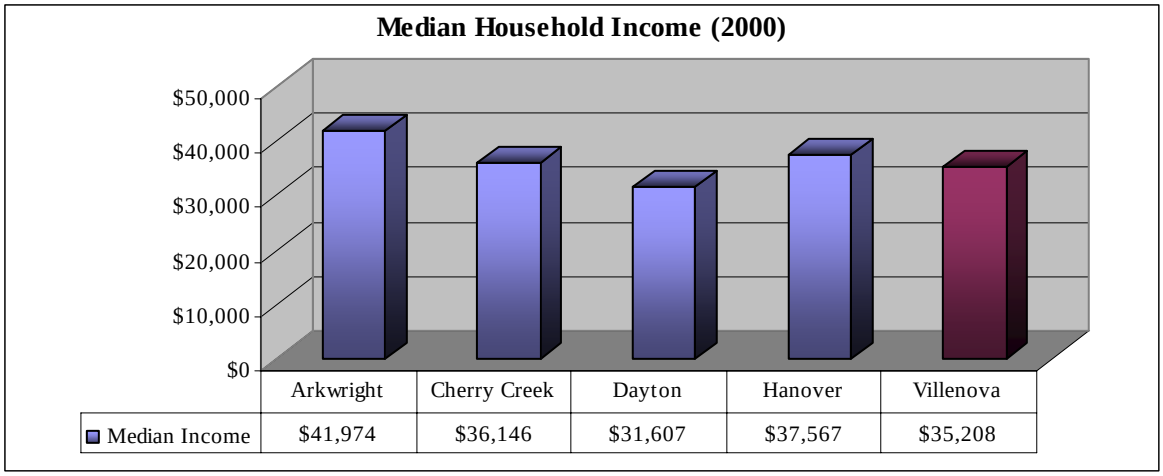
INDUSTRY	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	64	12.4
Construction	44	8.5
Manufacturing	86	16.6
Wholesale trade	5	1
Retail trade	32	6.2
Transportation and warehousing, and utilities	36	6.9
Information	4	0.8
Finance, insurance, real estate, and rental and leasing	11	2.1
Professional, scientific, management, administrative, and waste management services	14	2.7
Educational, health and social services	139	26.8
Arts, entertainment, recreation, accommodation and food services	27	5.2
Other services (except public administration)	22	4.2
Public administration	34	6.6

Source: U.S. Census Bureau

The educational, health, and social services sector is the most dominant employer in the area. The manufacturing sector is the second largest.

Buying Power:

The 2000 Census median household income for the Town of Villenova was $35,208. The following shows the 2000 median household income for the Town of Villenova in relation to its surrounding towns.



Source: U.S. Census Bureau

The residents in the town of Arkwright have the largest amount of disposable income in the area, and the residents of Dayton have the least. Villenova falls in the middle range of the towns.

Area Data – Town of Villenova: (Cont'd.)

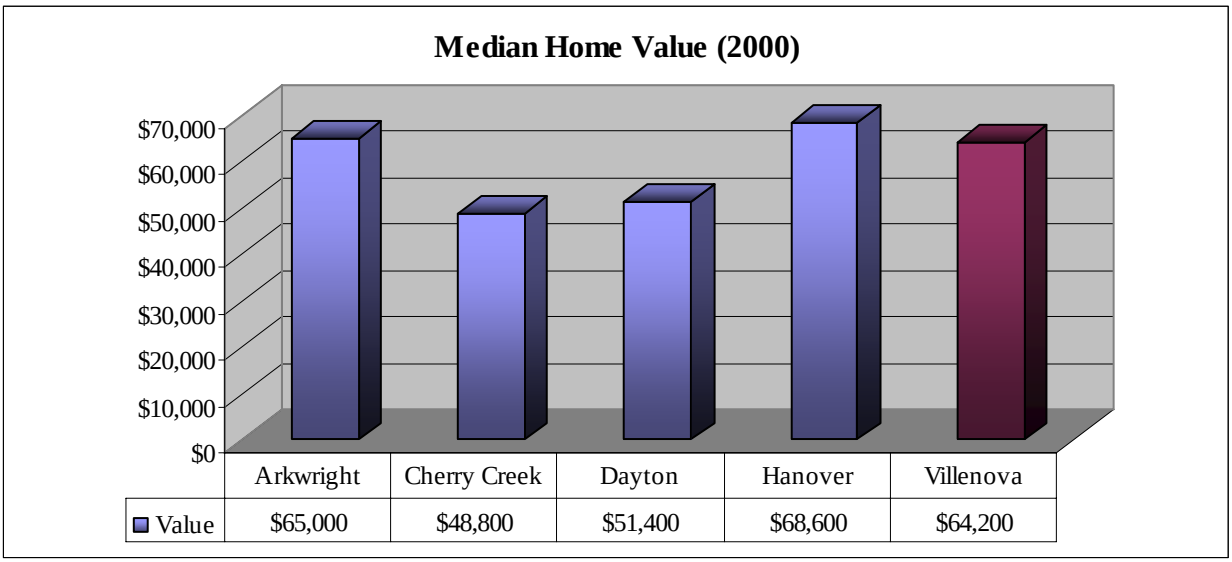
Housing:

According to the 2000 census there were 490 residential units in the Town of Villenova. Most of the homes were owner occupied (89%). The following shows the 2000 Census breakdown for the housing in the town.

UNITS IN STRUCTURE	Number	Percent
Single Family Dwelling	364	74.3
Two Family Dwelling	11	2.2
Mobile home	115	23.5
Total housing units	**490**	**100**

Source: 2000 U.S. Census

The 2000 Census median housing value in the Town of Villenova was $64,200. The following Graph shows the 2000 median housing value for Villenova and the surrounding towns.

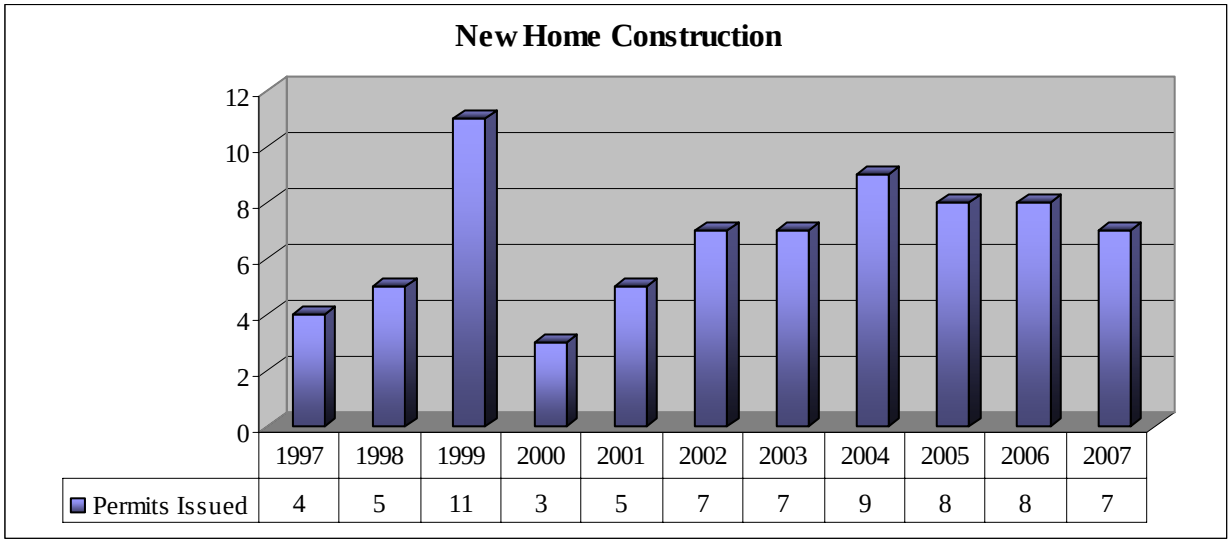


Source: 2000 U.S. Census

The people in the Town of Arkwright paid the most for their homes, followed closely behind by the Town of Villenova. The people in Cherry Creek paid the least for their homes at $48,800.

New residential construction reached its peak in 1999 with 11 new single-family homes constructed. The following year, construction fell to its lowest point with just 3 new homes. Since then, it has leveled off somewhat and has remained relatively constant. The following is a chart that represents the permits issued for new home construction over the past 10 years.

Area Data – Town of Villenova: (Cont'd.)

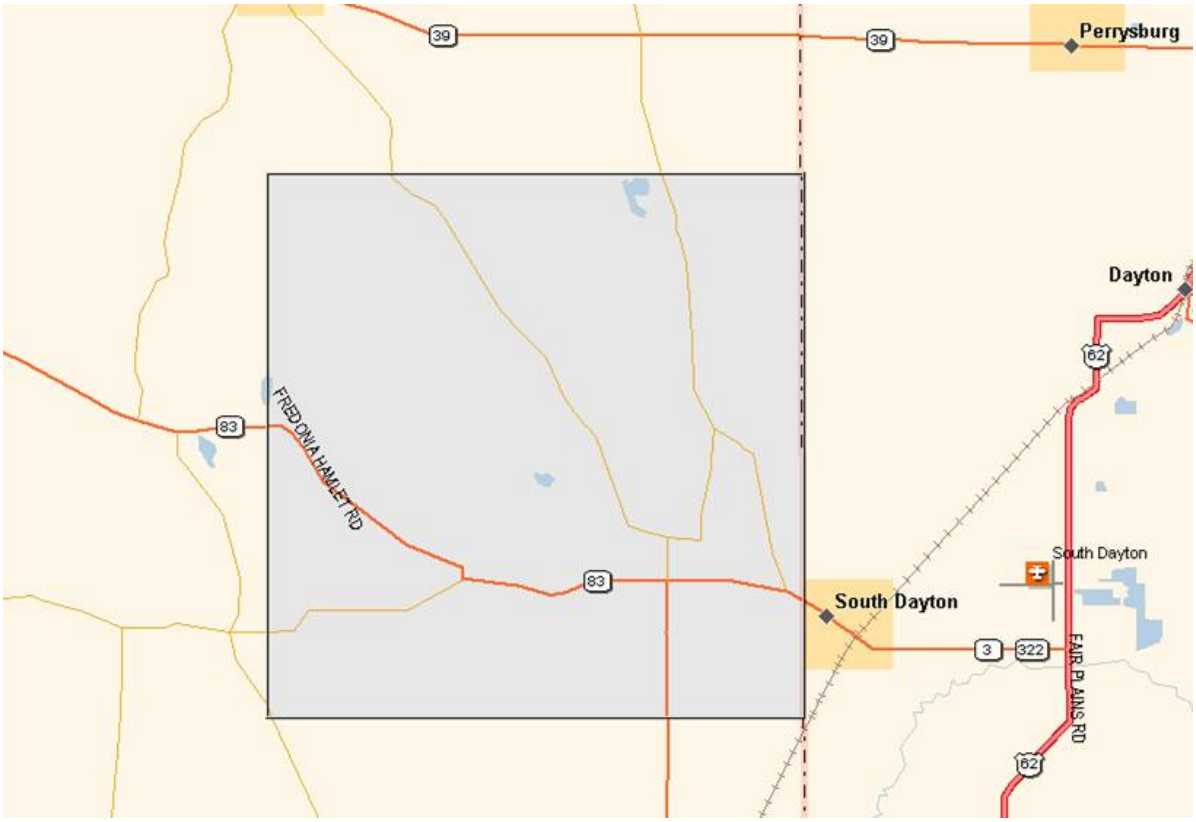


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Permits Issued	4	5	11	3	5	7	7	9	8	8	7

Source: U.S. Census Bureau

Transportation:

The main route running through Villenova is New York State Route 83, which runs in an east-west direction and then in a north-south direction at Balcom Corners.



Area Data – Town of Villenova: (Cont'd.)

Transportation: (Cont'd.)

Airports certified for carrier operations nearest to Villenova:

- CHAUTAUQUA COUNTY/JAMESTOWN (about 19 miles; JAMESTOWN, NY)
  BUFFALO NIAGARA INTL (about 47 miles; BUFFALO, NY)
  NIAGARA FALLS INTL (about 51 miles; NIAGARA FALLS, NY)

Other public-use airports nearest to Villenova:

- CHAUTAUQUA COUNTY/DUNKIRK (about 13 miles; DUNKIRK, NY)
  GOWANDA (about 14 miles; GOWANDA, NY)
  RANDOLPH (about 19 miles; RANDOLPH, NY)

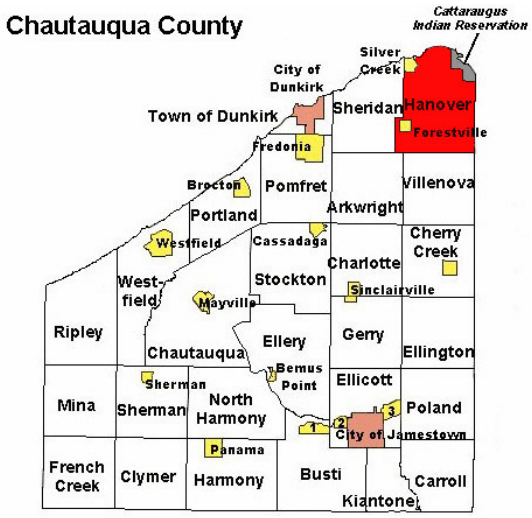
Conclusion:

The Town of Villenova's main attraction is its rural setting. The population should remain fairly stable well into the next decade. Only limited commercial or industrial growth is forecast.

Area Data-Hanover:

Location:

The Town of Hanover is on the south shore of Lake Erie situated at the northeast corner of Chautauqua County. Hanover is bordered by the Towns of Arkwright and Villenova to the south, and the Town of Sheridan to the west. The town is also bordered by the Cattaraugus Indian Reservation, Erie County and Perrysburg, to the east. Hanover encompasses an area of 49.3 square miles, which is divided into 5,109 land parcels. Located within the town are the Villages of Silver Creek and Forestville.



Silver Creek **-** The Village of Silver Creek is located in the northwest corner of the town. The Village of Silver Creek encompasses an area of 1.2 square miles.

Forestville **-** The Village of Forestville is located in the southwestern portion of the town. The Village of Forestville encompasses an area of 1.0 square miles.

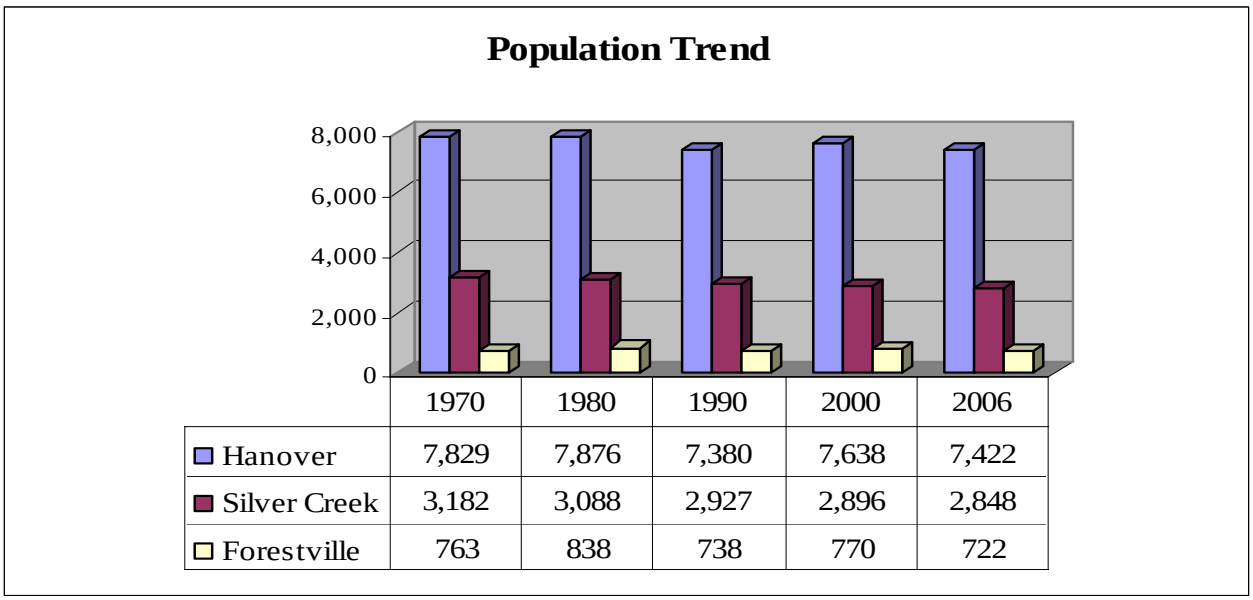
Population:

The population for the town was 7,422 persons according to 2006 census estimates.

Silver Creek - The 2006 population of Silver Creek was 2,848 persons

Forestville - The 2006 population of Forestville was 722 persons.

The following chart shows the population trend for the last four decades.

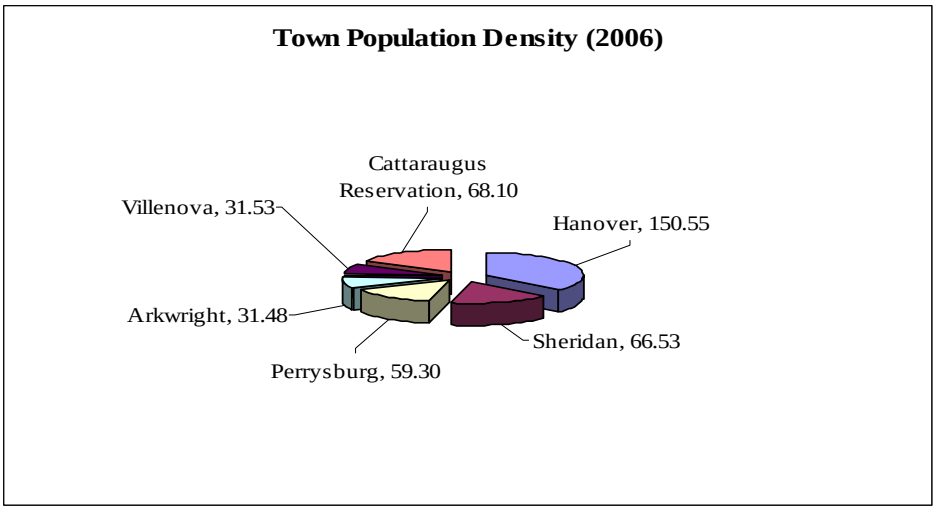


	1970	1980	1990	2000	2006
Hanover	7,829	7,876	7,380	7,638	7,422
Silver Creek	3,182	3,088	2,927	2,896	2,848
Forestville	763	838	738	770	722

Source: US Census Bureau

Area Data-Hanover: (Cont'd.)

The towns population dropped significantly (6.3%) in the 1980's, however the trend reversed itself in the 1990's with the population growing by 3.5%. Overall the population of the town and the two villages has remained relatively stable over the last 40 years. The population density of the town is 150.55 persons per square mile. The following chart shows the relationship between neighboring towns.

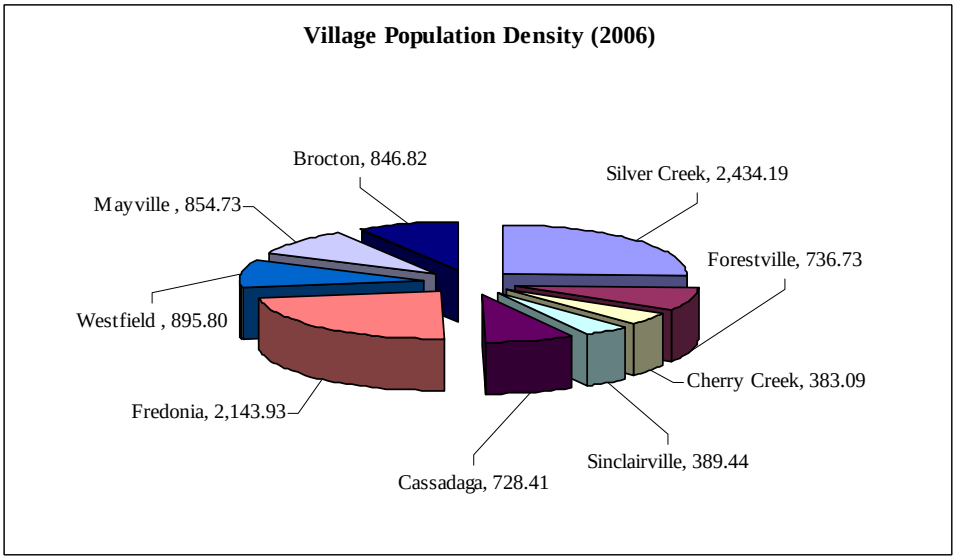


Source: U.S. Census Bureau

Silver Creek – The Village of Silver Creek has a population density of 2,434.19± persons per square mile

Forestville – The Village of Forestville has a population density of 736.73± persons per square mile.

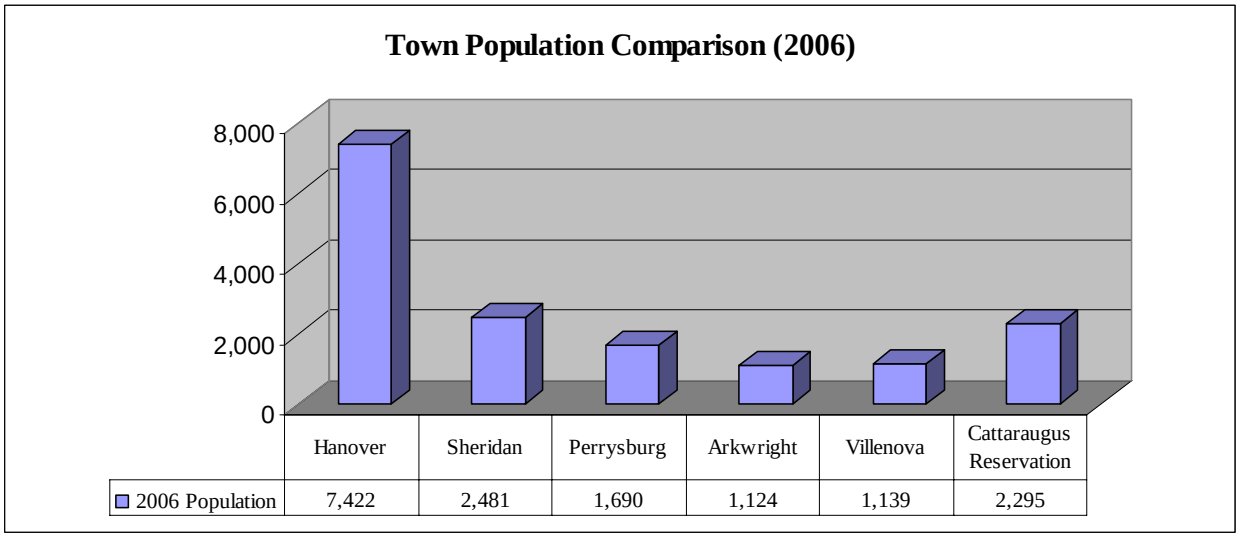
The following chart shows the relationship between the two villages in the town and other villages in Chautauqua County.



Source: U.S. Census Bureau

Area Data-Hanover: (Cont'd.)

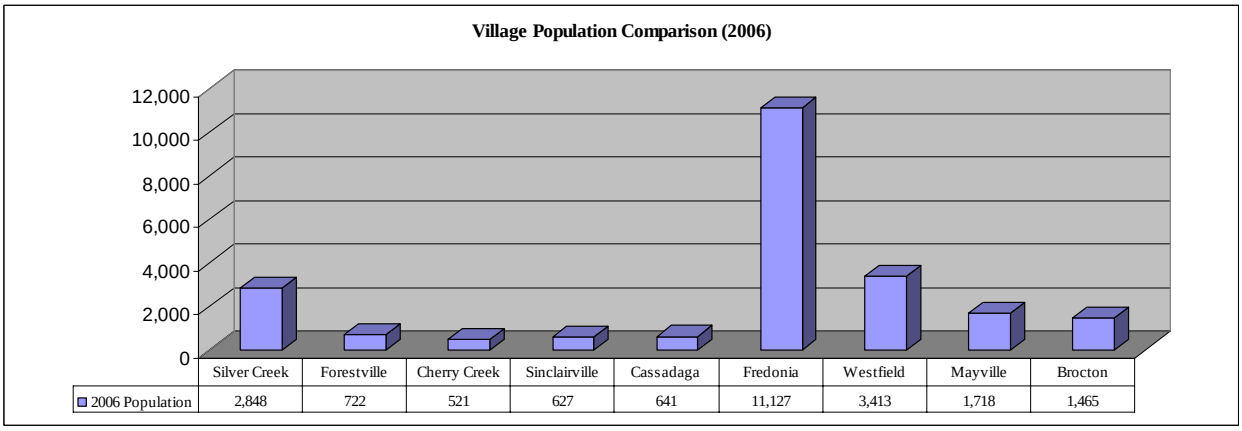
The population density is a reflection of the larger population. The chart below shows the population of the town and surrounding municipalities.



Source: U.S. Census Bureau

The larger population of the town can be attributed to easier access to the interstate highway system, which provides for easy commuting to both the Buffalo and Fredonia-Dunkirk areas.

The following graph shows the populations of the villages in Chautauqua County as compared to Silver Creek and Forestville.



Source: U.S. Census Bureau

The large population of the Village of Fredonia is attributed to the location of Fredonia State College inside the village. The population of the college is reported at over 5,000 students. The student population accounts for approximately 50% of the village population.

Area Data-Hanover: (Cont'd.)

Employment:

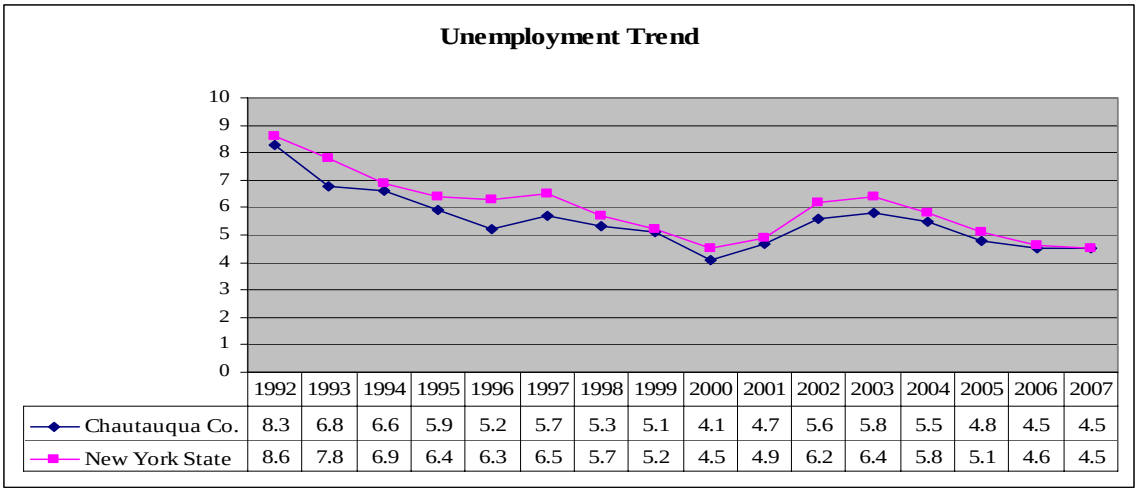
The following chart shows the percentage breakdown of employment sectors in the town and villages as per the 2000 Census.

INDUSTRY	Hanover	Silver Creek	Forestville
Agriculture, forestry, fishing and hunting, and mining	2.6	0	0.6
Construction	7.4	7.3	3.8
Manufacturing	16.9	16.8	15.8
Wholesale trade	3.8	4.2	2.8
Retail trade	9.9	6.3	9.5
Transportation and warehousing, and utilities	7.9	6.0	6.6
Information	2.2	1.9	6.0
Finance, insurance, real estate, and rental and leasing	2.5	3.0	3.5
Prof., scientific, management, admin. & waste management services	4.0	7.4	4.7
Educational, health and social services	23.5	27.4	27.2
Arts, entertainment, recreation, accommodation and food services	8.8	10.1	4.4
Other services (except public administration)	5.0	3.0	6.6
Public administration	5.5	6.5	8.2

Source: 2000 Census

The table above illustrates that the manufacturing and health service sectors makeup approximately 40% of the overall employment in the town and villages. The large manufacturing base is supported by several employers in the area; some of the largest being Belden & Blake Corp., Iroquois Natural Gas, Gernatt Asphalt Products, Schreiner Oil & Gas Inc. and the Great Lakes Energy Partnership. Several of these companies also have retail sales; to include the energy, oil and gas companies. These sectors account for a significant portion of the retail trade in the area.

As of February 2008 the unemployment rate in Chautauqua County was 5.9%. The following chart shows the unemployment rates for the county and state comparatively.



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Chautauqua Co.	8.3	6.8	6.6	5.9	5.2	5.7	5.3	5.1	4.1	4.7	5.6	5.8	5.5	4.8	4.5	4.5
New York State	8.6	7.8	6.9	6.4	6.3	6.5	5.7	5.2	4.5	4.9	6.2	6.4	5.8	5.1	4.6	4.5

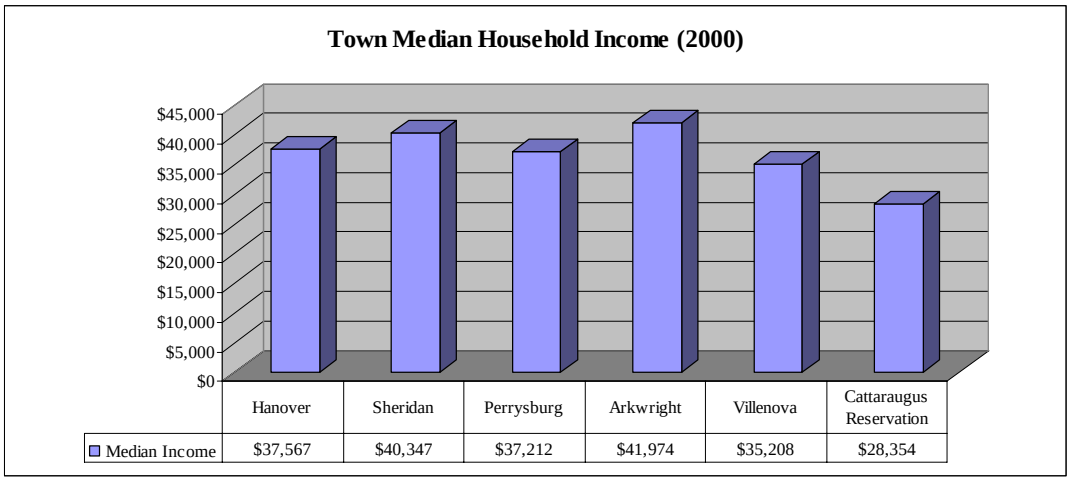
http://recenter.tamu.edu

Area Data-Hanover: (Cont'd.)

The unemployment rate for the area has been steadily dropping since 1992. In the last two years the unemployment rate has remained constant throughout all of Chautauqua County.

Buying Power:

The 2000 Census median household income in Hanover was $37,567. The following chart shows this income in relation to surrounding towns.



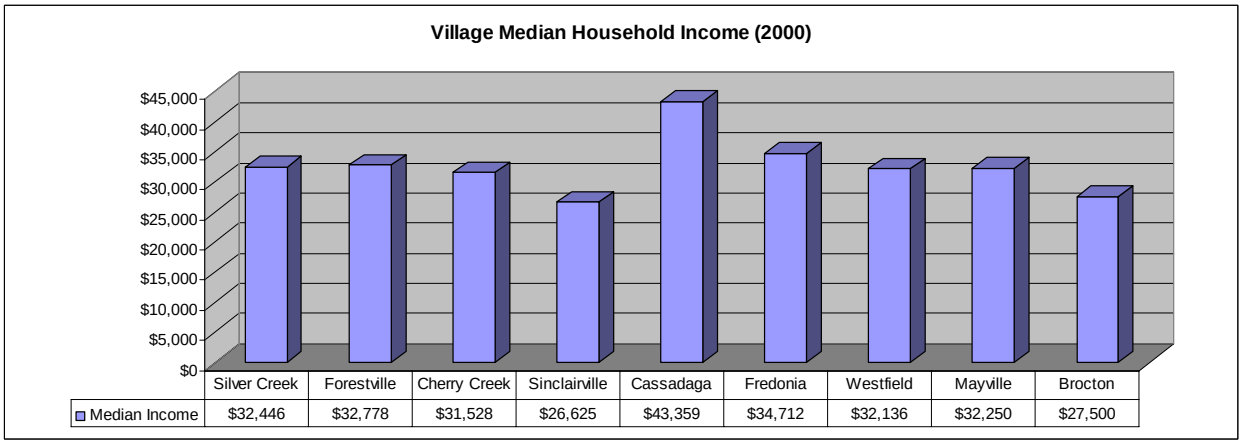
Source: U.S. Census Bureau

The median household income of the town is slightly lower than the surrounding towns with the exception of the Cattaraugus Indian reservation, which tends to have very high unemployment rates and low-income levels.

Silver Creek - The 2000 median household income for the Village of Silver Creek was $32,446.

Forestville - The 2000 median household income for the Village of Forestville was $32,778.

The following graph illustrates the 2000 median household income for the two villages as compared to other villages in Chautauqua County.

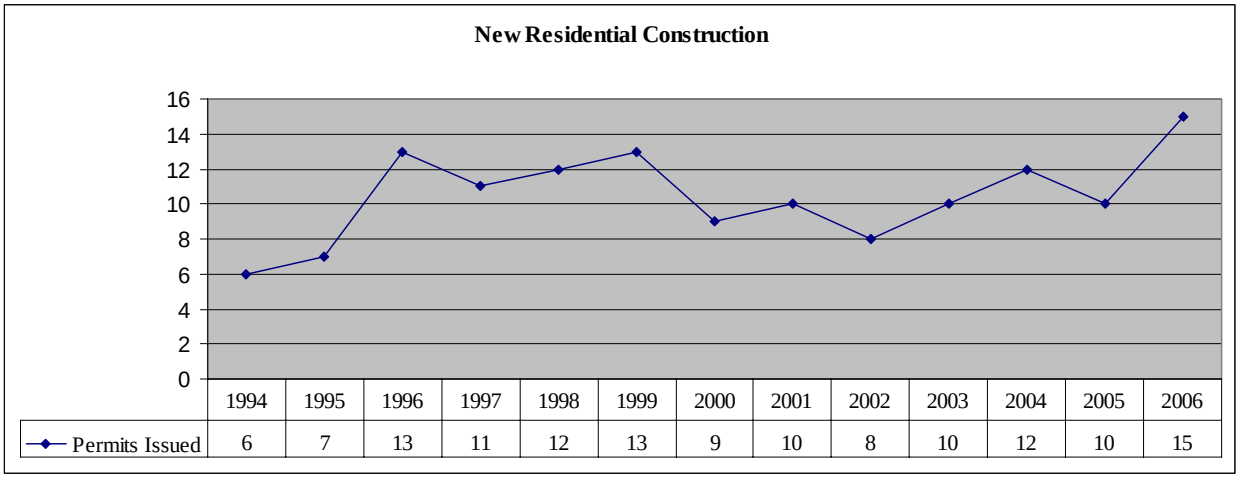


Source: U.S. Census Bureau

Area Data-Hanover: (Cont'd.)

Housing:

According to the 2000 Census there were 3,501 housing units in the Town of Hanover. The median home value in the town was $68,600. The majority of the housing units in the town (77.3%) are owner occupied. The median rent for the tenant occupied units in the town was $492. The following chart shows the new residential construction trend for the last decade in Hanover.



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Permits Issued	6	7	13	11	12	13	9	10	8	10	12	10	15

Source: http://socds.huduser.org

Silver Creek – Of the housing units in the town 1,323 were located in Silver Creek. The median home value for this village was $63,500 and 70.4 percent of the homes were owner occupied. The median rent for the tenant occupied housing in Silver Creek was $518.

Forestville – Of the housing units in the town 328 were located in Forestville. The median home value in Forestville was $57,300 and 67.8 percent of the homes were owner occupied. The median rent for the tenant occupied units in Forestville was $448.

Commercial:

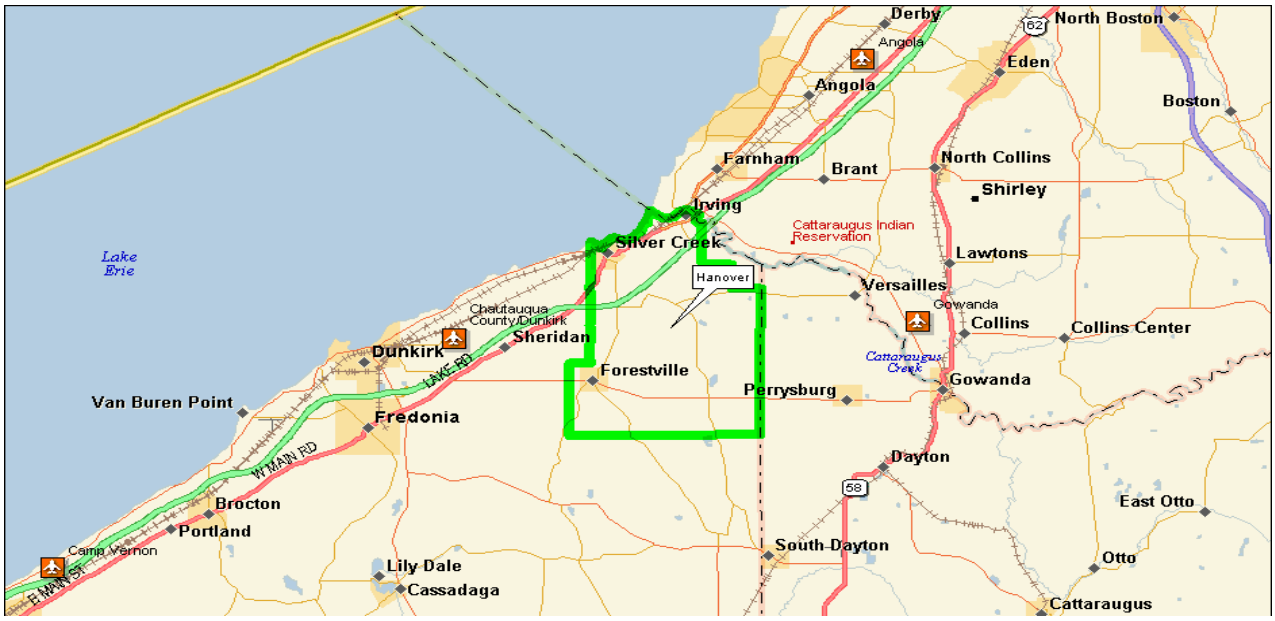
The commercial building trend has remained reasonably stable and is expected to grow at a slow rate. The "Grape Belt" runs along the Lake Erie Basin generally stretching from Pennsylvania to the Silver Creek area in northwestern Chautauqua County. The grape industry plays a very important role, as indicated by the presence of a number of food processing facilities, including Red Wing in Fredonia, Cliffstar in Dunkirk, and Welch Food; which originated in Westfield, New York, near the southern border of New York State.

Other factors influencing the economy of the Town of Hanover include its location on the shores of Lake Erie, and proximity to the Cattaraugus Reservation. While much of the shoreline of Lake Erie is steep bank waterfront, the town has a few areas of water accessible property that has contributed to the growth of seasonal and water related activities.

Area Data-Hanover: (Cont'd.)

The Native American community, just across Cattaraugus Creek from Hanover, is seeing an increase in their economy. This trend is mainly due to their ability to sell items such as gasoline and cigarettes tax free on their reservation; as well as revenue from the gaming industry located on the reservation.

Transportation:



The main traffic corridor in the town is Interstate highway 90 running east west. The town is also served by state highways 5 and 20 that also run east-west and state highway 39 that runs north-south. Overall the easy access to I-90 gives the northern portion of the town a good transportation system.

Most development activity in Hanover has occurred along Routes 5 & 20, near the Thruway. There is little other new development in the commercial area of the village. While Silver Creek is a rural commercial village it has easy access to the I-90 (NYS Thruway) about half a mile to the northeast. The Thruway provides good access to the Buffalo metropolitan area, approximately 40 miles (35 minutes) to the north and to Dunkirk and Fredonia, approximately 12 miles (10 minutes) to the south.

Alleghany Road is a local connecting corridor between the lakeshore resort areas and Silver Creek on the north, and rural communities to the south, including Forestville and Perrysburg. The Cattaraugus Indian Reservation is about one mile northeast of Silver Creek, where Routes 5 and 20 split. Routes 5 and 20 are State highways into Erie County from the southwest. State Routes 5 and 20 both parallel Lake Erie, and at one time were primary east-west. These routes join in Silver Creek, and are one highway into Erie County and the Buffalo metropolitan area to the east. These routes contributed to growth in communities like Silver Creek but are now primarily scenic tourist routes. An exit to the New York State Thruway (I-90) is located on Routes 5 & 20, in the town, just north of the village. A number of industries are located in these Northern Chautauqua County communities.

Conclusion:

This town and its villages are likely to remain a mostly rural area due to its distance from Buffalo. The area does offer limited seasonal recreational activities associated with Lake Erie. Overall the town and villages should remain generally stable with respect to population, commercial and economic base.

Market Area Description:

The subject market area is considered relatively similar to the four comparable wind farms being considered in this analysis. The market area has varied terrain and is predominately rural in character. With the exception of small localized community centers, the area is largely undeveloped. Large tracts of agricultural land cover the area with lands unsuitable for agricultural use being primarily mature deciduous woodlands. With the exception of the more developed community centers, the area contains minimal low-density single-family residential structures and farmsteads. The terrain is varied with little level land and it is characterized by undulating hills, ridges and smaller rounded hillocks.

The transportation infrastructure in the market area is considered average. There are several county routes and town roads that provide access throughout the market area.

Market Area Description: (Cont'd.)

Residential uses are either clustered at various crossroad hamlets or are very sparsely located on individual parcels. Residences are often located roadside, however many are located on isolated lots not viewable from local roads. These rural homes range in quality and condition from well maintained single-family frame construction to older homes exhibiting significant signs of deferred maintenance. There are also a number of seasonal homes, camps and cabins interspersed throughout the market area. New residential development is limited in the market area.

Review of Available Literature:

In preparation for our analysis, a review of literature concerning property value impacts related to wind farm development was undertaken. With the somewhat recent development of wind farms as an alternative energy source in the United States, limited research has been done. The literature on wind energy facilities and surrounding property values that have been conducted can be grouped into two categories: survey based studies and transaction based studies.

Survey based studies are generally question based studies that involve soliciting feedback from assessors, real estate agents and residents in areas affected by, or proposed to be affected by, wind farm development. They are generally subjective and offer insights on community attitudes, however their reliance on qualitative data limit their usefulness in ascertaining true property value impacts and this has led to varied conclusions.

A brief description of each study, its conclusions and flaws are presented below:

The most well known wind farm study is <u>The Effect of Wind Development on Local Property Values</u> produced in May 2003 by the Renewable Energy Policy Project (REPP). This report studied eleven wind farms located in California, New York, Texas, Vermont, Wisconsin, Pennsylvania and Iowa. The report reviewed approximately 25,000 residential sales within the five-mile view shed of the various wind farms and compared them to sales in a similar "control area" outside of the view shed. The study employed simple regression analysis to look at the rate of change in property values in both the view shed and control area over the entire study period, before the wind farms came on line and after the wind farms came on line. The general conclusion of this study was that "the statistical analysis does not support a contention that property values within the view shed of wind developments suffer or perform poorer than in a comparable region" and even states that "for the great majority of projects (wind farms) the property values rose more quickly in the view shed than they did in the comparable community." This studies method has been criticized for several reasons:

There is no effort to discern which properties within the 5-mile view sheds have an actual view of the wind farm. The analysis does not control for distance to the turbines. There is no attempt to sort out inappropriate (non arms-length) transactions.

Market Area Description: (Cont'd.)

A second wind farm study is A Real Estate Study of the Proposed White Oak Wind Energy Center produced in 2007 by Poletti and Associates, Inc. This study focuses on two wind farms located in Wisconsin and Illinois. It reviews approximately 300 residential land and home sales and takes a similar approach to the REPP report with two key differences. It eliminates non arms-length sales and excludes sales of homes built prior to 1960 in an effort to control for residential dwelling specific characteristics like construction quality, amenities and condition.

The reports conclusion was that "there was no significant difference in price per square foot for residences within the target area (view shed) when compared to those within the control area" and "similarly, analysis of vacant agricultural land and small and medium sized residential tracts indicated that there was no significant difference in the price per acre for these types of properties". Criticism of this study lies in two areas:

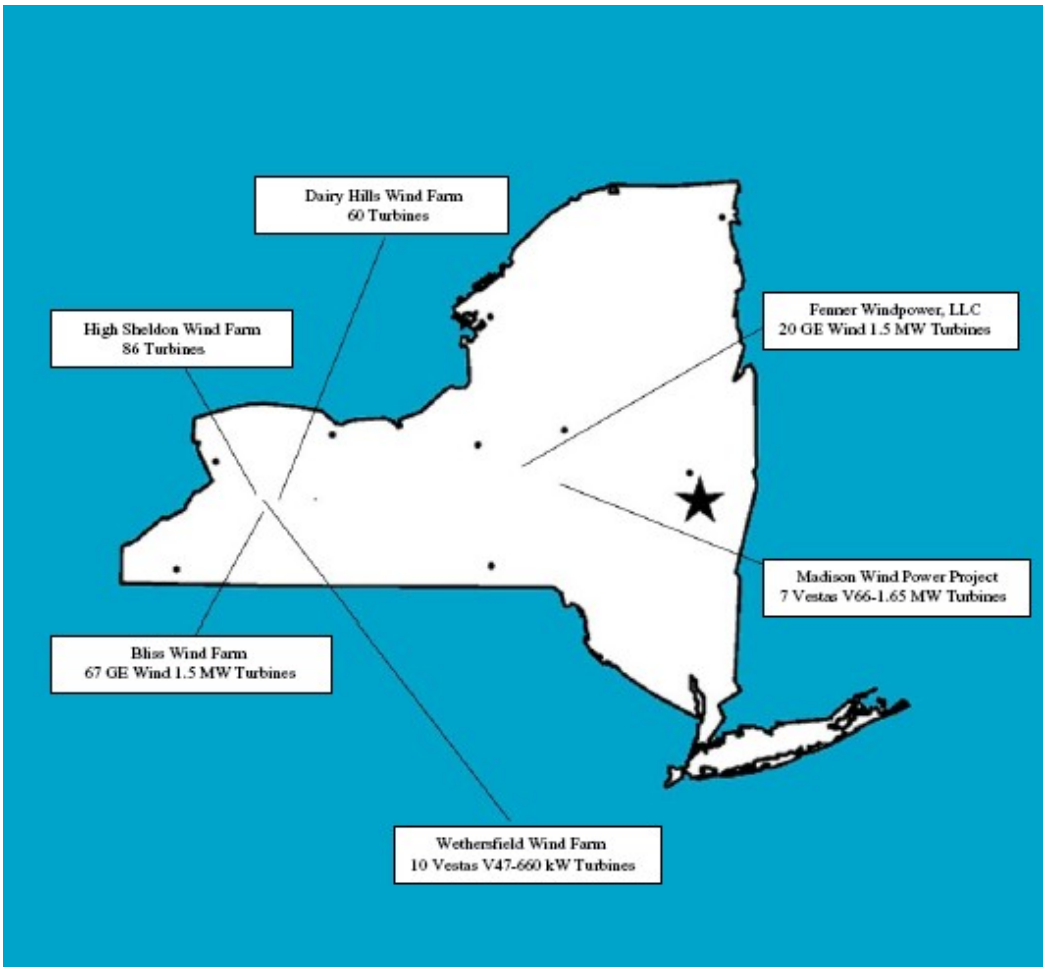
There is no effort to discern which properties within the 5-mile view sheds have an actual view of the wind farm.
The analysis does not control for distance to the turbines.

A final transaction based study is the Impacts of Windmill Visibility on Property Values in Madison County, New York produced in 2006 by Ben Hoen of the Bard Center for Environmental Policy. This report analyzed 280 arms-length residential home sales within five miles of the Fenner wind farm between 1995 and 2005. A visit to each home was made and an unbiased scoring method was used to quantify the degree to which each of the houses could see the wind farm and the distance from the home to the turbines was calculated. These and other characteristics were incorporated into an econometric model to ascertain if the properties sales prices were uniquely affected by windmill visibility. This in depth report found no measurable effect of windmill visibility on property values and even indicated that this evidence holds when concentrating on homes within one-mile of the turbines and on those that sold immediately following construction of the facility in 2001. This is by far the most extensive and soundly designed study completed to date.

The various studies reviewed offer varied conclusions. Transaction based studies, however, have consistently produced results that demonstrate no apparent effect of wind farm development on property values for surrounding areas.

Our analysis will consider sales data within an approximate five square mile area surrounding four existing wind farms located throughout New York State. Surrounding land uses are predominately agricultural with interspersed residential development along the roadside. The following wind farms were considered, however the High Sheldon Dairy Hills Wind Farm, Noble Wethersfield Windpark and Noble Allegany Windpark have not been constructed yet therefore no analysis was possible.

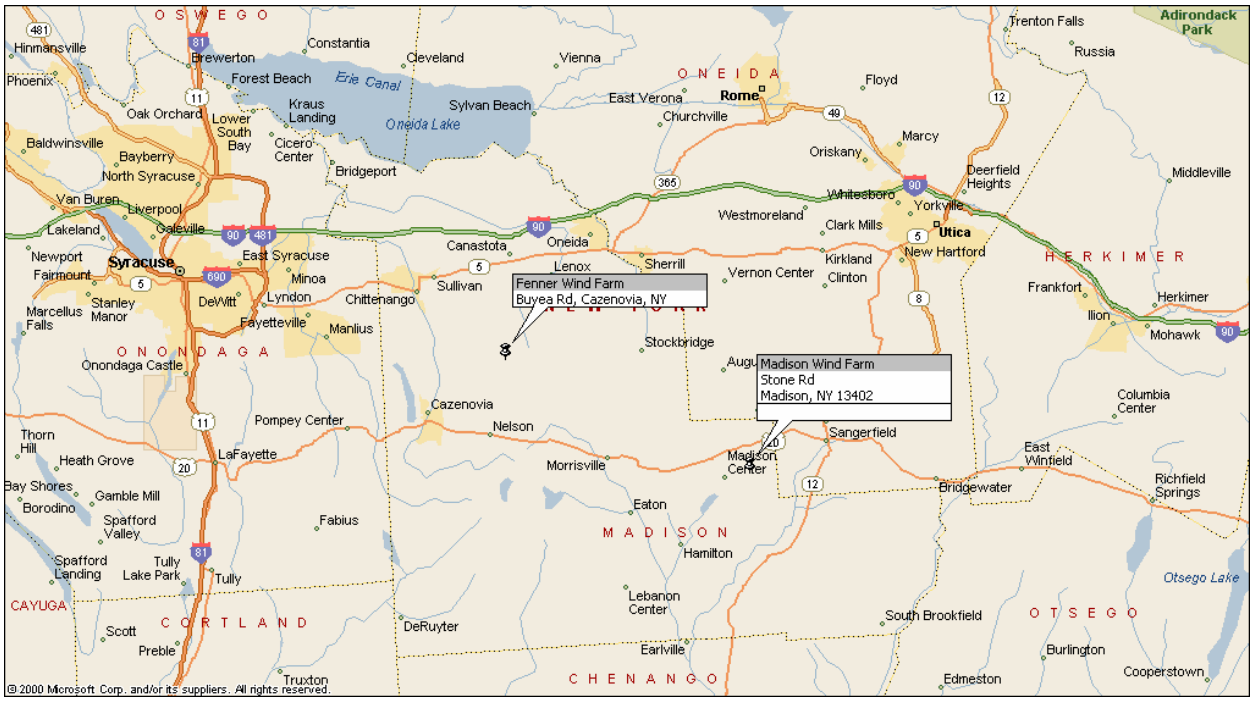
Market Area Description: (Cont'd.)



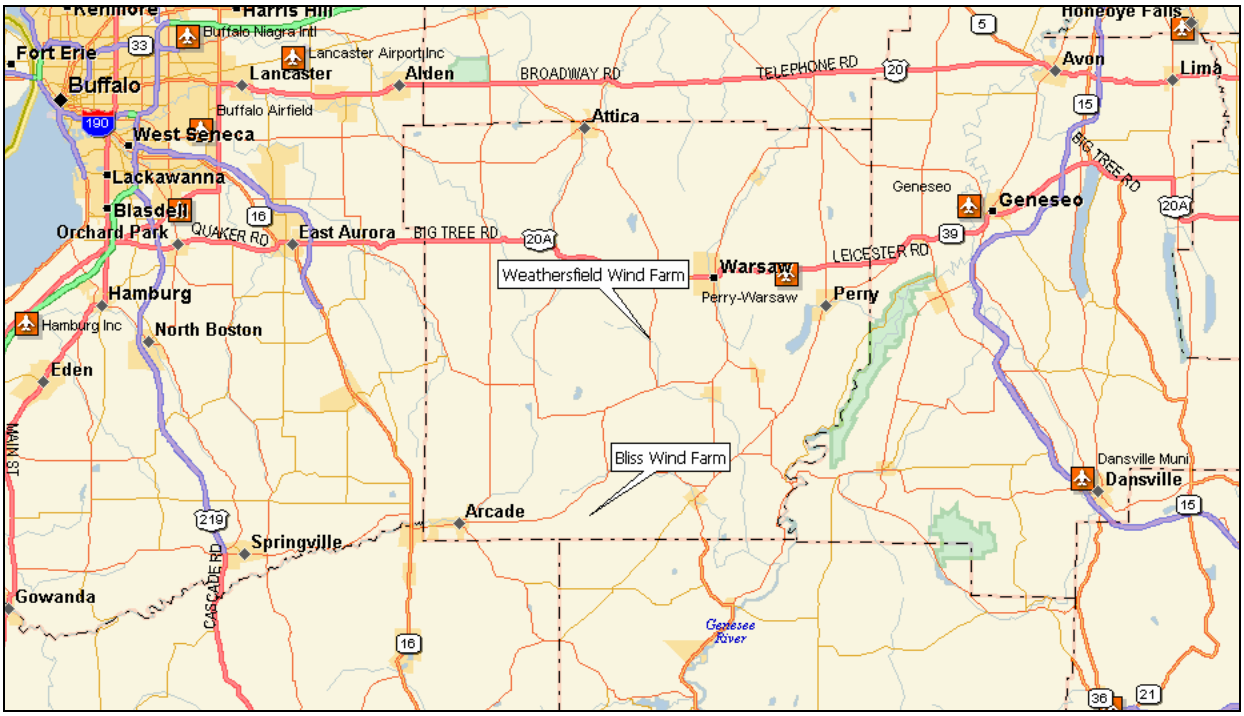
Below is a basic overview of the wind farms utilized in our analysis.

Project Name	Madison Wind Power	Wethersfield Wind Farm	Fenner Windpower	Noble Bliss Windpark
Town	Madison	Wethersfield	Fenner	Eagle
County	Madison	Wyoming	Madison	Wyoming
Project Owner	Horizon Wind Energy	Enel North America	Enel North America	Noble Power LLC
# of Turbines	7	10	20	67
Turbine Type	Vestas V66-1,650 kw	Vestas V47-660 kw	GE Wind-1,500 kw	GE Wind-1,500 kw
Rotor Diameter	216.5 ft. (66m)	154 ft. (47m)	231 ft. (70.5m)	253 ft. (77.1)
Hub Height	220 ft. (67m)	213 ft. (65m)	213 ft. (65m)	262 ft.
Total Turbine Height	339.25 ft.	290 ft.	328.5 ft.	388.9 ft.

Madison & Fenner Wind Farms
Madison County, New York



Wethersfield Wind Farm & Noble Bliss Windpark
Wyoming County, New York

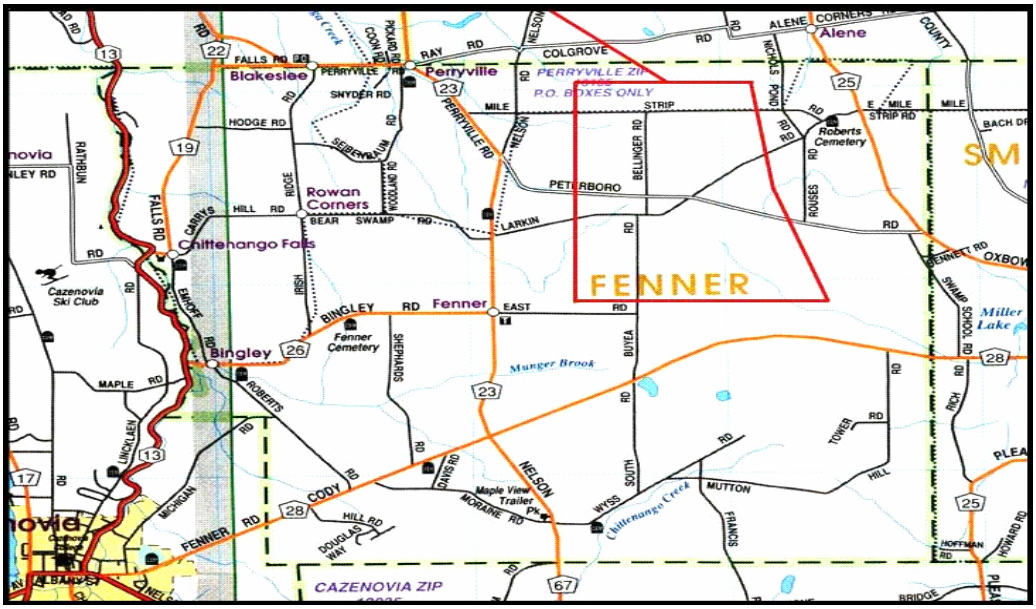


Madison Wind Farm
Madison County, New York

The Madison Wind Farm is located in the Town of Madison, Madison County, New York. This project was New York's first commercial wind farm and has been on line since September 2000. The site consists of seven (7) 220-foot high turbine towers & 216-foot rotor diameter. Total turbine height is 339.25 feet.

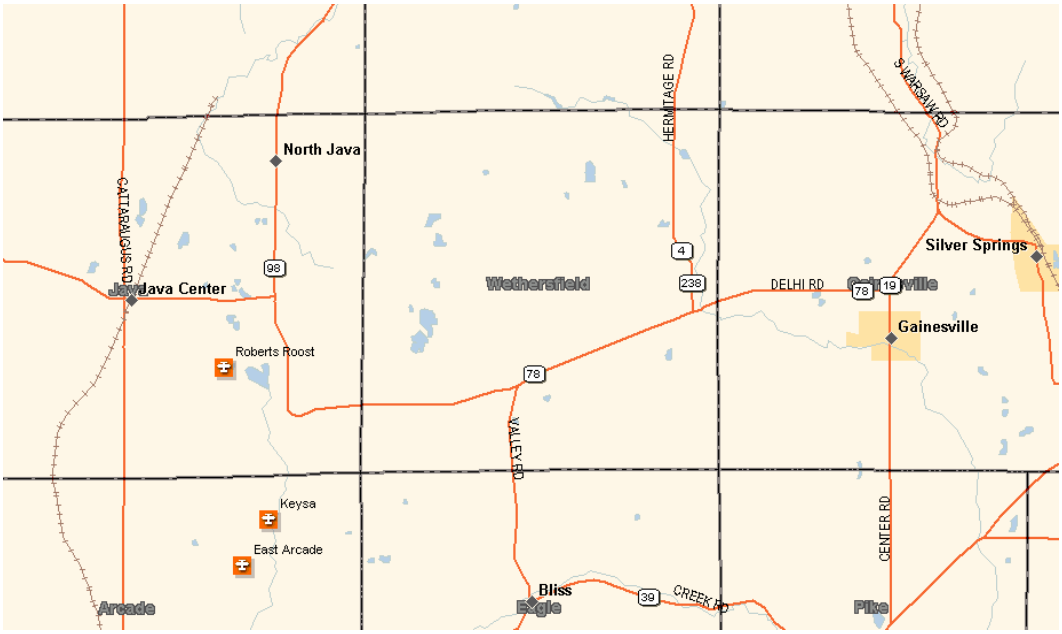
Fenner Wind Farm
Madison County, New York

The Fenner Windpower Project is located at the Town of Fenner, Madison County, New York. The Project encompasses an area of approximately 2,000 acres of leased land. This wind farm and has been on line since November 2001. The site consists of twenty (20) 213-Foot High turbine towers & 231 foot rotor diameter. Total turbine height is 328.5 feet.



Wethersfield Wind Farm
Wyoming County, New York

The Wethersfield Wind Farm is a 10 turbine, 6.6 MW wind energy farm located in the Town of Wethersfield, in Wyoming County, New York. The 310 acre Wethersfield site is located along one of the highest ridges in Wyoming County. The wind energy project came online in October 2000. The site consists of ten (10) 213-Foot High turbine towers & 154 foot rotor diameter. Total turbine height is 290 feet.



Noble Bliss Windpark
Wyoming County, New York

Source: Sherry Grugel

The Noble Bliss Windpark is a 67 turbine park, on approximately 93 acres, encompassing a 5,071 acre area in the Town of Eagle, Wyoming County. The project was recently completed in the fall of 2007 and went online in the spring of 2008. The wind turbines are General Electric 1.5 Megawatt turbines, approximately 253 feet tall, in an MTS configuration, with T-Flange generators. The project area spans a wide variety of land, with a mixture of 2,532 acres of agricultural land, 2,475 acres of forested land, and 49 acres of wetlands.

Source: Sherry Grugel

Demographic Comparison:

The following chart compares the demographic data from a five-mile radius surrounding the approximate center point of the subject (includes portions of the Towns of Villenova and Hanover) with the demographic data of the five-mile radius surrounding the approximate center point of the comparable properties used in this analysis.

2007 Demographics	Subject	Weathersfield	Madison	Fenner	Bliss
Population	3,296	2,479	7,729	4,837	2,341
Population Density	42.0	31.6	98.4	61.6	29.8
Households	1,331	857	2,819	1,634	803
Median Age	39.9	39.1	39.6	38.7	39.4
Median Household Income	$44,868	$44,916	$39,890	$51,426	$41,621
Total Housing Units	1,491	1,165	3,333	1,921	1,115
Owner Occupied	1,117 (74.9%)	738 (63.4%)	2,191 (65.7%)	1,422 (74%)	692 (62.0%)
Renter Occupied	215 (14.4%)	118 (10.2%)	628 (18.9%)	211 (11%)	111 (10.0%)
Vacant*	160 (10.7%)	308 (26.4%)	514 (15.4%)	288 (15%)	312 (28.0%)

***Vacant housing units – this may seem inflated in the subject areas because it does not take into consideration the residences designed for seasonal, recreational or occasional use.*

As indicated, the subject and comparables are located in similar low-density rural locations. This is typical for wind farm development in New York State. This data reflects a five-mile radius from an approximate center-point of each developed or proposed wind farm. It should be noted that the subject runs along a ridge line and therefore the center-point method does limit the area calculated for comparison, however it does provide insight as to the general demographics of the subject area.

Scope of Work:

As previously mentioned there are four major categories which can influence property values. The category fundamental to this analysis are environmental concerns, which considers surrounding land uses. This analysis will address the impact of a wind farm in close proximity to residential development. Externalities can impact housing values in several ways; i.e., unpleasant odors, excessive noise, health and safety concerns and view. The existence of the wind farms do not produce odors, nor have they been proven to cause any health and safety concerns, therefore, the only external influence common to a wind farms is view, noise and potential shadow flicker.

As previously mentioned, the wind farms (with the exception of Noble Bliss Windpark) went online from September 2000 to November 2001. In order to determine if the wind farms have any impact on residential real estate values a qualitative analysis in the form of relative comparison is utilized by comparing sales 5 years prior to the construction of the respective wind farms to sales subsequent to the construction and operation of the wind farm.

Scope of Work: (Cont.)

The market area considered approximately a five mile radius surrounding the respective wind farms. The five mile radius was considered applicable due to the view shed of these properties ranging great distances in some instances. The second technique is called paired sales analysis. This technique compares sales and re-sales of the same property before and after the construction of the respective wind farms. In order to determine if the wind farm had an influence on real estate values, a specific residential sale prior to the construction of the wind farm will be compared to its subsequent sale after the date of construction. Market sales and re-sales were researched and analyzed within the respective market areas from January 1995 to December 2007 as provided by municipal records and local realtors.

In addition the data developed for both techniques was separated into several distance bins to attempt to ascertain if values were uniquely affected based on proximity to the wind farms. This distance sensitive breakdown is probably not as strong an indicator due to the lack of available data. It is my opinion that 10-15 sales in each distance bin are the minimum necessary for any potential statistical correlation and even when utilizing a sample of that size it is likely to produce unreliable results. Unfortunately without adequate sales data in each distance bin it is impossible to determine if the closer proximity to the wind farm uniquely impacts value.

As is typical with the majority of wind farms, they are located in sparse rural communities where sales transactions are limited. Furthermore they are typically situated on higher elevations and ridgelines with little to no surrounding development within a mile radius. Due to limited data, a comprehensive statistical analysis was not undertaken and would not be relevant. The two forms of analysis utilized are considered more appropriate where limited quantitative data is available. There was not enough of a sampling size to analyze the sales data based on type of construction, age, condition, land area etc. In order to make a proper statistical analysis you would need multiple sales of each style residence built during the same time period, being similar in size, bedroom count, land area and being similar in overall conditions. This does not exist in the respective study markets and is not typical in the majority of rural markets where wind farms are constructed and operated in New York State.

The qualitative analysis considered the market area as a whole to determine if any negative stigmas were apparent. Additionally the paired sales analysis considered individual sales and re-sales of properties to determine if any outside influence impacted the respective properties. The conclusions drawn are considered sufficiently supported based on the data available and the methods considered.

Finally, “ground-truthing” (drive by inspection) of 75% of the properties within a mile radius of the wind farm was performed. During this process it was evident that there were a minimal number of properties with a direct view of the wind farm due to the extreme topography which is typical of rural markets where these types of projects are located.

The following are the findings and conclusions drawn from the respective projects.

Wethersfield Wind Farm
Wyoming County, New York

The Wethersfield Wind Farm came online in October 2000. Sales data from 1995 to 1999 in the subject market area will be compared to sales data from 2000 to 2007. The following sales data was researched and analyzed in order to derive the conclusions drawn from this analysis.

SALES 1995-1999

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Wethersfield	107-2-19	4344	HERMITAGE	N/A	N/A	10/2/1995	$32,000	N/A	N/A
Wyoming	Orangeville	95.-1-7	3344	ORG-CTR RD	2.00	1,336	5/6/1996	$63,900	1976	$47.83
Wyoming	Orangeville	94.-2-44	38	ORG-CTR RD	1.72	913	5/29/1996	$45,000	1971	$49.29
Wyoming	Orangeville	94.-2-8	2865	DUNHAM RD	5.48	1,820	9/11/1996	$94,500	1976	$51.92
Wyoming	Orangeville	96.-1-10	4286	LIBERTY ST RD	1.40	1,080	4/18/1997	$58,000	1993	$53.70
Wyoming	Orangeville	94.-1-6.122	2982	DUNHAM RD	1.25	945	8/20/1997	$39,900	1993	$42.22
Wyoming	Orangeville	95.-2-24	4080	QUAKERTOWN RD	N/A	1,856	9/19/1997	$75,000	1975	$40.41
Wyoming	Orangeville	94.-1-4.1	2930	DUNHAM RD	9.63	2,016	3/25/1998	$82,000	1970	$40.67
Wyoming	Orangeville	94.-1-9		SYLER RD	5.94	1,325	5/27/1998	$41,000	1970	$30.94
Wyoming	Wethersfield	120.-1-7.2	4759	HERMITAGE RD	17.14	2,134	7/16/1998	$77,000	1900	$36.08
Wyoming	Orangeville	94.-2-12.2	3130	DUNHAM RD	9.07	1,671	8/12/1998	$141,000	1983	$84.38
Wyoming	Orangeville	94.-2-50.12	2949	DUNHAM RD	5.56	1,344	1/21/1999	$45,000	1983	$33.48
Wyoming	Orangeville	94.-2-5	2849	DUNHAM RD	3.43	1,480	6/3/1999	$69,000	1974	$46.62
Wyoming	Wethersfield	108.3-1-17	4173	WETHERSFIELD RD	0.67	1,168	6/16/1999	$52,000	1900	$44.52
Wyoming	Orangeville	94.-2-22.2	3853	WEBER RD	0.88	1,800	9/30/1999	$127,000	1991	$70.56
							Average =	**$69,487**		**$48.05**
							Median =	**$63,900**		**$45.57**

SALES 2000-2007

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangeville	94.-2-35	28	MEADOW LARK LN	2.07	800	4/2/2000	$44,900	1975	$56.13
Wyoming	Wethersfield	108.3-1-22	4261	HERMITAGE RD	0.76	1,601	5/8/2000	$23,000	1920	$14.37
Wyoming	Orangeville	95.-1-4	3	CARDINAL DR	2.40	1,288	6/5/2000	$70,000	1993	$54.35
Wyoming	Orangeville	94.-2-45	39	ORG-CTR RD	1.72	912	12/5/2000	$44,000	1970	$48.25
Wyoming	Orangeville	94.-2-22.2	3853	WEBER RD	0.88	1,800	11/2/2001	$110,000	1991	$61.11
Wyoming	Orangeville	95.-1-11	6	ROBIN LA	1.86	912	9/13/2002	$53,000	1972	$58.11
Wyoming	Wethersfield	108.3-1-30	4200	WETHERSFIELD RD	1.03	1,044	1/31/2003	$55,000	1965	$52.68
Wyoming	Wethersfield	118.-1-19.2	4027	SODOM RD	4.73	1,872	7/25/2003	$85,000	1980	$45.41
Wyoming	Orangeville	96.-1-33.2	3801	HERMITAGE RD	0.33	960	3/19/2004	$20,000	1930	$20.83
Wyoming	Wethersfield	106.-2-8.2	3071	WETHERSFIELD RD	1.90	2,421	8/30/2004	$157,000	1870	$64.85
Wyoming	Wethersfield	108.3-1-4	4201	HERMITAGE RD	0.73	1,998	1/31/2005	$76,000	1900	$38.04
Wyoming	Wethersfield	108.3-1-30	4200	WETHERSFIELD RD	1.03	1,044	9/27/2005	$65,000	1965	$62.26
Wyoming	Wethersfield	119.-1-21.2	4596	HERMITAGE RD	1.39	2,400	10/11/2005	$125,000	1995	$52.08
Wyoming	Orangeville	96.-1-5.11	3742	HERMITAGE RD	1.21	1,311	10/21/2005	$117,500	1880	$89.63
Wyoming	Orangeville	94.-2-54.12	2953	DUNHAM RD	5.57	2,125	12/21/2005	$140,000	1986	$65.88
Wyoming	Orangeville	94.-2-50.12	2949	DUNHAM RD	5.56	1,344	6/28/2006	$96,000	1983	$71.43
Wyoming	Wethersfield	120.00-1-4.112	4502	HERMITAGE RD	8.56	1,624	3/17/2006	$50,000	1900	$30.79
Wyoming	Orangeville	108.3-1-6	4217	HERMITAGE RD	0.50	1,480	6/2/2006	$75,000	1900	$50.68
Wyoming	Orangevile	82.00-2-44	22	DEER POND ACRES	6.10	1,024	6/28/2006	$85,000	1984	$83.01
Wyoming	Orangevile	94.00-2-50.12	2949	DUNHAM RD	5.56	1,344	6/28/2006	$96,000	1983	$71.43
Wyoming	Orangevile	83.00-1-24.2	9	DEER POND ACRES	5.06	1,200	7/20/2006	$97,000	1995	$80.83
Wyoming	Orangevile	96.00-1-33.2	3801	HERMITAGE RD	0.33	960	9/1/2006	$74,000	1930	$77.08
Wyoming	Orangevile	82.00-2-32	3203	SYLER RD	1.10	1,266	10/20/2006	$74,200	1980	$58.61
Wyoming	Wethersfield	132.01-1-36	5129	SHEPPARD	0.48	1,160	1/18/2007	$60,000	1900	$51.72
Wyoming	Orangevile	81.00-3-16	2661	CENTERLINE RD	0.24	1,335	2/2/2007	$54,902	1890	$41.13
Wyoming	Orangevile	81.00-3-14	2671	CENTERLINE RD	0.46	2,504	4/20/2007	$84,800	1890	$33.87
Wyoming	Wethersfield	108.03-1-28	4180	WETHERSFIELD RD	1.17	1,200	6/5/2007	$18,000	1900	$15.00
Wyoming	Wethersfield	117.00-2-2	2618	SODOM RD	2.66	780	6/22/2007	$47,500	1959	$60.90
Wyoming	Orangevile	94.00-2-10.113	3332	SYLER RD	14.86	1,196	7/10/2007	$130,000	1985	$108.70
Wyoming	Orangevile	105.00-3-7	3853	HOLLOW RD	4.28	1,080	7/30/2007	$73,000	1905	$67.59
Wyoming	Orangevile	95.00-2-20	4011	QUAKERTOWN RD	1.41	1,344	7/31/2007	$82,000	1950	$61.01
Wyoming	Wethersfield	107.-2-14.112	4038	WETHERSFIELD RD	6.14	1,012	8/24/2007	$81,000	1994	$80.04
Wyoming	Orangevile	82.-1-3	3133	ROYCE RD	3.55	2,464	9/27/2007	$168,000	1971	$68.18
Wyoming	Orangevile	95.-1-17	13	ROBIN LA	2.07	2,135	11/30/2007	$50,000	1982	$23.42
							Average =	**$78,877**		**$56.45**
							Median =	**$74,600**		**$58.36**

The previous sales are located within a five mile radius of the wind farm. As can be seen on the previous sales grid there is a wide range of property sizes, land areas and age. The sales indicate a wide range of value which is typical in a rural market with limited homogeneity as compared to city or suburban properties. The sales area considered a representative sampling of the property types in the market. According to the 2005 city-data.com estimates the median house value in the Town of Wethersfield was $74,100.

The median house value in the target area was indicated at $63,900 from 1995-1999 and $74,600 from 2000-2007 indicating a 16.74% increase over a 6 ½ year period or 2.58% annually.

The median house value for the county from 2004 to 2007 is as follows:

Wyoming County:

2004		2005		2006		2007	
# Sales	**Median**	**# Sales**	**Median**	**# Sales**	**Median**	**#Sales**	**Median**
371	$74,932	439	$80,000	367	$84,800	348	$82,900

The county median sales price was $74,932 in 2004, and then trended significantly upward, increasing to $80,000 in 2005 and to $84,800 in 2006. According to the New York State Office of Real Property Services, the 2007 median sale price was $82,900. Overall this indicates a 10.63% increase over a four year period or 2.66% annually which is sufficiently in line with the target area indicating a 2.58% annual increase. Based on the sample size in the subject area and the county wide sample sizes, minor discrepancies can be expected.

As can be seen by the above sales data there appears to be no influence on property values since the construction and operation of the wind farm. Average and median sales prices on a whole have increased indicating that the existence of the wind farm has not diminished real property values in this sub market. Additionally, the subject target area has appreciated at a rate sufficiently similar to the remaining county.

As indicated, there are a limited number of properties with direct views of the wind farm due to extreme topography changes. Therefore the view shed, any noise level and potential for shadow flickers from the blades is mitigated. This is typical with wind farms due to the high elevations and rural nature of the project areas.

Overall, there is considered to be no stigma attached to the project due to the continual sale and resale of properties near the project and considering that the values have appreciated at similar rate when compared to the rest of the county.

Additionally sales and re-sales of properties were considered within the market as follows:

County	Municipality	Address	Street	SaleDate	SalePrice
Wyoming	Orangeville	2205	KROTZ RD	3/7/1997	$40,000
Wyoming	Orangeville	2205	KROTZ RD	8/31/2000	$45,000
Wyoming	Orangeville	2658	FARM RD	9/27/1999	$87,500
Wyoming	Orangeville	2658	FARM RD	3/14/2005	$138,000
Wyoming	Orangeville	2648A	BUFFALO RD	12/12/1995	$133,500
Wyoming	Orangeville	2648A	BUFFALO RD	1/22/2004	$150,000
Wyoming	Orangeville	2648D	BUFFALO RD	7/22/1999	$107,500
Wyoming	Orangeville	2648D	BUFFALO RD	1/25/2000	$110,000
Wyoming	Orangeville	2659	SYLER RD	5/24/1999	$95,500
Wyoming	Orangeville	2659	SYLER RD	5/10/2004	$128,000
Wyoming	Orangeville	3878	RTE 20A	11/29/1996	$34,875
Wyoming	Orangeville	3878	RTE 20A	11/21/2003	$40,000
Wyoming	Orangeville	2661	CENTERLINE RD	10/24/1996	$51,000
Wyoming	Orangeville	2661	CENTERLINE RD	10/5/2005	$54,902
Wyoming	Orangeville	3028	ROYCE RD	6/16/1995	$87,000
Wyoming	Orangeville	3028	ROYCE RD	2/7/2003	$80,000
Wyoming	Orangeville	3193	ROYCE RD	12/13/1995	$79,000
Wyoming	Orangeville	3193	ROYCE RD	8/29/2003	$93,000
Wyoming	Orangeville	32	DEER POND	5/2/2000	$102,000
Wyoming	Orangeville	32	DEER POND	12/3/2002	$112,500
Wyoming	Orangeville	3105	HERMITAGE RD	10/1/2001	$57,500
Wyoming	Orangeville	3105	HERMITAGE RD	3/10/2004	$66,950
Wyoming	Orangeville	3853	WEBER RD	9/30/1999	$127,000
Wyoming	Orangeville	3853	WEBER RD	11/2/2001	$110,000
Wyoming	Wethersfield	4200	WETHERSFIELD RD	1/31/2003	$55,000
Wyoming	Wethersfield	4200	WETHERSFIELD RD	9/27/2005	$65,000
Wyoming	Wethersfield	2834	PEE DEE RD	5/16/1997	$66,900
Wyoming	Wethersfield	2834	PEE DEE RD - LOT 4	10/22/2004	$71,000
Wyoming	Wethersfield	3056	RTE 78	4/12/1999	$57,000
Wyoming	Wethersfield	3056	RT 78	5/15/2003	$57,000
Wyoming	Wethersfield	3803	HOBDAY RD	10/29/1996	$33,000
Wyoming	Wethersfield	3803	HOBDAY RD	9/25/1997	$66,000
Wyoming	Wethersfield	5771	ROUTE 362	9/10/1996	$37,500
Wyoming	Wethersfield	5771	ROUTE 362	11/19/2007	$57,500

As is evident by the above correlated sales, there appears to be little to no effect on real estate values of the respective properties subsequent to the construction and operation of the facility. Of the 17 sales analyzed 14 increased in value, 2 decreased and 1 stayed the same. This analysis did not include an interview with the respective property owners at the time of sale to determine any underlying factors which may have additionally impacted sales prices. (i.e. capital improvements, additions, deferred maintenance). However, the sales data utilized is considered representative of the market as a whole and it is unlikely that every property had some or all of the previously mentioned underlying factors impacting their respective properties from sale to resale.

In conclusion it appears that the existence of the wind farm does not appear to have any impact on surrounding property values as a whole.

In addition the sales data was broken down by distance to the wind farm. Targeted areas of 0-1 miles, 1-2 miles, 2-3 miles, 3-4 miles and 4-5 miles were utilized. Unfortunately limited sales data in this rural market makes this technique unreliable in producing meaningful results. The data is broken down as follows:

1995-1999 (0-1 Miles) – No Data

2000-2007 (0-1 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Wethersfield	118.-1-19.2	4027	SODOM RD	4.73	1,872	7/25/2003	$85,000	1980	$45.41

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Wethersfield	107-2-19	4344	HERMITAGE	N/A	N/A	10/2/1995	$32,000	N/A	N/A
Wyoming	Orangeville	94.-2-22.2	3853	WEBER RD	0.88	1,800	9/30/1999	$127,000	1991	$70.56

2000-2007 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangeville	94.-2-22.2	3853	WEBER RD	0.88	1,800	11/2/2001	$110,000	1991	$61.11
Wyoming	Wethersfield	106.-2-8.2	3071	WETHERSFIELD RD	1.90	2,421	8/30/2004	$157,000	1870	$64.85

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangeville	95.-1-7	3344	ORG-CTR RD	2.00	1,336	5/6/1996	$63,900	1976	$47.83
Wyoming	Orangeville	94.-2-44	38	ORG-CTR RD	1.72	913	5/29/1996	$45,000	1971	$49.29
Wyoming	Orangeville	94.-2-8	2865	DUNHAM RD	5.48	1,820	9/11/1996	$94,500	1976	$51.92
Wyoming	Orangeville	94.-1-6.122	2982	DUNHAM RD	1.25	945	8/20/1997	$39,900	1993	$42.22
Wyoming	Orangeville	95.-2-24	4080	QUAKERTOWN RD	N/A	1,856	9/19/1997	$75,000	1975	$40.41
Wyoming	Orangeville	94.-1-4.1	2930	DUNHAM RD	9.63	2,016	3/25/1998	$82,000	1970	$40.67
Wyoming	Orangeville	94.-1-9		SYLER RD	5.94	1,325	5/27/1998	$41,000	1970	$30.94
Wyoming	Wethersfield	120.-1-7.2	4759	HERMITAGE RD	17.14	2,134	7/16/1998	$77,000	1900	$36.08
Wyoming	Orangeville	94.-2-12.2	3130	DUNHAM RD	9.07	1,671	8/12/1998	$141,000	1983	$84.38
Wyoming	Orangeville	94.-2-50.12	2949	DUNHAM RD	5.56	1,344	1/21/1999	$45,000	1983	$33.48
Wyoming	Orangeville	94.-2-5	2849	DUNHAM RD	3.43	1,480	6/3/1999	$69,000	1974	$46.62
Wyoming	Wethersfield	108.3-1-17	4173	WETHERSFIELD RD	0.67	1,168	6/16/1999	$52,000	1900	$44.52
							Median =	$66,450		$43.37

2000-2007 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangeville	94.-2-35	28	MEADOW LARK LN	2.07	800	4/2/2000	$44,900	1975	$56.13
Wyoming	Wethersfield	108.3-1-22	4261	HERMITAGE RD	0.76	1,601	5/8/2000	$23,000	1920	$14.37
Wyoming	Orangeville	95.-1-4	3	CARDINAL DR	2.40	1,288	6/5/2000	$70,000	1993	$54.35
Wyoming	Orangeville	94.-2-45	39	ORG-CTR RD	1.72	912	12/5/2000	$44,000	1970	$48.25
Wyoming	Orangeville	95.-1-11	6	ROBIN LA	1.86	912	9/13/2002	$53,000	1972	$58.11
Wyoming	Wethersfield	108.3-1-30	4200	WETHERSFIELD RD	1.03	1,044	1/31/2003	$55,000	1965	$52.68
Wyoming	Orangeville	96.-1-33.2	3801	HERMITAGE RD	0.33	960	3/19/2004	$20,000	1930	$20.83
Wyoming	Wethersfield	108.3-1-4	4201	HERMITAGE RD	0.73	1,998	1/31/2005	$76,000	1900	$38.04
Wyoming	Wethersfield	108.3-1-30	4200	WETHERSFIELD RD	1.03	1,044	9/27/2005	$65,000	1965	$62.26
Wyoming	Wethersfield	119.-1-21.2	4596	HERMITAGE RD	1.39	2,400	10/11/2005	$125,000	1995	$52.08
Wyoming	Orangeville	96.-1-5.11	3742	HERMITAGE RD	1.21	1,311	10/21/2005	$117,500	1880	$89.63
Wyoming	Orangeville	94.-2-54.12	2953	DUNHAM RD	5.57	2,125	12/21/2005	$140,000	1986	$65.88
Wyoming	Orangeville	94.-2-50.12	2949	DUNHAM RD	5.56	1,344	6/28/2006	$96,000	1983	$71.43
Wyoming	Wethersfield	120.00-1-4.112	4502	HERMITAGE RD	8.56	1,624	3/17/2006	$50,000	1900	$30.79
Wyoming	Orangeville	108.3-1-6	4217	HERMITAGE RD	0.50	1,480	6/2/2006	$75,000	1900	$50.68
Wyoming	Orangevile	82.00-2-44	22	DEER POND ACRES	6.10	1,024	6/28/2006	$85,000	1984	$83.01
Wyoming	Orangevile	94.00-2-50.12	2949	DUNHAM RD	5.56	1,344	6/28/2006	$96,000	1983	$71.43
Wyoming	Orangevile	83.00-1-24.2	9	DEER POND ACRES	5.06	1,200	7/20/2006	$97,000	1995	$80.83
Wyoming	Orangevile	96.00-1-33.2	3801	HERMITAGE RD	0.33	960	9/1/2006	$74,000	1930	$77.08
Wyoming	Wethersfield	108.03-1-28	4180	WETHERSFIELD RD	1.17	1,200	6/5/2007	$18,000	1900	$15.00
Wyoming	Orangevile	105.00-3-7	3853	HOLLOW RD	4.28	1,080	7/30/2007	$73,000	1905	$67.59
Wyoming	Orangevile	95.00-2-20	4011	QUAKERTOWN RD	1.41	1,344	7/31/2007	$82,000	1950	$61.01
Wyoming	Wethersfield	107.00-2-17.112	4038	WETHERSFIELD RD	6.14	1,012	8/24/2007	$81,000	1994	$80.04
							Median =	$74,000		$58.11

This distance bin had the most available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 1.75% annually which is a slightly slower rate than the 2.58% for the entire view shed. It is impossible with limited data in the other distance bins to conclude that this lower appreciation is based on distance to the wind farm.

1995-1999 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangeville	96.-1-10	4286	LIBERTY ST RD	1.40	1,080	4/18/1997	$58,000	1993	$53.70

2000-2007 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangevile	82.00-2-32	3203	SYLER RD	1.10	1,266	10/20/2006	$74,200	1980	$58.61
Wyoming	Wethersfield	132.01-1-36	5129	SHEPPARD	0.48	1,160	1/18/2007	$60,000	1900	$51.72
Wyoming	Wethersfield	117.00-2-2	2618	SODOM RD	2.66	780	6/22/2007	$47,500	1959	$60.90
Wyoming	Orangevile	94.00-2-10.113	3332	SYLER RD	14.86	1,196	7/10/2007	$130,000	1985	$108.70

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (4-5 Miles) – No Data

2000-2007 (4-5 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Wyoming	Orangevile	81.00-3-16	2661	CENTERLINE RD	0.24	1,335	2/2/2007	$54,902	1890	$41.13
Wyoming	Orangevile	81.00-3-14	2671	CENTERLINE RD	0.46	2,504	4/20/2007	$84,800	1890	$33.87
Wyoming	Orangevile	82.00-1-3	3133	ROYCE RD	3.55	2,464	9/27/2007	$168,000	1971	$68.18
Wyoming	Wethersfield	142.00-1-24.2	5771	ROUTE 362	0.55	1,070	11/19/2007	$57,500	1930	$53.74

There is insufficient data available for meaningful comparison in this distance bin. Most of the sales were located in the 2-3 mile distance bin. Without more data it is impossible to determine if the property values within each distance bin were uniquely affected.

In order to further explore the correlation between distance and property values the paired sales analysis was broken down by the same distance bins.

County	Municipality	Address	Street	SaleDate	SalePrice	Distance
Wyoming	Orangeville	2205	KROTZ RD	3/7/1997	$40,000	
Wyoming	Orangeville	2205	KROTZ RD	8/31/2000	$45,000	>5
Wyoming	Orangeville	2658	FARM RD	9/27/1999	$87,500	
Wyoming	Orangeville	2658	FARM RD	3/14/2005	$138,000	>5
Wyoming	Orangeville	2648A	BUFFALO RD	12/12/1995	$133,500	
Wyoming	Orangeville	2648A	BUFFALO RD	1/22/2004	$150,000	>5
Wyoming	Orangeville	2648D	BUFFALO RD	7/22/1999	$107,500	
Wyoming	Orangeville	2648D	BUFFALO RD	1/25/2000	$110,000	>5
Wyoming	Orangeville	2659	SYLER RD	5/24/1999	$95,500	
Wyoming	Orangeville	2659	SYLER RD	5/10/2004	$128,000	4-5
Wyoming	Orangeville	3878	RTE 20A	11/29/1996	$34,875	
Wyoming	Orangeville	3878	RTE 20A	11/21/2003	$40,000	4-5
Wyoming	Orangeville	2661	CENTERLINE RD	10/24/1996	$51,000	
Wyoming	Orangeville	2661	CENTERLINE RD	10/5/2005	$54,902	4-5
Wyoming	Orangeville	3028	ROYCE RD	6/16/1995	$87,000	
Wyoming	Orangeville	3028	ROYCE RD	2/7/2003	$80,000	4-5
Wyoming	Orangeville	3193	ROYCE RD	12/13/1995	$79,000	
Wyoming	Orangeville	3193	ROYCE RD	8/29/2003	$93,000	4-5
Wyoming	Orangeville	32	DEER POND	5/2/2000	$102,000	
Wyoming	Orangeville	32	DEER POND	12/3/2002	$112,500	2-3
Wyoming	Orangeville	3105	HERMITAGE RD	10/1/2001	$57,500	
Wyoming	Orangeville	3105	HERMITAGE RD	3/10/2004	$66,950	4-5
Wyoming	Orangeville	3853	WEBER RD	9/30/1999	$127,000	
Wyoming	Orangeville	3853	WEBER RD	11/2/2001	$110,000	1-2
Wyoming	Wethersfield	4200	WETHERSFIELD RD	1/31/2003	$55,000	
Wyoming	Wethersfield	4200	WETHERSFIELD RD	9/27/2005	$65,000	2-3
Wyoming	Wethersfield	2834	PEE DEE RD	5/16/1997	$66,900	
Wyoming	Wethersfield	2834	PEE DEE RD - LOT 4	10/22/2004	$71,000	3-4
Wyoming	Wethersfield	3056	RTE 78	4/12/1999	$57,000	
Wyoming	Wethersfield	3056	RT 78	5/15/2003	$57,000	4-5
Wyoming	Wethersfield	3803	HOBDAY RD	10/29/1996	$33,000	
Wyoming	Wethersfield	3803	HOBDAY RD	9/25/1997	$66,000	4-5
Wyoming	Wethersfield	5771	ROUTE 362	9/10/1996	$37,500	
Wyoming	Wethersfield	5771	ROUTE 362	11/19/2007	$57,500	4-5

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With the small amount of available data this approach is again limited in its usefulness. The two sales that did decline in value were in the 1-2 mile and 4-5 mile distance bins. The sale in the 1-2 mile distance bin was the only paired sale available at that distance and without further data it is impossible to reach a definitive conclusion that the wind farm was the cause of this decrease. The sale in the 4-5 mile distance bin appears to be an anomaly as there are eight other sales in the same distance bin that increased in value. Overall it is impossible to reach definitive conclusions on the effect of distance to property value for this comparable; however the data does not indicate an overall affect.

Madison Wind Farm
Madison County, New York

The Madison Wind Farm came online in September 2000. Sales data from 1995 to 1999 in the subject market area will be compared to sales data from 2000 to 2007. The following sales data was researched and analyzed in order to derive the conclusions drawn from this analysis.

SALES 1995-1999

County	Municipality	SBL	Address	Street	Land	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	114.6-1-17	7264	VALLEY RD	0.23	1,658	2/1/1995	$22,000	1870	$13.27
Oneida	Sangerfield	397.000-1-	715	MASON RD	100.50	2,072	4/5/1995	$106,800	1840	$51.54
Madison	Madison	114.-1-43	3753	SOLSVILLE	0.12	1,146	6/16/1995	$37,000	1955	$32.29
Madison	Madison	114.-2-19	7561	ROUTE 20	7.69	1,704	1/19/1996	$150,000	1875	$88.03
Madison	Madison	102.-1-15.13	4017	STRATFORD	2.44	2,722	3/1/1996	$77,500	1902	$28.47
Madison	Madison	114.-2-35	7490	ROUTE 20	0.45	1,359	3/8/1996	$56,000	1875	$41.21
Madison	Madison	114.-1-75.2	3652	MADISON	7.79	768	6/27/1996	$135,000	1960	$175.78
Madison	Madison	126.-1-36.3	3355	FREDERICK	3.15	2,160	8/19/1996	$76,500	1970	$35.42
Madison	Madison	114.19-1-36	3513	SOUTH ST	0.21	1,650	12/27/1996	$40,700	1973	$24.67
Madison	Madison	114.15-1-36	7337	ROUTE 20 E	0.21	1,832	6/24/1997	$35,500	1885	$19.38
Madison	Madison	102.-1-59	7481	WATER ST	3.31	2,269	8/22/1997	$43,000	1850	$18.95
Madison	Madison	126.-1-6.2	3631	RT 12B	4.77	2,320	9/19/1997	$75,000	1878	$32.33
Madison	Madison	114.15-1-7	7323	ROUTE 20 W	6.50	2,892	10/27/1997	$80,000	1840	$27.66
Madison	Madison	114.6-1-18	7267	VALLEY RD	0.29	1,538	1/20/1998	$21,500	1875	$13.98
Madison	Madison	114.15-1-55	7402	ROUTE 20 E	0.49	2,768	2/7/1998	$20,000	1815	$7.23
Madison	Madison	114.15-1-56	7400	ROUTE 20 E	0.35	1,596	2/7/1998	$38,000	1815	$23.81
Madison	Madison	102.-1-43	7470	BROOKSIDE	1.05	1,691	5/11/1998	$59,900	1905	$35.42
Madison	Madison	102.-1-47	7523	VALLEY RD	0.13	1,080	6/1/1998	$33,200	1860	$30.74
Madison	Madison	114.19-1-30	3571	SOUTH ST	0.26	1,115	7/15/1998	$43,000	1920	$38.57
Madison	Madison	126.-1-62	3247	CENTER RD	1.72	2,092	8/7/1998	$68,600	1900	$32.79
Madison	Madison	114.-1-16	3835	SOLSVILLE	0.50	1,508	9/8/1998	$65,000	1972	$43.10
Madison	Madison	114.-2-33	7484	ROUTE 20	1.72	2,379	3/8/1999	$87,500	1900	$36.78
Madison	Madison	103.-1-55	4239	CAMP RD	3.62	1,457	3/11/1999	$66,000	1966	$45.30
Madison	Madison	126.-1-56	3275	LOVEJOY	0.43	1,730	5/18/1999	$45,000	1850	$26.01
Madison	Madison	102.-1-14	4032	BIRD RD	2.16	720	6/14/1999	$72,000	1977	$100.00
Madison	Madison	114.-2-32	7478	ROUTE 20	0.54	1,287	8/31/1999	$55,000	1840	$42.74
Madison	Madison	102.-1-59	7481	WATER ST	8.00	2,269	9/30/1999	$46,000	1850	$20.27
Madison	Madison	114.19-1-11	7306	ROUTE 20 W	0.85	1,233	10/29/1999	$50,000	1850	$40.55
Madison	Madison	127.-1-15	3430	CENTER RD	3.08	1,254	12/9/1999	$69,000	1974	$55.02
Madison	Madison	126.-1-6.2	3487	RT 12B	4.77	2,320	12/10/1999	$75,000	1878	$32.33
							Average=	**$61,657**		**$40.45**
							Median =	**$57,950**		**$32.56**

SALES 2000-2007

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	102.-1-34	4317	SOLSVILLE-	1.87	1,395	2/25/2000	$50,000	1958	$35.84
Madison	Madison	114.6-1-5	3885	AUGUSTA RD	0.56	1,920	4/28/2000	$20,000	1890	$10.42
Madison	Madison	114.19-1-15.1	7316	MAIN ST RT 20	0.42	2,160	5/10/2000	$72,500	1810	$33.56
Madison	Madison	102.-1-16.1	3963	AUGUSTA RD	0.90	1,680	5/12/2000	$28,000	1990	$16.67
Madison	Madison	126.-1-32.1	3381	FREDERICK RD	0.89	2,088	5/19/2000	$110,000	1984	$52.68
Madison	Madison	114.-1-42	7270	INDIAN	1.49	2,223	6/7/2000	$77,500	1850	$34.86
Madison	Madison	114.15-1-23	3712	NORTH ST	1.22	2,322	6/15/2000	$87,400	1940	$37.64
Madison	Madison	115.-1-1.1	3522	LOVEJOY RD	1.00	1,092	7/25/2000	$72,500	1990	$66.39
Madison	Madison	114.19-1-7	7280	RT 20	0.45	2,112	7/27/2000	$63,000	1850	$29.83
Madison	Madison	102.-1-16.1	3963	SOLSVILLE	0.90	1,680	10/5/2000	$40,000	1990	$23.81
Madison	Madison	126.-1-11	3200	WEST HILL ROAD	8.18	2,448	11/20/2000	$148,000	1966	$60.46
Madison	Madison	126.-1-61	3261	LOVEJOY RD	1.98	1,344	4/3/2001	$82,000	1990	$61.01
Madison	Madison	103.-1-23.11	4099	ST RTE 12B	1.59	1,906	4/17/2001	$70,000	1850	$36.73
Madison	Madison	114.15-1-29	3678	NORTH ST	0.34	1,374	6/8/2001	$52,500	1850	$38.21
Madison	Madison	114.15-1-61	7382	RT 20 E	0.25	1,651	7/23/2001	$47,000	1850	$28.47
Madison	Madison	114.15-1-43	7377	RT 20	0.30	1,271	7/25/2001	$48,000	1830	$37.77
Madison	Madison	115.-1-41	3840	CENTER RD	1.82	1,916	10/19/2001	$65,000	1900	$33.92
Madison	Madison	114.15-1-56	7400	RT 20 EAST	0.35	1,596	4/8/2002	$62,000	1815	$38.85
Madison	Madison	103.-1-41	4172	RT 12B	1.95	832	6/10/2002	$68,500	1952	$82.33
Madison	Madison	114.15-1-6	7321	ROUTE 20	0.50	2,240	7/31/2002	$83,900	1890	$37.46
Oneida	Sangerfield	397.000-1-32	805	PLEASANT	N/A	2,184	8/20/2002	$76,000	1920	$34.80
Madison	Madison	115.-1-27	3723	CENTER RD	1.75	1,728	11/14/2002	$120,000	1850	$69.44
Madison	Madison	126.-1-51	3200	W LAKE	2.57	1,108	11/19/2002	$58,000	1967	$52.35
Madison	Madison	114.15-1-25	3696	NORTH ST	0.22	1,566	3/10/2003	$21,000	1920	$13.41
Madison	Madison	114.19-1-54	3538	SOUTH ST	0.41	1,608	4/17/2003	$40,000	1910	$24.88
Madison	Madison	114.15-1-12	3665	NORTH ST	0.44	1,943	6/5/2003	$90,000	1914	$46.32
Madison	Madison	103.-1-56	4285	CAMP RD	0.41	922	8/12/2003	$64,000	1960	$69.41
Madison	Madison	103.-1-63	6676	SANGER HILL	1.36	1,326	11/13/2003	$85,000	1835	$64.10
Madison	Madison	114.19-1-42	3602	SOUTH ST	0.44	1,550	11/24/2003	$60,000	1865	$38.71
Madison	Madison	114.19-1-46	3502	SOUTH STREET	0.85	1,311	1/28/2004	$80,400	1924	$61.33
Madison	Madison	114.19-1-36	3513	SOUTH ST	0.21	1,650	2/23/2004	$88,250	1973	$53.48
Madison	Madison	126.-1-61	3261	LOVEJOY RD	1.98	1,344	2/23/2004	$95,000	1990	$70.68
Madison	Madison	126.-1-9.1	3353	WEST HILL RD	4.77	1,248	4/15/2004	$78,500	1975	$62.90
Madison	Madison	114.-1-33	3712	HORSESHOE	0.45	936	4/16/2004	$90,000	1973	$96.15
Madison	Madison	114.-2-19	7561	STATE ROUTE 20,	7.69	1,704	4/30/2004	$260,000	1875	$152.58
Madison	Madison	114.-1-16	3835	SOLSVILLE	0.50	1,508	6/11/2004	$67,000	1972	$44.43
Madison	Madison	114.15-1-5	7317	RT 20	0.39	1,868	6/30/2004	$95,000	1932	$50.86
Madison	Madison	114.15-1-42	7373	RT 20	0.72	2,138	6/30/2004	$70,000	1830	$32.74
Madison	Madison	126.-1-38.11	3458	FREDERICK RD	7.38	1,644	8/13/2004	$92,000	1988	$55.96
Madison	Madison	114.19-1-42	3602	SOUTH ST	0.44	1,550	8/29/2004	$110,000	1865	$70.97
Madison	Madison	114.-2-31	7474	RT 20	0.12	768	9/29/2004	$21,275	1935	$27.70
Madison	Madison	114.-2-34	7490	ROUTE 20	0.45	1,359	9/29/2004	$55,000	1875	$40.47
Madison	Madison	114.19-1-7	7280	ROUTE 20W	0.45	2,112	11/5/2004	$66,000	1850	$31.25
Madison	Madison	114.15-1-54	7406	STATE RT 20	0.47	1,200	1/25/2005	$71,500	1968	$59.58
Madison	Madison	103.-1-40.2	4874	STATE RTE 12B	3.21	1,836	1/31/2005	$55,000	1995	$29.96
Madison	Madison	114.15-1-41	7363	ST RT 20	0.60	2,030	4/13/2005	$31,500	1850	$15.52
Madison	Madison	103.-1-23.13	4759	NYS RT 12B	1.39	1,906	4/26/2005	$86,000	1850	$45.12
Madison	Madison	126.-1-17.2	7124	HILLCREST RD	1.83	2,240	7/7/2005	$82,500	1997	$36.83
Madison	Madison	115-1-34	8141	ROUTE 20	2.48	2,542	10/17/2005	$90,000	1805	$35.41
Madison	Madison	114.19-1-35	3519	SOUTH ST.	0.10	814	10/21/2005	$61,000	1948	$74.94
Madison	Madison	114.15-1-47	7401	Route 20	0.32	1,845	11/15/2005	$59,000	1905	$31.98
Madison	Madison	126-1-70	3134	CENTER RD	1.41	1,271	2/7/2006	$67,500	1880	$53.11
Madison	Madison	114.19-1-56	3524	SOUTH ST.	0.41	1,288	3/27/2006	$86,000	1978	$66.77
Madison	Madison	114.15-1-26	3692	NORTH ST.	0.23	1,448	7/28/2006	$27,500	1870	$18.99
Madison	Madison	138.00-1-28	3115	LAKE MORRAINE	4.3	888	8/2/2006	$130,000	1961	$146.40
Madison	Hamilton	154.00-2-49.118	5605	LAKEVIEW CT	2.9	2,400	8/15/2006	$380,000	2005	$158.33
Madison	Hamilton	154.00-2-49.5	5551	LAKEVIEW CT	2.34	2,340	8/17/2006	$258,000	2003	$110.26
Madison	Waterville	391.00-1-57	1394	BROTHERTOWN F	0.94	3,024	9/1/2006	$141,000	1980	$46.63
Madison	Hamilton	126.00-1-14	3161	W HILL RD	1.08	1,920	9/29/2006	$99,000	1830	$51.56
Madison	Madison	126.00-1-62	3139	CENTER RD	1.72	2,092	10/2/2006	$162,500	1900	$77.68
Oneida	Oriskany Falls	390.06-1-2.2	6320	BARKER RD	0.92	1,483	10/6/2006	$73,140	2000	$49.32
Madison	Madison	114.00-1-2	3920	STRATFORD ST	0.48	1,150	11/6/2006	$75,000	2000	$65.22
Madison	Madison	125.08-1-19	6845	US ROUTE 20	0.69	1,664	11/14/2006	$107,900	1870	$64.84
Madison	Sangerfield	391.00-1-12	7065	SANGER HILL RD	0.65	2,960	11/15/2006	$96,500	1960	$32.60
Madison	Madison	125.07-1-31	6763	US ROUTE 20	0.28	1,667	11/29/2006	$70,000	1900	$41.99
Madison	Waterville	391.00-1-20	1342	BROTHERTOWN F	0.48	1,404	1/3/2007	$167,890	1974	$119.58
Oneida	Oriskany Falls	381.00-1-39.7	101	PINEHURST LN	1.16	1,800	5/3/2007	$250,000	2003	$138.89
Madison	Hamilton	138.-1-55.12	5483	HILL RD	4.59	2,616	7/2/2007	$395,000	1988	$150.99
Oneida	Oriskany Falls	381.19-1-34	253	MAIN ST	2.8	2,592	7/17/2007	$67,980	1910	$26.23
Madison	Madison	154.-2-49.2	5124	HILL RD	0.81	1,440	7/30/2007	$130,000	1977	$90.28
Madison	Madison	126.-1-42	3373	FREDERICK RD	0.53	1,216	8/31/2007	$97,400	1948	$80.10
							Average=	**$93,648**		**$56.07**
							Median =	**$76,000**		**$46.63**

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The previous sales are located within a five mile radius of the wind farm. As can be seen on the previous sales grid there is a wide range of property sizes, land areas and age. The sales indicate a wide range of value which is typical in a rural market with limited homogeneity as compared to city or suburban properties. The sales area considered a representative sampling of the property types in the market. According to the 2005 city-data.com estimates the median house value in the Town of Madison was $90,600.

The median house value in the target area was indicated at $57,950 from 1995-1999 and $76,000 from 2000-2007 indicating a 31.15% increase over a 6 ½ year period or 4.79% annually.

The median house value for the county from 2004 to 2007 is as follows:

Madison County:

2004		2005		2006		2007	
# Sales	**Median**	**# Sales**	**Median**	**# Sales**	**Median**	**#Sales**	**Median**
800	$94,900	860	$107,000	867	$113,000	761	$120,900

The county median sales price was $94,900 in 2004 trending upward in 2005, 2006 and 2007 to $120,900 according to the New York State Office of Real Property Services. This indicates a 27.40% increase over a four year period or 6.85% annually which is slightly greater than the target area indicating a 4.79% annual increase. This difference can have a number of underlying causes. These include discrepancies in the sample sizes used in the analysis and those used by the Office of Real Property Services as well as differing levels of appreciation and volume of transactions in the varying towns within the county. It is impossible with the amount of data available to attribute the difference to the construction and operation of the wind farm.

As can be seen by the above sales data there appears to be no significant influence on property values since the construction and operation of the wind farm. Average and median sales prices on a whole have increased indicating that the existence of the wind farm has not diminished real property values in this sub market. Additionally, the subject target area has appreciated at a rate reasonably similar to the remaining county.

As indicated, there are a limited number of properties with direct views of the wind farm due to extreme topography changes. Therefore the view shed, any noise level and potential for shadow flickers from the blades is mitigated. This is typical with wind farms due to the high elevations and rural nature of the project areas.

Overall, there is considered to be no stigma attached to the project due to the continual sale and resale of properties near the project and considering that the values have appreciated at similar rate when compared to the rest of the county.

Additionally sales and re-sales of properties were considered within the market as follows:

County	Municipality	Address	Street	Sale Date	Sale Price
Madison	Madison	3963	AUGUSTA RD	5/12/2000	$28,000
Madison	Madison	3963	SOLSVILLE AUGUSTA RD	10/5/2000	$40,000
Madison	Madison	7481	WATER ST	8/22/1997	$43,000
Madison	Madison	7481	WATER ST	9/30/1999	$46,000
Madison	Madison	3835	SOLSVILLE RD	9/8/1998	$65,000
Madison	Madison	3835	SOLSVILLE RD	6/11/2004	$67,000
Madison	Madison	7561	ROUTE 20	1/19/1996	$150,000
Madison	Madison	7561	STATE ROUTE 20, EAST	4/30/2004	$260,000
Madison	Madison	7400	ROUTE 20 E	2/7/1998	$38,000
Madison	Madison	7400	RT 20 EAST	4/8/2002	$62,000
Madison	Madison	7280	RT 20	7/27/2000	$63,000
Madison	Madison	7280	ROUTE 20W	11/5/2004	$66,000
Madison	Madison	3513	SOUTH ST	12/27/1996	$40,700
Madison	Madison	3513	SOUTH ST	2/23/2004	$88,250
Madison	Madison	3602	SOUTH ST	11/24/2003	$60,000
Madison	Madison	3602	SOUTH ST	8/29/2004	$110,000
Madison	Madison		RT 12B	9/19/1997	$75,000
Madison	Madison		RT 12B	12/10/1999	$75,000
Madison	Madison	3261	LOVEJOY RD	4/3/2001	$82,000
Madison	Madison	3261	LOVEJOY RD	2/23/2004	$95,000
Madison	Madison	2871	JC HILL RD	7/3/1996	$180,000
Madison	Madison	2871	JOHNNY CAKE HILL RD	7/28/2003	$205,000
Madison	Madison	2821	JC HILL RD	8/21/1998	$139,000
Madison	Madison	2821	JOHNNYCAKE HILL RD	7/15/2002	$172,500
Madison	Madison	1776	CARTER RD	11/7/1997	$80,000
Madison	Madison	1776	CARTER RD	7/12/2001	$95,000
Madison	Madison	6831	AIRPORT RD	1/27/1999	$200,000
Madison	Madison	6831	AIRPORT RD	6/26/2002	$235,000
Madison	Madison	6899	AIRPORT RD	5/4/1995	$84,000
Madison	Madison	6899	AIRPORT RD	11/24/2004	$130,000
Madison	Madison	6899	AIRPORT RD	8/10/2005	$151,000
Madison	Madison	6725	ENGLISH AVE	12/15/1999	$87,800
Madison	Madison	6725	ENGLISH AVE	2/19/2003	$142,000
Madison	Madison	6753	ENGLISH AVE	11/1/1995	$85,000
Madison	Madison	6753	ENGLISH AVE	10/15/2004	$130,000
Madison	Madison	6660	ENGLISH AVE	8/25/2000	$83,000
Madison	Madison	6660	ENGLISH AVE	5/10/2002	$110,000
Madison	Madison	6661	ENGLISH AVE	5/7/1997	$110,000
Madison	Madison	6661	ENGLISH AVE	3/21/2003	$138,000
Madison	Madison	6655	ENGLISH AVE	3/26/1999	$73,000
Madison	Madison	6655	ENGLISH AVE	6/7/2002	$100,000
Madison	Madison	2468	JC HILL RD	1/1/1995	$62,000
Madison	Madison	2468	JOHNNY CAKE HILL RD	6/2/2000	$66,500
Madison	Madison	7005	WEST LAKE RD	6/28/1999	$103,000
Madison	Madison	7005	SPILLWAY RD	11/21/2003	$137,000
Madison	Madison	7231	BUTTERNUT LANE	2/26/1998	$89,500
Madison	Madison	7231	BUTTERNUT LANE	5/12/2004	$120,000
Madison	Madison	7310	LAKEVIEW COURT	7/28/1997	$141,500
Madison	Madison	7310	LAKEVIEW COURT	5/24/1999	$149,500

SALES /RE-SALES (Cont'd.)

County	Municipality	Address	Street	Sale Date	Sale Price
Madison	Madison	7296	HILL RD	3/26/1996	$78,000
Madison	Madison	7296	HILL RD	8/7/2002	$117,000
Madison	Madison		HILL RD	12/15/2000	$225,000
Madison	Madison		HILL RD	6/11/2004	$200,000
Madison	Madison	2385	BROOKVIEW DR	7/7/1999	$108,000
Madison	Madison	2385	BROOKVIEW DR	6/26/2001	$137,000
Madison	Madison	2390	MEADOW LANE	2/6/1997	$122,000
Madison	Madison	2390	MEADOW LANE	7/27/2004	$135,000
Oneida	Sangerfield	1362	BROTHERTOWN RD	8/6/1997	$45,000
Oneida	Sangerfield	1362	BROTHERTOWN RD	11/23/1998	$42,000
Oneida	Sangerfield	7247	MADISON ST	9/12/2001	$82,000
Oneida	Sangerfield	7247	MADISON ST	5/12/2003	$91,000
Oneida	Sangerfield		ROUTE 20	7/3/2003	$25,000
Oneida	Sangerfield		US RTE 20	4/28/2004	$31,000
Oneida	Waterville	136	ELMWOOD AVE SS	7/11/1996	$43,500
Oneida	Waterville	136	ELMWOOD AVE SS	10/26/2005	$72,000
Oneida	Waterville	120	ELMWOOD AVE ES	8/18/1998	$45,000
Oneida	Waterville	120	ELMWOOD AVE	10/6/2003	$75,500
Oneida	Waterville	359	PUTNAM ST	3/22/1996	$96,000
Oneida	Waterville	359	PUTNAM ST	9/2/1999	$100,000
Oneida	Waterville	359	PUTNAM ST	7/11/2005	$157,000
Oneida	Waterville	101	S STAFFORD AVE	2/26/1998	$85,000
Oneida	Waterville	101	S STAFFORD AVE	5/14/2002	$146,000
Oneida	Waterville	146	STAFFORD AVE ES	2/12/1998	$99,000
Oneida	Waterville	146	STAFFORD AVE ES	11/7/2003	$124,020
Oneida	Waterville	145	BABBOTT AVE	6/9/2004	$52,500
Oneida	Waterville	145	BABBOTT AVE WS	10/10/2005	$78,000
Oneida	Waterville	131	MAIN ST NS	7/8/1999	$34,500
Oneida	Waterville	131	MAIN ST	9/28/2005	$55,000
Oneida	Waterville	156	ELMWOOD AVE SS	5/11/1999	$40,000
Oneida	Waterville	156	ELMWOOD AVE	9/27/2005	$75,531
Oneida	Waterville	173	MADISON ST	10/23/2000	$45,000
Oneida	Waterville	173	MADISON ST	7/13/2001	$40,500
Oneida	Waterville	124	DOOLITTLE AVE WS	4/17/1998	$38,000
Oneida	Waterville	124	DOOLITTLE AVE	8/4/2001	$76,000
Oneida	Waterville	124	DOOLITTLE AV	11/23/2004	$93,000
Oneida	Waterville	215	OSBORNE AVE	4/7/2003	$52,900
Oneida	Waterville	215	OSBORNE AVE	4/8/2005	$53,000
Oneida	Waterville	155	OSBORNE AVE ES	5/21/1997	$57,500
Oneida	Waterville	155	OSBORNE AVE	8/1/2001	$63,000
Oneida	Waterville	101	DOOLITTLE AVE ES	12/12/1996	$85,000
Oneida	Waterville	101	DOOLITTLE AVE ES	7/3/2000	$116,500
Oneida	Waterville	539	WHITE ST	1/19/2001	$117,000
Oneida	Waterville	539	WHITE ST	5/9/2002	$130,000
Oneida	Waterville	245	OSBORNE AVE ES	12/27/2004	$82,500
Oneida	Waterville	245	OSBORNE AVE ES	10/7/2005	$110,200

As is evident by the above correlated sales, there appears to be little to no effect on real estate values of the respective properties subsequent to the construction and operation of the facility. Of the 46 sales analyzed 42 increased in value, 3 decreased and 1 stayed the same. This analysis did not include an interview with the respective property owners at the time of sale to determine any underlying factors which may have additionally impacted sales prices. (i.e. capital improvements, additions, deferred maintenance). Furthermore, since these sales are retrospective it is unlikely that the owners would recall the specifics at the time of sale and realtor information of this detail is not typically included in their reports. However, the sales data utilized is considered representative of the market as a whole and it is unlikely that every property had some or all of the previously mentioned underlying factors impacting their respective properties from sale date to resale.

In conclusion it appears that the existence of the wind farm does not appear to have any impact on surrounding property values as a whole.

In addition the sales data was broken down by distance to the wind farm. Targeted areas of 0-1 miles, 1-2 miles, 2-3 miles, 3-4 miles and 4-5 miles were utilized. Unfortunately limited sales data in this rural market makes this technique unreliable in producing meaningful results. The data is broken down as follows:

1995-1999 (0-1 Miles) – No Data

2000-2007 (0-1 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	115.-1-41	3840	CENTER RD	1.82	1,916	10/19/2001	$65,000	1900	$33.92
Madison	Madison	115.-1-27	3723	CENTER RD	1.75	1,728	11/14/2002	$120,000	1850	$69.44
Madison	Madison	115-1-34	8141	ROUTE 20	2.48	2,542	10/17/2005	$90,000	1805	$35.41

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	127.-1-15	3430	CENTER RD	3.08	1,254	12/9/1999	$69,000	1974	$55.02

2000-2007 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	115.-1-1.1	3522	LOVEJOY RD	1.00	1,092	7/25/2000	$72,500	1990	$66.39
Madison	Madison	126.-1-61	3261	LOVEJOY RD	1.98	1,344	4/3/2001	$82,000	1990	$61.01
Madison	Madison	103.-1-41	4172	RT 12B	1.95	832	6/10/2002	$68,500	1952	$82.33
Oneida	Sangerfield	397.000-1-32	805	PLEASANT VALLEY RD	N/A	2,184	8/20/2002	$76,000	1920	$34.80
Madison	Madison	126.-1-61	3261	LOVEJOY RD	1.98	1,344	2/23/2004	$95,000	1990	$70.68
Madison	Madison	103.-1-40.2	4874	STATE RTE 12B	3.21	1,836	1/31/2005	$55,000	1995	$29.96
Madison	Madison	103.-1-23.13	4759	NYS RT 12B	1.39	1,906	4/26/2005	$86,000	1850	$45.12

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Oneida	Sangerfield	19.1	715	MASON RD	100.50	2,072	4/5/1995	$106,800	1840	$51.54
Madison	Madison	114.-2-19	7561	ROUTE 20	7.69	1,704	1/19/1996	$150,000	1875	$88.03
Madison	Madison	114.-2-35	7490	ROUTE 20	0.45	1,359	3/8/1996	$56,000	1875	$41.21
Madison	Madison	114.-1-75.2	3652	MADISON LAKE	7.79	768	6/27/1996	$135,000	1960	$175.78
Madison	Madison	126.-1-36.3	3355	FREDERICK RD	3.15	2,160	8/19/1996	$76,500	1970	$35.42
Madison	Madison	114.19-1-36	3513	SOUTH ST	0.21	1,650	12/27/1996	$40,700	1973	$24.67
Madison	Madison	114.15-1-36	7337	ROUTE 20 E	0.21	1,832	6/24/1997	$35,500	1885	$19.38
Madison	Madison	102.-1-59	7481	WATER ST	3.31	2,269	8/22/1997	$43,000	1850	$18.95
Madison	Madison	114.15-1-7	7323	ROUTE 20 W	6.50	2,892	10/27/1997	$80,000	1840	$27.66
Madison	Madison	114.15-1-55	7402	ROUTE 20 E	0.49	2,768	2/7/1998	$20,000	1815	$7.23
Madison	Madison	114.15-1-56	7400	ROUTE 20 E	0.35	1,596	2/7/1998	$38,000	1815	$23.81
Madison	Madison	102.-1-43	7470	BROOKSIDE RD	1.05	1,691	5/11/1998	$59,900	1905	$35.42
Madison	Madison	102.-1-47	7523	VALLEY RD	0.13	1,080	6/1/1998	$33,200	1860	$30.74
Madison	Madison	114.19-1-30	3571	SOUTH ST	0.26	1,115	7/15/1998	$43,000	1920	$38.57
Madison	Madison	126.-1-62	3247	CENTER RD	1.72	2,092	8/7/1998	$68,600	1900	$32.79
Madison	Madison	114.-2-33	7484	ROUTE 20	1.72	2,379	3/8/1999	$87,500	1900	$36.78
Madison	Madison	126.-1-56	3275	LOVEJOY RD	0.43	1,730	5/18/1999	$45,000	1850	$26.01
Madison	Madison	114.-2-32	7478	ROUTE 20	0.54	1,287	8/31/1999	$55,000	1840	$42.74
Madison	Madison	102.-1-59	7481	WATER ST	8.00	2,269	9/30/1999	$46,000	1850	$20.27
Madison	Madison	114.19-1-11	7306	ROUTE 20 W	0.85	1,233	10/29/1999	$50,000	1850	$40.55

Median = $52,500 $34.10

2000-2007 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	114.6-1-5	3885	AUGUSTA RD	0.56	1,920	4/28/2000	$20,000	1890	$10.42
Madison	Madison	114.19-1-15.1	7316	MAIN ST RT 20	0.42	2,160	5/10/2000	$72,500	1810	$33.56
Madison	Madison	126.-1-32.1	3381	FREDERICK RD	0.89	2,088	5/19/2000	$110,000	1984	$52.68
Madison	Madison	114.15-1-23	3712	NORTH ST	1.22	2,322	6/15/2000	$87,400	1940	$37.64
Madison	Madison	103.-1-23.11	4099	ST RTE 12B	1.59	1,906	4/17/2001	$70,000	1850	$36.73
Madison	Madison	114.15-1-29	3678	NORTH ST	0.34	1,374	6/8/2001	$52,500	1850	$38.21
Madison	Madison	114.15-1-61	7382	RT 20 E	0.25	1,651	7/23/2001	$47,000	1850	$28.47
Madison	Madison	114.15-1-43	7377	RT 20	0.30	1,271	7/25/2001	$48,000	1830	$37.77
Madison	Madison	114.15-1-56	7400	RT 20 EAST	0.35	1,596	4/8/2002	$62,000	1815	$38.85
Madison	Madison	114.15-1-6	7321	ROUTE 20	0.50	2,240	7/31/2002	$83,900	1890	$37.46
Madison	Madison	126.-1-51	3200	W LAKE MORAINE RD	2.57	1,108	11/19/2002	$58,000	1967	$52.35
Madison	Madison	114.15-1-25	3696	NORTH ST	0.22	1,566	3/10/2003	$21,000	1920	$13.41
Madison	Madison	114.19-1-54	3538	SOUTH ST	0.41	1,608	4/17/2003	$40,000	1910	$24.88
Madison	Madison	114.15-1-12	3665	NORTH ST	0.44	1,943	6/5/2003	$90,000	1914	$46.32
Madison	Madison	103.-1-56	4285	CAMP RD	0.41	922	8/12/2003	$64,000	1960	$69.41
Madison	Madison	103.-1-63	6676	SANGER HILL ROAD	1.36	1,326	11/13/2003	$85,000	1835	$64.10
Madison	Madison	114.19-1-42	3602	SOUTH ST	0.44	1,550	11/24/2003	$60,000	1865	$38.71
Madison	Madison	114.19-1-46	3502	SOUTH STREET	0.85	1,311	1/28/2004	$80,400	1924	$61.33
Madison	Madison	114.19-1-36	3513	SOUTH ST	0.21	1,650	2/23/2004	$88,250	1973	$53.48
Madison	Madison	114.-2-19	7561	STATE ROUTE 20, EAST	7.69	1,704	4/30/2004	$260,000	1875	$152.58
Madison	Madison	114.15-1-5	7317	RT 20	0.39	1,868	6/30/2004	$95,000	1932	$50.86
Madison	Madison	114.15-1-42	7373	RT 20	0.72	2,138	6/30/2004	$70,000	1830	$32.74
Madison	Madison	126.-1-38.11	3458	FREDERICK RD	7.38	1,644	8/13/2004	$92,000	1988	$55.96
Madison	Madison	114.19-1-42	3602	SOUTH ST	0.44	1,550	8/29/2004	$110,000	1865	$70.97
Madison	Madison	114.-2-31	7474	RT 20	0.12	768	9/29/2004	$21,275	1935	$27.70
Madison	Madison	114.-2-34	7490	ROUTE 20	0.45	1,359	9/29/2004	$55,000	1875	$40.47
Madison	Madison	114.15-1-54	7406	STATE RT 20	0.47	1,200	1/25/2005	$71,500	1968	$59.58
Madison	Madison	114.15-1-41	7363	ST RT 20	0.60	2,030	4/13/2005	$31,500	1850	$15.52
Madison	Madison	114.19-1-35	3519	SOUTH ST.	0.10	814	10/21/2005	$61,000	1948	$74.94
Madison	Madison	114.15-1-47	7401	Route 20	0.32	1,845	11/15/2005	$59,000	1905	$31.98
Madison	Madison	126-1-70	3134	CENTER RD	1.41	1,271	2/7/2006	$67,500	1880	$53.11
Madison	Madison	114.19-1-56	3524	SOUTH ST.	0.41	1,288	3/27/2006	$86,000	1978	$66.77
Madison	Madison	114.15-1-26	3692	NORTH ST.	0.23	1,448	7/28/2006	$27,500	1870	$18.99
Madison	Waterville	391.00-1-57	1394	BROTHERTOWN RD	0.94	3,024	9/1/2006	$141,000	1980	$46.63
Oneida	Oriskany Falls	390.06-1-2.2	6320	BARKER RD	0.92	1,483	10/6/2006	$73,140	2000	$49.32
Madison	Sangerfield	391.00-1-12	7065	SANGER HILL RD	0.65	2,960	11/15/2006	$96,500	1960	$32.60
Madison	Waterville	391.00-1-20	1342	BROTHERTOWN RD	0.48	1,404	1/3/2007	$167,890	1974	$119.58
Oneida	Oriskany Falls	381.19-1-34	253	MAIN ST	2.8	2,592	7/17/2007	$67,980	1910	$26.23

Median= $70,000 $39.66

This distance bin had the most available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 5.13% annually which is a slightly higher rate than the 4.79% for the entire view shed.

1995-1999 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	114.6-1-17	7264	VALLEY RD	0.23	1,658	2/1/1995	$22,000	1870	$13.27
Madison	Madison	114.-1-43	3753	SOLSVILLE RD	0.12	1,146	6/16/1995	$37,000	1955	$32.29
Madison	Madison	102.-1-15.13	4017	STRATFORD ST	2.44	2,722	3/1/1996	$77,500	1902	$28.47
Madison	Madison	114.6-1-18	7267	VALLEY RD	0.29	1,538	1/20/1998	$21,500	1875	$13.98
Madison	Madison	114.-1-16	3835	SOLSVILLE RD	0.50	1,508	9/8/1998	$65,000	1972	$43.10
Madison	Madison	102.-1-14	4032	BIRD RD	2.16	720	6/14/1999	$72,000	1977	$100.00

2000-2007 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	102.-1-34	4317	SOLSVILLE-AUGUSTA RD	1.87	1,395	2/25/2000	$50,000	1958	$35.84
Madison	Madison	102.-1-16.1	3963	AUGUSTA RD	0.90	1,680	5/12/2000	$28,000	1990	$16.67
Madison	Madison	114.-1-42	7270	INDIAN OPEINING RD	1.49	2,223	6/7/2000	$77,500	1850	$34.86
Madison	Madison	114.19-1-7	7280	RT 20	0.45	2,112	7/27/2000	$63,000	1850	$29.83
Madison	Madison	102.-1-16.1	3963	SOLSVILLE AUGUSTA RD	0.90	1,680	10/5/2000	$40,000	1990	$23.81
Madison	Madison	126.-1-11	3200	WEST HILL ROAD	8.18	2,448	11/20/2000	$148,000	1966	$60.46
Madison	Madison	114.-1-33	3712	HORSESHOE BEND	0.45	936	4/16/2004	$90,000	1973	$96.15
Madison	Madison	114.-1-16	3835	SOLSVILLE ROAD	0.50	1,508	6/11/2004	$67,000	1972	$44.43
Madison	Madison	114.19-1-7	7280	ROUTE 20W	0.45	2,112	11/5/2004	$66,000	1850	$31.25
Madison	Madison	126.-1-17.2	7124	HILLCREST RD	1.83	2,240	7/7/2005	$82,500	1997	$36.83
Madison	Madison	138.00-1-28	3115	LAKE MORRAINE RD	4.3	888	8/2/2006	$130,000	1961	$146.40
Madison	Madison	126.00-1-62	3139	CENTER RD	1.72	2,092	10/2/2006	$162,500	1900	$77.68
Madison	Madison	126.-1-42	3373	FREDERICK RD	0.53	1,216	8/31/2007	$97,400	1948	$80.10

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (4-5 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	126.-1-6.2	3631	RT 12B	4.77	2,320	9/19/1997	$75,000	1878	$32.33
Madison	Madison	103.-1-55	4239	CAMP RD	3.62	1,457	3/11/1999	$66,000	1966	$45.30
Madison	Madison	126.-1-6.2	3487	RT 12B	4.77	2,320	12/10/1999	$75,000	1878	$32.33

2000-2007 (4-5 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Year Built	Price/SF
Madison	Madison	126.-1-9.1	3353	WEST HILL RD	4.77	1,248	4/15/2004	$78,500	1975	$62.90
Madison	Hamilton	154.00-2-49.11	5605	LAKEVIEW CT	2.9	2,400	8/15/2006	$380,000	2005	$158.33
Madison	Hamilton	154.00-2-49.5	5551	LAKEVIEW CT	2.34	2,340	8/17/2006	$258,000	2003	$110.26
Madison	Hamilton	126.00-1-14	3161	W HILL RD	1.08	1,920	9/29/2006	$99,000	1830	$51.56
Madison	Madison	114.00-1-2	3920	STRATFORD ST	0.48	1,150	11/6/2006	$75,000	2000	$65.22
Madison	Madison	125.08-1-19	6845	US ROUTE 20	0.69	1,664	11/14/2006	$107,900	1870	$64.84
Madison	Madison	125.07-1-31	6763	US ROUTE 20	0.28	1,667	11/29/2006	$70,000	1900	$41.99
Oneida	Oriskany Falls	381.00-1-39.7	101	PINEHURST LN	1.16	1,800	5/3/2007	$250,000	2003	$138.89
Madison	Hamilton	138.-1-55.12	5483	HILL RD	4.59	2,616	7/2/2007	$395,000	1988	$150.99

There is insufficient data available for meaningful comparison in this distance bin.

Again the limited sales data for this comparable offers few insights when based on distance to the wind farm. Most of the sales were located in the 2-3 mile distance bin which demonstrated a 5.13% annual appreciation rate. Without more data it is impossible to determine if the property values within each distance bin were uniquely affected. In order to further explore the correlation between distance and property values the paired sales analysis was broken down by the same distance bins.

County	Municipality	Address	Street	Sale Date	Sale Price	Distance
Madison	Madison	3963	AUGUSTA RD	5/12/2000	$28,000	
Madison	Madison	3963	SOLSVILLE AUGUSTA RD	10/5/2000	$40,000	3-4
Madison	Madison	7481	WATER ST	8/22/1997	$43,000	
Madison	Madison	7481	WATER ST	9/30/1999	$46,000	2-3
Madison	Madison	3835	SOLSVILLE RD	9/8/1998	$65,000	
Madison	Madison	3835	SOLSVILLE RD	6/11/2004	$67,000	3-4
Madison	Madison	7561	ROUTE 20	1/19/1996	$150,000	
Madison	Madison	7561	STATE ROUTE 20, EAST	4/30/2004	$260,000	2-3
Madison	Madison	7400	ROUTE 20 E	2/7/1998	$38,000	
Madison	Madison	7400	RT 20 EAST	4/8/2002	$62,000	2-3
Madison	Madison	7280	RT 20	7/27/2000	$63,000	
Madison	Madison	7280	ROUTE 20W	11/5/2004	$66,000	2-3
Madison	Madison	3513	SOUTH ST	12/27/1996	$40,700	
Madison	Madison	3513	SOUTH ST	2/23/2004	$88,250	2-3
Madison	Madison	3602	SOUTH ST	11/24/2003	$60,000	
Madison	Madison	3602	SOUTH ST	8/29/2004	$110,000	2-3
Madison	Madison		RT 12B	9/19/1997	$75,000	
Madison	Madison		RT 12B	12/10/1999	$75,000	4-5
Madison	Madison	3261	LOVEJOY RD	4/3/2001	$82,000	
Madison	Madison	3261	LOVEJOY RD	2/23/2004	$95,000	1-2
Madison	Madison	2871	JC HILL RD	7/3/1996	$180,000	
Madison	Madison	2871	JOHNNY CAKE HILL RD	7/28/2003	$205,000	>5
Madison	Madison	2821	JC HILL RD	8/21/1998	$139,000	
Madison	Madison	2821	JOHNNYCAKE HILL RD	7/15/2002	$172,500	>5
Madison	Madison	1776	CARTER RD	11/7/1997	$80,000	
Madison	Madison	1776	CARTER RD	7/12/2001	$95,000	3-4
Madison	Madison	6831	AIRPORT RD	1/27/1999	$200,000	
Madison	Madison	6831	AIRPORT RD	6/26/2002	$235,000	>5
Madison	Madison	6899	AIRPORT RD	5/4/1995	$84,000	
Madison	Madison	6899	AIRPORT RD	11/24/2004	$130,000	
Madison	Madison	6899	AIRPORT RD	8/10/2005	$151,000	>5
Madison	Madison	6725	ENGLISH AVE	12/15/1999	$87,800	
Madison	Madison	6725	ENGLISH AVE	2/19/2003	$142,000	>5
Madison	Madison	6753	ENGLISH AVE	11/1/1995	$85,000	
Madison	Madison	6753	ENGLISH AVE	10/15/2004	$130,000	>5
Madison	Madison	6660	ENGLISH AVE	8/25/2000	$83,000	
Madison	Madison	6660	ENGLISH AVE	5/10/2002	$110,000	>5
Madison	Madison	6661	ENGLISH AVE	5/7/1997	$110,000	
Madison	Madison	6661	ENGLISH AVE	3/21/2003	$138,000	>5
Madison	Madison	6655	ENGLISH AVE	3/26/1999	$73,000	
Madison	Madison	6655	ENGLISH AVE	6/7/2002	$100,000	>5
Madison	Madison	2468	JC HILL RD	1/1/1995	$62,000	
Madison	Madison	2468	JOHNNY CAKE HILL RD	6/2/2000	$66,500	>5
Madison	Madison	7005	WEST LAKE RD	6/28/1999	$103,000	
Madison	Madison	7005	SPILLWAY RD	11/21/2003	$137,000	>5
Madison	Madison	7231	BUTTERNUT LANE	2/26/1998	$89,500	
Madison	Madison	7231	BUTTERNUT LANE	5/12/2004	$120,000	4-5
Madison	Madison	7310	LAKEVIEW COURT	7/28/1997	$141,500	
Madison	Madison	7310	LAKEVIEW COURT	5/24/1999	$149,500	4-5

County	Municipality	Address	Street	Sale Date	Sale Price	Distance
Madison	Madison	7296	HILL RD	3/26/1996	$78,000	
Madison	Madison	7296	HILL RD	8/7/2002	$117,000	4-5
Madison	Madison		HILL RD	12/15/2000	$225,000	
Madison	Madison		HILL RD	6/11/2004	$200,000	3-4
Madison	Madison	2385	BROOKVIEW DR	7/7/1999	$108,000	
Madison	Madison	2385	BROOKVIEW DR	6/26/2001	$137,000	>5
Madison	Madison	2390	MEADOW LANE	2/6/1997	$122,000	
Madison	Madison	2390	MEADOW LANE	7/27/2004	$135,000	>5
Oneida	Sangerfield	1362	BROTHERTOWN RD	8/6/1997	$45,000	
Oneida	Sangerfield	1362	BROTHERTOWN RD	11/23/1998	$42,000	2-3
Oneida	Sangerfield	7247	MADISON ST	9/12/2001	$82,000	
Oneida	Sangerfield	7247	MADISON ST	5/12/2003	$91,000	3-4
Oneida	Sangerfield		ROUTE 20	7/3/2003	$25,000	
Oneida	Sangerfield		US RTE 20	4/28/2004	$31,000	N/A
Oneida	Waterville	136	ELMWOOD AVE SS	7/11/1996	$43,500	
Oneida	Waterville	136	ELMWOOD AVE SS	10/26/2005	$72,000	4-5
Oneida	Waterville	120	ELMWOOD AVE ES	8/18/1998	$45,000	
Oneida	Waterville	120	ELMWOOD AVE	10/6/2003	$75,500	4-5
Oneida	Waterville	359	PUTNAM ST	3/22/1996	$96,000	
Oneida	Waterville	359	PUTNAM ST	9/2/1999	$100,000	
Oneida	Waterville	359	PUTNAM ST	7/11/2005	$157,000	4-5
Oneida	Waterville	101	S STAFFORD AVE	2/26/1998	$85,000	
Oneida	Waterville	101	S STAFFORD AVE	5/14/2002	$146,000	4-5
Oneida	Waterville	146	STAFFORD AVE ES	2/12/1998	$99,000	
Oneida	Waterville	146	STAFFORD AVE ES	11/7/2003	$124,020	4-5
Oneida	Waterville	145	BABBOTT AVE	6/9/2004	$52,500	
Oneida	Waterville	145	BABBOTT AVE WS	10/10/2005	$78,000	4-5
Oneida	Waterville	131	MAIN ST NS	7/8/1999	$34,500	
Oneida	Waterville	131	MAIN ST	9/28/2005	$55,000	4-5
Oneida	Waterville	156	ELMWOOD AVE SS	5/11/1999	$40,000	
Oneida	Waterville	156	ELMWOOD AVE	9/27/2005	$75,531	4-5
Oneida	Waterville	173	MADISON ST	10/23/2000	$45,000	
Oneida	Waterville	173	MADISON ST	7/13/2001	$40,500	4-5
Oneida	Waterville	124	DOOLITTLE AVE WS	4/17/1998	$38,000	
Oneida	Waterville	124	DOOLITTLE AVE	8/4/2001	$76,000	
Oneida	Waterville	124	DOOLITTLE AV	11/23/2004	$93,000	4-5
Oneida	Waterville	215	OSBORNE AVE	4/7/2003	$52,900	
Oneida	Waterville	215	OSBORNE AVE	4/8/2005	$53,000	4-5
Oneida	Waterville	155	OSBORNE AVE ES	5/21/1997	$57,500	
Oneida	Waterville	155	OSBORNE AVE	8/1/2001	$63,000	4-5
Oneida	Waterville	101	DOOLITTLE AVE ES	12/12/1996	$85,000	
Oneida	Waterville	101	DOOLITTLE AVE ES	7/3/2000	$116,500	4-5
Oneida	Waterville	539	WHITE ST	1/19/2001	$117,000	
Oneida	Waterville	539	WHITE ST	5/9/2002	$130,000	4-5
Oneida	Waterville	245	OSBORNE AVE ES	12/27/2004	$82,500	
Oneida	Waterville	245	OSBORNE AVE ES	10/7/2005	$110,200	4-5

Once again a lack of sufficient data renders this approach limited in usefulness. The three sales that declined in value were located in the 2-3 mile, 3-4 mile and 4-5 mile distance bins. Each of these distance bins have numerous other sales that demonstrate an appreciation in value and therefore no definitive conclusion can be reached. The data does not indicate a trend by distance but does indicate an overall increase in value for the market.

Fenner Wind Farm
Madison County, New York

The Fenner Wind Farm came online in November 2001. Sales data from 1995 to 1999 in the subject market area will be compared to sales data from 2000 to 2007. The following sales data was researched and analyzed in order to derive the conclusions drawn from this analysis.

SALES 1995-1999

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Smithfield	71.-1-54	5447	BUYEA ROAD	0.86	1,224	2/7/1995	$16,000	1870	$13.07
Madison	Fenner	78.-1-8	2893	BINGLEY	3.28	2,567	2/28/1995	$165,900	1860	$64.63
Madison	Smithfield	80.-1-56	5275	BUYEA ROAD	2.17	872	4/23/1995	$17,000	1928	$19.50
Madison	Lincoln	60.-1-26.13	RR 3	NELSON RD	2.87	2,428	5/26/1995	$150,000	1994	$61.78
Madison	Fenner	77.-2-22.5	2434	CARY HL RD	6.86	1,847	6/23/1995	$90,600	1977	$49.05
Madison	Fenner	60.3-1-6	103C	PERRYVILLE RD	0.74	1,350	8/11/1995	$54,000	1900	$40.00
Madison	Fenner	87.-1-44	4867	SOUTH	1.58	1,105	8/15/1995	$64,000	1825	$57.92
Madison	Fenner	79.-1-21	5308	SWAMP SCHL	0.94	1,680	10/4/1995	$72,500	1965	$43.15
Madison	Fenner	77.-2-14	5195	EMHOFF	1.50	1,875	10/20/1995	$74,900	1890	$39.95
Madison	Fenner	68.-1-23.2	2489	CAREY HILL	2.52	1,280	10/31/1995	$69,300	1995	$54.14
Madison	Fenner	68.1-1-39.2	5615	RT 13	0.39	1,436	11/6/1995	$75,000	1978	$52.23
Madison	Fenner	87.-1-18	4803	NELSON	0.76	2,728	3/1/1996	$30,000	1801	$11.00
Madison	Fenner	88.-1-24	3966	CODY RD	6.99	2,015	3/28/1996	$87,500	1981	$43.42
Madison	Lincoln	60.-1-28	6003	NELSON RD	5.37	2,012	4/17/1996	$125,000	1976	$62.13
Madison	Fenner	79.-1-19	5365	SWAMP SCHOOL RD	0.35	1,524	5/22/1996	$69,900	1963	$45.87
Madison	Fenner	70.-1-48	3921	PETERBORO	1.14	1,824	7/17/1996	$68,500	1981	$37.55
Madison	Fenner	87.-1-10.121	2910	FENNER RD	5.71	2,961	8/16/1996	$180,000	1991	$60.79
Madison	Fenner	88.-1-12.2	4499	FRANCIS RD	28.49	1,300	8/20/1996	$106,000	1990	$81.54
Madison	Fenner	69.-1-31.1	3181	LARKIN RD	4.80	960	8/23/1996	$83,000	1989	$86.46
Madison	Fenner	78.-1-14	2786	BINGLEY	0.85	1,348	9/17/1996	$85,000	1968	$63.06
Madison	Smithfield	89.-1-5.12	4675	RICH RD	4.72	2,150	10/4/1996	$95,000	1908	$44.19
Madison	Smithfield	89.-1-28	4799	GILL ROAD	5.03	1,664	10/8/1996	$78,000	1989	$46.88
Madison	Lincoln	60.-1-5.12	3097	INGALLS CORNERS RD	2.88	1,979	10/11/1996	$120,000	1992	$60.64
Madison	Fenner	87.-1-67.8	3573	WYSS RD	0.92	640	11/21/1996	$50,000	1977	$78.13
Madison	Fenner	68.-1-28.32	5421	IRISH RIDGE	2.85	1,920	11/22/1996	$90,900	1992	$47.34
Madison	Lincoln	61.-1-14	6811	OXBOW	0.39	1,034	12/2/1996	$38,500	1843	$37.23
Madison	Fenner	70.-1-18.118	6348	OXBOW RD	5.04	1,608	8/25/1997	$86,400	1992	$53.73
Madison	Fenner	87.-1-61.3	4794	SOUTH ROAD	6.41	2,080	10/29/1997	$95,500	1985	$45.91
Madison	Lincoln	61.-1-45.6	4136	WHITMAN	1.22	1,316	12/19/1997	$90,000	1986	$68.39
Madison	Lincoln	60.-1-26.22	3151	RAY	1.51	1,632	12/23/1997	$87,500	1973	$53.62
Madison	Lincoln	61.-1-40	6734	OXBOW	0.89	2,716	12/23/1997	$74,000	1974	$27.25
Madison	Smithfield	80.-1-5.13	5815	OXBOW	2.82	1,260	12/30/1997	$35,000	1963	$27.78
Madison	Fenner	78.-1-32	5042	NELSON ROAD	5.46	1,453	3/24/1998	$30,000	1850	$20.65
Madison	Fenner	87.-1-31.2	4875	BUYEA RD	1.70	2,164	5/29/1998	$77,349	1932	$35.74
Madison	Fenner	88.-1-24	3966	CODY RD	6.99	2,015	6/8/1998	$105,000	1981	$52.11
Madison	Fenner	88.-1-9	3663	MUTTON HILL RD	1.85	1,840	6/12/1998	$42,500	1973	$23.10
Madison	Fenner	77.-2-17	5099	EMHOFF RD	2.00	1,159	6/29/1998	$60,000	1969	$51.77
Madison	Fenner	70.-1-18.116	4027	MILESTRIP RD	1.93	1,158	7/2/1998	$79,200	1993	$68.39
Madison	Fenner	88.-1-13.126	4538	FRANCIS RD	2.77	1,500	7/20/1998	$72,500	1987	$48.33
Madison	Lincoln	60.-1-30	3038	RAY	0.90	920	7/23/1998	$41,200	1850	$44.78
Madison	Lincoln	61.-1-22.1	3825	ALENE COR	8.01	1,776	7/28/1998	$81,800	1951	$46.06
Madison	Fenner	68.1-1-18	2424	STABLES	0.98	1,322	9/16/1998	$54,500	1965	$41.23
Madison	Fenner	70.-1-43.1	5566	ROUSES	3.97	1,450	9/18/1998	$84,000	1986	$57.93
Madison	Smithfield	80.20-1-1	5173	SWAMP ROAD	6.13	1,743	9/24/1998	$50,000	1850	$28.69
Madison	Lincoln	61.-1-40	6734	OXBOW	0.89	2,716	10/15/1998	$82,800	1974	$30.49
Madison	Smithfield	80.15-1-52	5256	PLST VLL Y	0.36	1,212	11/17/1998	$50,000	1850	$41.25
Madison	Smithfield	80.15-1-4.2	5323	OXBOW	1.07	2,138	12/17/1998	$37,500	1860	$17.54
Madison	Lincoln	60.-1-9	3171	INGALLS CORNERS RD	0.63	1,104	5/6/1999	$54,900	1959	$49.73
Madison	Fenner	79.-1-9	3813	CODY ROAD	4.15	1,202	6/29/1999	$79,000	1970	$65.72
Madison	Fenner	88.-1-29.1	4269	MUTTON HILL ROAD	2.68	816	7/9/1999	$70,000	1974	$85.78
Madison	Fenner	87.-1-10.121	2910	FENNER ROAD	5.71	2,961	7/27/1999	$186,750	1991	$63.07
Madison	Fenner	87.-1-55.2	4631	SOUTH ROAD	4.68	2,905	9/10/1999	$133,000	1971	$45.78
Madison	Lincoln	60.-1-26.14	3168	INGALS CRNERS	2.33	1,680	9/23/1999	$89,409	1995	$53.22
Madison	Fenner	77.-2-52.11	5240	IRISH RIDGE ROAD	5.98	2,407	10/18/1999	$75,000	1870	$31.16
Madison	Fenner	88.-1-27.12	4390	MUTTON HILL ROAD	1.17	995	10/18/1999	$65,000	1974	$65.33
Madison	Fenner	70.-1-47.2	3947	PETERBORO ROAD	1.01	2,388	11/22/1999	$52,500	1880	$21.98
							Average=	**$78,193**		**$47.65**
							Median =	**$75,000**		**$47.11**

SALES 2000-2007

County	Municipality	SBL	Address	Street	Land Area	SF	Sale Date	Sale Price	Yr Built	$/SF
Madison	Smithfield	80.19-1-9	4538	ELIZABETH ST	1.15	420	1/18/2000	$47,500	1940	$113.10
Madison	Fenner	87.-1-8	2894	MORAINE RD	0.94	2,380	1/20/2000	$120,000	1974	$50.42
Madison	Lincoln	60.-1-5.13	3111	INGALLS CORNERS RD	21.03	1,710	3/10/2000	$200,000	1900	$116.96
Madison	Fenner	69.-1-31.16	3061	BEAR SWAMP RD	4.76	1,404	3/14/2000	$75,100	1988	$53.49
Madison	Smithfield	71.-1-47.12	4538	MILE STRIP RD	4.92	1,144	4/13/2000	$63,680	1997	$55.66
Madison	Fenner	68.1-1-25	5626	FOSSIL ROCK RD	4.28	1,710	5/1/2000	$84,000	1956	$49.12
Madison	Fenner	88.-1-27.3	4272	MUTTON HILL ROAD	2.07	1,720	7/28/2000	$84,200	1984	$48.95
Madison	Smithfield	71.-1-47.3	4522	MILE STRIP RD	1.00	1,323	9/21/2000	$65,000	1974	$49.13
Madison	Fenner	78.-1-47	3517	CODY RD	1.17	1,440	10/4/2000	$67,900	1974	$47.15
Madison	Fenner	88.-1-13.123	3646	MUTTON HILL RD	0.91	1,380	10/13/2000	$69,900	1974	$50.65
Madison	Lincoln	60.-1-26.22	3151	RAY RD	1.51	1,632	10/20/2000	$87,000	1973	$53.31
Madison	Fenner	69.-1-31.7	5362	NELSON RD	5.71	1,322	3/29/2001	$85,000	1900	$64.30
Madison	Fenner	88.-1-13.128	3662	MUTTON HILL RD	0.92	960	5/4/2001	$40,000	1990	$41.67
Madison	Fenner	78.-1-8	2893	BINGLEY RD	3.28	2,567	5/18/2001	$237,000	1860	$92.33
Madison	Fenner	70.-1-59	6200	OXBOW RD	7.58	1,680	5/31/2001	$107,000	1970	$63.69
Madison	Lincoln	60.-1-5.12	3097	INGALLS CORNERS RD	2.88	1,979	6/6/2001	$140,000	1992	$70.74
Madison	Fenner	77.-2-22.5	2434	CARNEY HILL RD	6.86	1,847	6/13/2001	$108,000	1977	$58.47
Madison	Smithfield	80.15-1-46	4708	PARK ST	0.49	2,642	7/18/2001	$40,000	1797	$15.14
Madison	Fenner	69.-1-31.222	2965	BEAR SWAMP RD	1.89	1,976	8/6/2001	$78,700	1995	$39.83
Madison	Fenner	78.-1-10	2829	BINGLEY RD	23.78	2,068	8/6/2001	$147,000	1900	$71.08
Madison	Smithfield	80.15-1-15.12	5304	PETERBORO ROAD	1.71	1,452	8/15/2001	$90,000	1880	$61.98
Madison	Smithfield	80.-1-60	5183	BUYEA RD	0.68	960	8/23/2001	$64,600	1970	$67.29
Madison	Fenner	87.-1-12	4595	DAVIS ROAD	1.19	2,480	8/31/2001	$150,000	1803	$60.48
Madison	Smithfield	89.-1-8	4651	PLEASANT VALLEY RD	7.94	3,380	10/3/2001	$150,000	1850	$44.38
Madison	Fenner	77.-2-10.1	5237	EMHOFF RD	2.26	1,740	10/24/2001	$78,000	1954	$44.83
Madison	Fenner	79.-1-18.11	4042	PETERBORO RD	9.38	2,040	11/9/2001	$146,150	1988	$71.64
Madison	Lincoln	61.-1-34.4	6625	OLD COUNTRY RD	23.96	620	11/27/2001	$67,000	1984	$108.06
Madison	Fenner	78.-1-31.12	5116	NELSON ROAD	1.06	1,488	12/21/2001	$79,900	1976	$53.70
Madison	Fenner	70.-1-18.116	4027	E MILES STRIP ROAD	1.93	1,158	1/25/2002	$99,500	1993	$85.92
Madison	Lincoln	60.-1-26.3	3179	RAY ROAD	1.52	1,666	1/29/2002	$105,000	1976	$63.03
Madison	Fenner	60.3-1-5	2752	PERRYVILLE RD	0.70	2,262	3/4/2002	$72,000	1878	$31.83
Madison	Fenner	70.-1-55.2	5945	OXBOW RD	4.87	1,735	5/31/2002	$111,200	1850	$64.09
Madison	Fenner	78.-1-48	3510	CODY ROAD	0.90	1,920	7/1/2002	$116,500	1997	$60.68
Madison	Smithfield	71.-1-37	5928	BUYEA ROAD	2.03	864	7/10/2002	$100,000	1998	$115.74
Madison	Lincoln	61.-1-45.6	4136	WHITMAN RD.	1.22	1,316	8/21/2002	$97,500	1986	$74.09
Madison	Lincoln	60.-1-34.2	6104	NELSON ROAD	2.67	1,948	9/19/2002	$120,000	1998	$61.60
Madison	Fenner	87.-1-61.4	4804	SOUTH RD	6.41	2,080	9/20/2002	$139,000	1985	$66.83
Madison	Lincoln	60.-1-2.1	6006	QUARRY RD	0.91	1,440	9/30/2002	$25,000	1974	$17.36
Madison	Fenner	78.-1-33	5030	NELSON RD	0.76	1,829	10/16/2002	$79,500	1825	$43.47
Madison	Fenner	88.-1-27.42	4300	MUTTON HILL RD	7.00	1,008	10/16/2002	$125,000	1984	$124.01
Madison	Lincoln	60.-1-26.22	3151	RAY RD	1.51	1,632	10/25/2002	$108,000	1973	$66.18
Madison	Smithfield	71.-1-30.2	4691	E MILESTRIP RD	88.13	1,299	11/20/2002	$115,000	1980	$88.53
Madison	Smithfield	80.15-1-64	5223	SWAMP RD	1.74	1,880	4/30/2003	$43,500	1850	$23.14
Madison	Lincoln	61.-1-45.2	6471	OLD COUNTRY RD	1.68	1,232	6/27/2003	$86,900	1977	$70.54
Madison	Fenner	87.-1-62.11	4691	SOUTH RD	2.94	1,184	7/1/2003	$105,000	1987	$88.68
Madison	Fenner	87.-1-18	4803	NELSON RD	0.76	2,728	7/28/2003	$56,700	1801	$20.78
Madison	Fenner	68.1-1-16	2446	STABLES RD	0.74	1,627	8/1/2003	$53,500	1985	$32.88
Madison	Fenner	69.-1-31.2	3151	LARKIN RD	4.45	1,344	9/8/2003	$144,900	1988	$107.81
Madison	Fenner	88.-1-13.126	4538	FRANCIS ROAD	2.77	1,500	9/29/2003	$75,500	1987	$50.33
Madison	Fenner	77.-2-40	2657	BINGLEY ROAD	1.85	2,073	10/24/2003	$135,000	1870	$65.12
Madison	Fenner	78.-1-22.2	3022	BINGLEY	1.00	1,242	10/28/2003	$72,500	1985	$58.37
Madison	Fenner	70.-1-23.1	3560	LARKIN RD	3.81	1,128	11/5/2003	$120,000	1979	$106.38
Madison	Fenner	87.-1-61.3	4794	SOUTH RD	6.41	2,080	11/14/2003	$142,000	1985	$68.27
Madison	Smithfield	80.15-1-30	4619	PETERBORO ROAD	0.69	1,611	11/28/2003	$51,500	1865	$31.97
Madison	Lincoln	61.-1-45.15	4141	WHITMAN ROAD	13.10	1,359	12/10/2003	$125,000	1994	$91.98
Madison	Fenner	87.-1-10.4	4610	SHEPHARD ROAD	0.42	1,372	12/16/2003	$161,000	1974	$117.35
Madison	Fenner	70.-1-18.119	4045	E MILESTRIP ROAD	4.72	1,120	12/22/2003	$107,000	1993	$95.54
Madison	Smithfield	80.20-1-6	5224	SWAMP RD	0.58	1,365	7/27/2004	$80,000	1900	$58.61
Madison	Fenner	87.-1-17	4771	NELSON RD	0.95	1,144	8/4/2004	$64,890	1977	$56.72
Madison	Fenner	70.-1-18.2	6414	OXBOW RD	1.41	1,113	8/12/2004	$80,000	1973	$71.88
Madison	Fenner	79.-1-26.3	5217	SWAMP SCHOOL RD	0.53	1,536	9/24/2004	$37,000	1900	$24.09
Madison	Fenner	77.-2-40	2657	BINGLEY ROAD	1.85	2,073	10/28/2004	$158,000	1870	$76.22
Madison	Fenner	88.-1-14.123	3743	MUTTON HILL ROAD	1.29	1,560	11/1/2004	$72,500	1989	$46.47
Madison	Fenner	88.-1-13.123	3646	MUTTON HILL&FRANCIS	0.91	1,380	11/30/2004	$79,900	1974	$57.90
Madison	Fenner	88.-1-8	4614	FRANCIS RD	0.83	1,040	3/14/2005	$76,850	1975	$73.89
Madison	Smithfield	80.-1-5.11	5801	OXBOW RD	1.31	1,812	5/2/2005	$90,000	1800	$49.67
Madison	Fenner	77.-2-14	5195	ENHOFF RD	1.50	1,875	5/27/2005	$93,000	1890	$49.60
Madison	Smithfield	80.15-1-15.12	5304	PETERBORO RD	1.71	1,452	6/22/2005	$107,000	1880	$73.69
Madison	Smithfield	89.-1-8	4651	PLEASANT VALLEY RD	7.94	3,380	6/30/2005	$185,000	1850	$54.73
Madison	Fenner	69.-1-8	3085	PERRYVILLE RD	0.79	1,437	7/26/2005	$119,800	1850	$83.37

SALES 2000-2007 (Cont'd.)

County	Municipality	SBL	Address	Street	Land Area	SF	Sale Date	Sale Price	Year Built	Price/SF
Madison	Lincoln	60.-1-5.12	3097	INGALLS CORNERS RD	2.88	1,979	8/22/2005	$196,000	1992	$99.04
Madison	Smithfield	89.00-1-4	4747	RICH RD	96.07	1,535	8/29/2005	$56,000	1870	$36.48
Madison	Lincoln	61.-1-34.4	6625	OLD COUNTY RD	23.96	620	9/22/2005	$70,300	1984	$113.39
Madison	Fenner	79.-1-13.2	3837	CODY RD	2.73	1,260	10/21/2005	$83,000	1966	$65.87
Madison	Fenner	78.-1-6.2	3019	BINGLEY RD	1.44	1,620	11/2/2005	$124,900	1995	$77.10
Madison	Smithfield	80.-1-65.1	5302	BUYEA RD	22.54	1,040	11/23/2005	$60,000	1998	$57.69
Madison	Fenner	87.-1-10.121	2910	FENNER RD	5.71	2,961	12/7/2005	$310,000	1991	$104.69
Madison	Fenner	79.-1-29	4109	CODY RD	3.9	1,500	12/23/2005	$116,600	1949	$77.73
Madison	Lincoln	60.-1-26.5	3144	INGALLS CORNERS RD	0.89	1,308	12/30/2005	$79,900	1985	$61.09
Madison	Fenner	69.-1-31.2	3151	LARKIN RD	4.45	1,344	1/3/2006	$189,900	1988	$141.29
Madison	Smithfield	80.15-1-46	4708	PARK ST	0.49	2,642	1/30/2006	$60,500	1797	$22.90
Madison	Fenner	60.3-1-14	2802	PERRYVILLE RD	0.33	1,525	4/4/2006	$87,000	1960	$57.05
Madison	Fenner	79.-1-18.16	4042	PETERBORO RD	9.38	2,040	4/13/2006	$170,000	1988	$83.33
Madison	Lincoln	44.00-2-36.52	4009	SEEBER RD	1.67	1,744	4/18/2006	$127,900	1999	$73.34
Madison	Fenner	78.-1-8	2893	BINGLEY RD	3.28	2,567	4/25/2006	$210,000	1860	$81.81
Madison	Smithfield	80.-1-74	4642	GLASSFACTORY RD	1.58	1,196	5/2/2006	$97,500	1974	$81.52
Madison	Fenner	77.00-2-34.12	2507	BINGLEY RD	1.00	1,856	5/9/2006	$155,000	1850	$83.51
Madison	Fenner	69.-1-31.18	3043	BEAR SWAMP RD	4.74	1,344	5/26/2006	$27,000	1989	$20.09
Madison	Fenner	77.-2-38	2625	BINGLEY RD	2.75	2,272	6/12/2006	$269,900	1978	$118.79
Madison	Fenner	69.-1-31.222	2965	BEAR SWAMP RD	1.89	1,976	6/15/2006	$79,000	1995	$39.98
Madison	Fenner	86.00-2-3	2454	BINGLEY RD	1.50	1,666	7/25/2006	$119,000	1869	$71.43
Madison	Fenner	68.-1-10	2710	NYS RT 13	0.82	1,488	8/10/2006	$45,000	1985	$30.24
Madison	Fenner	77.00-2-8	1200	FALLS RD	0.75	1,932	8/24/2006	$35,000	1930	$18.12
Madison	Fenner	70.00-1-18.111	6330	OXBOW RD	5.19	1,768	8/29/2006	$110,000	2000	$62.22
Madison	Fenner	96.00-2-34	4364	NELSON RD	0.64	912	9/7/2006	$108,000	1940	$118.42
Madison	Lincoln	44.00-2-36.75	6828	FORBES RD	2.20	4,384	11/13/2006	$385,000	2004	$87.82
Madison	Fenner	70.00-1-18.115	6374	OXBOW RD	5.15	1,980	11/22/2006	$179,500	2000	$90.66
Madison	Lincoln	51.00-1-5.1	3265	COTTONS RD	0.54	1,148	11/22/2006	$49,900	1920	$43.47
Madison	Fenner	86.00-2-34.13	4570	ROBERTS RD	1.11	1,456	1/3/2007	$142,000	1987	$97.53
Madison	Fenner	77.00-2-52.11	5214	IRISH RIDGE RD	2.82	1,860	2/28/2007	$245,000	2000	$131.72
Madison	Lincoln	52.00-1-33.23	4021	CLOCKVILLE RD	5.54	2,056	3/22/2007	$140,000	1995	$68.09
Madison	Lincoln	44.00-2-42.52	4034	SEEBER RD	0.79	1,444	3/29/2007	$93,000	1974	$64.40
Madison	Fenner	77.00-2-28.1	5082	EMHOFF RD	2.22	1,428	5/7/2007	$131,000	1986	$91.74
Madison	Fenner	87.00-1-24	3201	CODY RD	3.49	1,346	5/10/2007	$126,000	1969	$93.61
Madison	Smithfield	71.00-1-47.3	4522	E MILESTRIP RD	1	1,323	5/11/2007	$72,500	1974	$54.80
Madison	Lincoln	44.00-2-11.2	7586	OXBOW RD	0.61	1,344	6/14/2007	$114,000	1991	$84.82
Madison	Lincoln	60.-1-26.12	3098	INGALLS CORNERS RD	0.90	2,240	7/11/2007	$137,800	1981	$61.52
Madison	Fenner	78.-1-22.2	3022	BINGLEY RD	1.00	1,242	7/13/2007	$123,400	1985	$99.36
Madison	Fenner	86.-2-30.3	2767	FENNER RD	0.90	1,079	7/20/2007	$86,000	1850	$79.70
Madison	Lincoln	51.-1-7	3229	COTTONS RD	0.59	1,590	7/25/2007	$113,300	1878	$71.26
Madison	Fenner	78.-1-28.21	5300	BUYEA RD	2.66	1,820	9/11/2007	$100,000	1991	$54.95
Madison	Fenner	69.-1-31.1	3181	LARKIN RD	4.80	960	10/5/2007	$138,947	1989	$144.74
Madison	Lincoln	52.1-1-45	3853	TIMMERMAN	0.42	1,124	10/19/2007	$48,000	1920	$42.70
Madison	Lincoln	44.-2-42.3	4016	SEEBER RD	0.68	1,334	11/20/2007	$108,500	1974	$81.33
							Average=	**$109,044**		**$68.67**
							Median =	**$100,000**		**$64.76**

The previous sales are located within a five mile radius of the wind farm. As can be seen on the previous sales grid there is a wide range of property sizes, land areas and age. The sales indicate a wide range of value which is typical in a rural market with limited homogeneity as compared to city or suburban properties. The sales area considered a representative sampling of the property types in the market. According to the 2005 city-data.com estimates the median house value in the Town of Fenner was $91,500.

The median house value in the target area was indicated at $75,000 from 1995-1999 and $100,000 from 2000-2007 indicating a 33.33% increase over a 6 ½ year period or 5.13% annually.

The median house value for the county from 2004 to 2007 is as follows:

Madison County:

2004		2005		2006		2007	
# Sales	**Median**	**# Sales**	**Median**	**#Sales**	**Median**	**# Sales**	**Median**
800	$94,900	860	107,000	850	$113,750	761	$120,900

The county median sales price was $94,900 in 2004 trending upward in 2005, 2006 and 2007 to $120,900 according to the New York State Office of Real Property Services. This indicates a 27.40% increase over a four year period or 6.85% annually which is slightly greater than the target area indicating a 5.13% annual increase. This difference can have a number of underlying causes. These include discrepancies in the sample sizes used in the analysis and those used by the Office of Real Property Services as well as differing levels of appreciation and volume of transactions in the varying towns within the county. It is impossible with the amount of data available to attribute the difference to the construction and operation of the wind farm.

As can be seen by the above sales data there appears to be no influence on property values since the construction and operation of the wind farm. Average sales prices on a whole have increased indicating that the existence of the wind farm has not diminished real property values in this sub market. Additionally, the subject target area has appreciated at a reasonably similar rate as the remaining county.

As indicated, there are a limited number of properties with direct views of the wind farm due to extreme topography changes. Therefore the view shed, any noise level and potential for shadow flickers from the blades is mitigated. This is typical with wind farms due to the high elevations and rural nature of the project areas.

Overall, there is considered to be no stigma attached to the project due to the continual sale and resale of properties near the project which have also appreciated at similar rates to the rest of the county.

Additionally sales and re-sales of properties were considered within the market as follows:

County	Municipality	Address	Street	Sale Date	Sale Price
Madison	Lincoln		BRUCE RD	4/11/2001	$97,500
Madison	Lincoln		BRUCE RD	2/27/2004	$137,000
Madison	Lincoln	3464	NELSON PLACE WEST	11/15/1999	$131,500
Madison	Lincoln	3464	NELSON PL WEST	8/19/2005	$180,000
Madison	Lincoln		OXBOW RD	7/2/1997	$45,000
Madison	Lincoln		OXBOW RD	1/3/2001	$88,000
Madison	Lincoln	3540	LINCOLN KNOLLS E	1/7/1999	$182,500
Madison	Lincoln	3540	LINCOLN KNOLLS E	8/23/2001	$290,000
Madison	Lincoln	3540	LINCOLN KNOLLS EAST	2/13/2004	$285,000
Madison	Lincoln	6980	KNOLLS NO	7/15/1996	$232,000
Madison	Lincoln	6980	LINCOLN KNOLLS NO	9/23/2005	$245,000
Madison	Lincoln	6985	LINCOLN KNOLLS	2/3/1995	$172,000
Madison	Lincoln	6985	LINCOLN KNOLLS NORTH	7/18/2003	$220,000
Madison	Lincoln	6988	LINCOLN KNOLLS N	6/30/1999	$230,000
Madison	Lincoln	6988	LINCOLN KNOLLS N	10/31/2001	$235,000
Madison	Lincoln	6988	LINCOLN KNOLLS N	3/15/2004	$275,000
Madison	Lincoln	3472	LINCOLN KNOLLS E	8/22/2001	$170,000
Madison	Lincoln	3472	LINCOLN KNOLLS EAST	11/16/2004	$215,000
Madison	Lincoln	3493	LINCOLN KNOLLS E	10/12/1995	$195,000
Madison	Lincoln	3493	LINCOLN KNOLLS E	2/11/2005	$225,000
Madison	Lincoln		COTTONS RD	11/22/1996	$118,500
Madison	Lincoln		COTTONS RD	12/8/1999	$144,500
Madison	Lincoln	7191	OLD CO	6/25/1998	$89,000
Madison	Lincoln	7191	OLD COUNTY RD	8/26/2003	$114,000
Madison	Lincoln		INGALLS CORNERS RD	10/11/1996	$120,000
Madison	Lincoln	3097	INGALLS CORNERS RD	6/6/2001	$140,000
Madison	Lincoln	3097	INGALLS CORNERS RD	8/22/2005	$196,000
Madison	Lincoln	3151	RAY RD	10/20/2000	$87,000
Madison	Lincoln	3151	RAY RD	10/25/2002	$108,000
Madison	Lincoln	6625	OLD COUNTRY RD	11/27/2001	$67,000
Madison	Lincoln	6625	OLD COUNTY RD	9/22/2005	$70,300
Madison	Lincoln		OXBOW	12/23/1997	$74,000
Madison	Lincoln		OXBOW	10/15/1998	$82,800
Madison	Lincoln	173D	WHITMAN	12/19/1997	$90,000
Madison	Lincoln	173 D	WHITMAN RD	8/21/2002	$97,500
Madison	Lincoln	4448	WHITMAN	8/31/1999	$93,500
Madison	Lincoln	4448	WHITMAN RD	6/12/2001	$96,000
Madison	Lincoln	6297	CREEK RD	10/8/2002	$46,800
Madison	Lincoln	6297	CREEK RD	8/12/2004	$54,000
Madison	Smithfield	4881	GOFF RD	9/24/2002	$120,500
Madison	Smithfield	4881	GOFF RD	5/27/2004	$150,000
Madison	Fenner	5195	EMHOFF	10/20/1995	$74,900
Madison	Fenner	5195	ENHOFF RD	5/27/2005	$93,000
Madison	Fenner	2434	CARY HL RD	6/23/1995	$90,600
Madison	Fenner	2434	CARNEY HILL RD	6/13/2001	$108,000
Madison	Fenner	2657	BINGLEY RD	10/24/2003	$135,000
Madison	Fenner	2657	BINGLEY RD	10/28/2004	$158,000
Madison	Fenner	2893	BINGLEY	2/28/1995	$165,900
Madison	Fenner	2893	BINGLEY RD	5/18/2001	$237,000

SALES /RE-SALES (Cont'd.)

County	Municipality	Address	Street	Sale Date	Sale Price
Madison	Smithfield		OXBOW RD	8/15/2001	$90,000
Madison	Smithfield		OXBOW RD	6/22/2005	$107,000
Madison	Smithfield	5591	STOCKBRIDGE FALLS	1/25/1999	$72,000
Madison	Smithfield	5591	STOCKBRIDGE FALLS RD	5/16/2003	$90,000
Madison	Fenner	2910	FENNER RD	8/16/1996	$180,000
Madison	Fenner	2910	FENNER RD	7/27/1999	$186,750
Madison	Fenner	4830	NELSON	3/1/1996	$30,000
Madison	Fenner	4830	NELSON RD	7/28/2003	$56,700
Madison	Fenner	3650	MUTTON HILL RD	10/13/2000	$69,900
Madison	Fenner	3650	MUTTON HILL RD	11/30/2004	$79,900
Madison	Fenner	4544	FRANCIS RD	7/20/1998	$72,500
Madison	Fenner	4544	FRANCIS RD	9/29/2003	$75,500
Madison	Fenner	2	CODY RD	3/28/1996	$87,500
Madison	Fenner	2	CODY RD	6/8/1998	$105,000
Madison	Smithfield		PLEASANT VALLEY RD	10/3/2001	$150,000
Madison	Smithfield	4651	PLEASANT VALLEY RD	6/30/2005	$185,000
Madison	Smithfield			10/17/2001	$67,010
Madison	Smithfield	5285	FEARON RD	10/15/2004	$68,000
Madison	Fenner	2616	FENNER RD	11/10/2000	$108,000
Madison	Fenner	2616	FENNER RD	12/21/2004	$135,000
Madison	Fenner	2858	HILL RD	7/27/1998	$128,000
Madison	Fenner	2858	HILL RD	9/29/1999	$145,000
Madison	Fenner	2888	DOUGLAS WAY	9/10/1996	$190,500
Madison	Fenner	2888	DOUGLAS WAY	5/13/1999	$194,000
Madison	Fenner	2888	DOUGLAS WAY	8/10/2000	$200,500
Madison	Fenner	3223	MORAINE	12/19/1997	$74,000
Madison	Fenner	3223	MORAINE RD	6/27/2001	$97,000

As is evident by the above correlated sales, there appears to be little to no effect on real estate values of the respective properties subsequent to the construction and operation of the facility. Of the 36 sales analyzed 36 increased in value. This analysis did not include an interview with the respective property owners at the time of sale to determine any underlying factors which may have additionally impacted sales prices. (i.e. capital improvements, additions, deferred maintenance). However, the sales data utilized is considered representative of the market as a whole and it is unlikely that every property had some or all of the previously mentioned underlying factors impacting their respective properties from sale date to resale.

In conclusion it appears that the existence of the wind farm does not appear to have any impact on surrounding property values as a whole.

In addition the sales data was broken down by distance to the wind farm. Targeted areas of 0-1 miles, 1-2 miles, 2-3 miles, 3-4 miles and 4-5 miles were utilized. Unfortunately limited sales data in this rural market makes this technique unreliable in producing meaningful results. The data is broken down as follows:

1995-1999 (0-1 Miles) – No Data

2000-2007 (0-1 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Fenner	70.-1-23.1	3560	LARKIN RD	3.81	1,128	11/5/2003	$120,000	1979	$106.38
Madison	Lincoln	78.-1-28.21	5300	BUYEA RD	2.66	1,820	9/11/2007	$100,000	1991	$54.95
Madison	Lincoln	69.-1-31.1	3181	LARKIN RD	4.80	960	10/5/2007	$138,947	1989	$144.74

There is insufficient data available for meaningful comparison in this distance bin.

1995-1999 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Lincoln	60.-1-26.13	RR 3	NELSON RD	2.87	2,428	5/26/1995	$150,000	1994	$61.78
Madison	Lincoln	60.-1-28	6003	NELSON RD	5.37	2,012	4/17/1996	$125,000	1976	$62.13
Madison	Fenner	79.-1-19	5365	SWAMP SCHOOL RD	0.35	1,524	5/22/1996	$69,900	1963	$45.87
Madison	Fenner	70.-1-48	3921	PETERBORO	1.14	1,824	7/17/1996	$68,500	1981	$37.55
Madison	Fenner	69.-1-31.1	3181	LARKIN RD	4.80	960	8/23/1996	$83,000	1989	$86.46
Madison	Fenner	70.-1-18.118	6348	OXBOW RD	5.04	1,608	8/25/1997	$86,400	1992	$53.73
Madison	Lincoln	60.-1-26.22	3151	RAY	1.51	1,632	12/23/1997	$87,500	1973	$53.62
Madison	Fenner	70.-1-18.116	4027	MILESTRIP RD	1.93	1,158	7/2/1998	$79,200	1993	$68.39
Madison	Lincoln	61.-1-22.1	3825	ALENE COR	8.01	1,776	7/28/1998	$81,800	1951	$46.06
Madison	Fenner	70.-1-43.1	5566	ROUSES	3.97	1,450	9/18/1998	$84,000	1986	$57.93
Madison	Fenner	79.-1-9	3813	CODY ROAD	4.15	1,202	6/29/1999	$79,000	1970	$65.72
Madison	Fenner	70.-1-47.2	3947	PETERBORO ROAD	1.01	2,388	11/22/1999	$52,500	1880	$21.98
							Median =	$82,400		$55.83

2000-2007 (1-2 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Fenner	69.-1-31.16	3061	BEAR SWAMP RD	4.76	1,404	3/14/2000	$75,100	1988	$53.49
Madison	Lincoln	60.-1-26.22	3151	RAY RD	1.51	1,632	10/20/2000	$87,000	1973	$53.31
Madison	Fenner	69.-1-31.7	5362	NELSON RD	5.71	1,322	3/29/2001	$85,000	1900	$64.30
Madison	Fenner	79.-1-18.11	4042	PETERBORO RD	9.38	2,040	11/9/2001	$146,150	1988	$71.64
Madison	Fenner	70.-1-18.116	4027	E MILES STRIP ROAD	1.93	1,158	1/25/2002	$99,500	1993	$85.92
Madison	Lincoln	60.-1-26.3	3179	RAY ROAD	1.52	1,666	1/29/2002	$105,000	1976	$63.03
Madison	Fenner	70.-1-55.2	5945	OXBOW RD	4.87	1,735	5/31/2002	$111,200	1850	$64.09
Madison	Lincoln	60.-1-34.2	6104	NELSON ROAD	2.67	1,948	9/19/2002	$120,000	1998	$61.60
Madison	Lincoln	60.-1-26.22	3151	RAY RD	1.51	1,632	10/25/2002	$108,000	1973	$66.18
Madison	Fenner	69.-1-31.2	3151	LARKIN RD	4.45	1,344	9/8/2003	$144,900	1988	$107.81
Madison	Fenner	70.-1-18.119	4045	E MILESTRIP ROAD	4.72	1,120	12/22/2003	$107,000	1993	$95.54
Madison	Fenner	70.-1-18.2	6414	OXBOW RD	1.41	1,113	8/12/2004	$80,000	1973	$71.88
Madison	Fenner	69.-1-8	3085	PERRYVILLE RD	0.79	1,437	7/26/2005	$119,800	1850	$83.37
Madison	Fenner	79.-1-13.2	3837	CODY RD	2.73	1,260	10/21/2005	$83,000	1966	$65.87
Madison	Fenner	69.-1-31.2	3151	LARKIN RD	4.45	1,344	1/3/2006	$189,900	1988	$141.29
Madison	Fenner	79.-1-18.16	4042	PETERBORO RD	9.38	2,040	4/13/2006	$170,000	1988	$83.33
Madison	Fenner	69.-1-31.18	3043	BEAR SWAMP RD	4.74	1,344	5/26/2006	$27,000	1989	$20.09
Madison	Fenner	70.-1-18.111	6330	OXBOW RD	5.19	1,768	8/29/2006	$110,000	2000	$62.22
							Median =	$107,500		$66.02

This distance bin had some available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 4.69% annually which is a slightly slower rate than the 5.13% for the entire view shed. It is impossible to conclude that this lower appreciation is based on distance to the wind farm.

1995-1999 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Fenner	78.-1-8	2893	BINGLEY	3.28	2,567	2/28/1995	$165,900	1860	$64.63
Madison	Fenner	60.3-1-6	103C	PERRYVILLE RD	0.74	1,350	8/11/1995	$54,000	1900	$40.00
Madison	Fenner	87.-1-44	4867	SOUTH	1.58	1,105	8/15/1995	$64,000	1825	$57.92
Madison	Fenner	79.-1-21	5308	SWAMP SCHL	0.94	1,680	10/4/1995	$72,500	1965	$43.15
Madison	Fenner	87.-1-18	4803	NELSON	0.76	2,728	3/1/1996	$30,000	1801	$11.00
Madison	Fenner	88.-1-24	3966	CODY RD	6.99	2,015	3/28/1996	$87,500	1981	$43.42
Madison	Lincoln	60.-1-5.12	3097	RD	2.88	1,979	10/11/1996	$120,000	1992	$60.64
Madison	Lincoln	61.-1-14	6811	OXBOW	0.39	1,034	12/2/1996	$38,500	1843	$37.23
Madison	Fenner	87.-1-61.3	4794	SOUTH ROAD	6.41	2,080	10/29/1997	$95,500	1985	$45.91
Madison	Lincoln	61.-1-45.6	4136	WHITMAN	1.22	1,316	12/19/1997	$90,000	1986	$68.39
Madison	Lincoln	61.-1-40	6734	OXBOW	0.89	2,716	12/23/1997	$74,000	1974	$27.25
Madison	Smithfield	80.-1-5.13	5815	OXBOW	2.82	1,260	12/30/1997	$35,000	1963	$27.78
Madison	Fenner	78.-1-32	5042	NELSON ROAD	5.46	1,453	3/24/1998	$30,000	1850	$20.65
Madison	Fenner	87.-1-31.2	4875	BUYEA RD	1.70	2,164	5/29/1998	$77,349	1932	$35.74
Madison	Fenner	88.-1-24	3966	CODY RD	6.99	2,015	6/8/1998	$105,000	1981	$52.11
Madison	Lincoln	60.-1-30	3038	RAY	0.90	920	7/23/1998	$41,200	1850	$44.78
Madison	Lincoln	61.-1-40	6734	OXBOW	0.89	2,716	10/15/1998	$82,800	1974	$30.49
Madison	Lincoln	60.-1-9	3171	RD	0.63	1,104	5/6/1999	$54,900	1959	$49.73
Madison	Lincoln	60.-1-26.14	3168	INGALS CRNERS	2.33	1,680	9/23/1999	$89,409	1995	$53.22
Madison	Fenner	88.-1-27.12	4390	MUTTON HILL ROAD	1.17	995	10/18/1999	$65,000	1974	$65.33
							Median =	$73,250		$44.10

2000-2007 (2-3 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Lincoln	60.-1-5.13	3111	INGALLS CORNERS RD	21.03	1,710	3/10/2000	$200,000	1900	$116.96
Madison	Fenner	78.-1-47	3517	CODY RD	1.17	1,440	10/4/2000	$67,900	1974	$47.15
Madison	Fenner	78.-1-8	2893	BINGLEY RD	3.28	2,567	5/18/2001	$237,000	1860	$92.33
Madison	Lincoln	60.-1-5.12	3097	INGALLS CORNERS RD	2.88	1,979	6/6/2001	$140,000	1992	$70.74
Madison	Fenner	69.-1-31.222	2965	BEAR SWAMP RD	1.89	1,976	8/6/2001	$78,700	1995	$39.83
Madison	Lincoln	61.-1-34.4	6625	OLD COUNTRY RD	23.96	620	11/27/2001	$67,000	1984	$108.06
Madison	Fenner	78.-1-31.12	5116	NELSON ROAD	1.06	1,488	12/21/2001	$79,900	1976	$53.70
Madison	Fenner	60.3-1-5	2752	PERRYVILLE RD	0.70	2,262	3/4/2002	$72,000	1878	$31.83
Madison	Fenner	78.-1-48	3510	CODY ROAD	0.90	1,920	7/1/2002	$116,500	1997	$60.68
Madison	Lincoln	61.-1-45.6	4136	WHITMAN RD.	1.22	1,316	8/21/2002	$97,500	1986	$74.09
Madison	Fenner	87.-1-61.4	4804	SOUTH RD	6.41	2,080	9/20/2002	$139,000	1985	$66.83
Madison	Lincoln	60.-1-2.1	6006	QUARRY RD	0.91	1,440	9/30/2002	$25,000	1974	$17.36
Madison	Fenner	78.-1-33	5030	NELSON RD	0.76	1,829	10/16/2002	$79,500	1825	$43.47
Madison	Lincoln	61.-1-45.2	6471	OLD COUNTRY RD	1.68	1,232	6/27/2003	$86,900	1977	$70.54
Madison	Fenner	87.-1-62.11	4691	SOUTH RD	2.94	1,184	7/1/2003	$105,000	1987	$88.68
Madison	Fenner	87.-1-18	4803	NELSON RD	0.76	2,728	7/28/2003	$56,700	1801	$20.78
Madison	Fenner	78.-1-22.2	3022	BINGLEY	1.00	1,242	10/28/2003	$72,500	1985	$58.37
Madison	Fenner	87.-1-61.3	4794	SOUTH RD	6.41	2,080	11/14/2003	$142,000	1985	$68.27
Madison	Lincoln	61.-1-45.15	4141	WHITMAN ROAD	13.10	1,359	12/10/2003	$125,000	1994	$91.98
Madison	Fenner	87.-1-17	4771	NELSON RD	0.95	1,144	8/4/2004	$64,890	1977	$56.72
Madison	Fenner	79.-1-26.3	5217	SWAMP SCHOOL RD	0.53	1,536	9/24/2004	$37,000	1900	$24.09
Madison	Smithfield	80.-1-5.11	5801	OXBOW RD	1.31	1,812	5/2/2005	$90,000	1800	$49.67
Madison	Lincoln	60.-1-5.12	3097	INGALLS CORNERS RD	2.88	1,979	8/22/2005	$196,000	1992	$99.04
Madison	Lincoln	61.-1-34.4	6625	OLD COUNTY RD	23.96	620	9/22/2005	$70,300	1984	$113.39
Madison	Fenner	78.-1-6.2	3019	BINGLEY RD	1.44	1,620	11/2/2005	$124,900	1995	$77.10
Madison	Fenner	79.-1-29	4109	CODY RD	3.90	1,500	12/23/2005	$116,600	1949	$77.73
Madison	Lincoln	60.-1-26.5	3144	INGALLS CORNERS RD	0.89	1,308	12/30/2005	$79,900	1985	$61.09
Madison	Fenner	60.3-1-14	2802	PERRYVILLE RD	0.33	1,525	4/4/2006	$87,000	1960	$57.05
Madison	Fenner	69.-1-31.222	2965	BEAR SWAMP RD	1.89	1,976	6/15/2006	$79,000	1995	$39.98
Madison	Fenner	70.00-1-18.1	6374	OXBOW RD	5.15	1,980	11/22/2006	$179,500	2000	$90.66
Madison	Fenner	87.00-1-24	3201	CODY RD	3.49	1,346	5/10/2007	$126,000	1969	$93.61
Madison	Fenner	60.-1-26.12	3098	INGALLS CORNERS RD	0.90	2,240	7/11/2007	$137,800	1981	$61.52
Madison	Lincoln	78.-1-22.2	3022	BINGLEY RD	1.00	1,242	7/13/2007	$123,400	1985	$99.36
							Median =	$90,000		$66.83

This distance bin had some available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 3.52% annually which is a slightly lower rate than the 5.13% for the entire view shed. It is impossible to conclude that this lower appreciation is based on distance to the wind farm.

1995-1999 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Smithfield	71.-1-54	5447	BUYEA ROAD	0.86	1,224	2/7/1995	$16,000	1870	$13.07
Madison	Smithfield	80.-1-56	5275	BUYEA ROAD	2.17	872	4/23/1995	$17,000	1928	$19.50
Madison	Fenner	77.-2-22.5	2434	CARY HL RD	6.86	1,847	6/23/1995	$90,600	1977	$49.05
Madison	Fenner	68.-1-23.2	2489	CAREY HILL	2.52	1,280	10/31/1995	$69,300	1995	$54.14
Madison	Fenner	87.-1-10.121	2910	FENNER RD	5.71	2,961	8/16/1996	$180,000	1991	$60.79
Madison	Fenner	88.-1-12.2	4499	FRANCIS RD	28.49	1,300	8/20/1996	$106,000	1990	$81.54
Madison	Fenner	78.-1-14	2786	BINGLEY	0.85	1,348	9/17/1996	$85,000	1968	$63.06
Madison	Smithfield	89.-1-5.12	4675	RICH RD	4.72	2,150	10/4/1996	$95,000	1908	$44.19
Madison	Fenner	87.-1-67.8	3573	WYSS RD	0.92	640	11/21/1996	$50,000	1977	$78.13
Madison	Fenner	68.-1-28.32	5421	IRISH RIDGE	2.85	1,920	11/22/1996	$90,900	1992	$47.34
Madison	Fenner	88.-1-9	3663	MUTTON HILL RD	1.85	1,840	6/12/1998	$42,500	1973	$23.10
Madison	Fenner	88.-1-13.126	4538	FRANCIS RD	2.77	1,500	7/20/1998	$72,500	1987	$48.33
Madison	Smithfield	80.15-1-52	5256	PLST VLL Y	0.36	1,212	11/17/1998	$50,000	1850	$41.25
Madison	Smithfield	80.15-1-4.2	5323	OXBOW	1.07	2,138	12/17/1998	$37,500	1860	$17.54
Madison	Fenner	88.-1-29.1	4269	MUTTON HILL ROAD	2.68	816	7/9/1999	$70,000	1974	$85.78
Madison	Fenner	87.-1-10.121	2910	FENNER ROAD	5.71	2,961	7/27/1999	$186,750	1991	$63.07
Madison	Fenner	87.-1-55.2	4631	SOUTH ROAD	4.68	2,905	9/10/1999	$133,000	1971	$45.78
Madison	Fenner	77.-2-52.11	5240	IRISH RIDGE ROAD	5.98	2,407	10/18/1999	$75,000	1870	$31.16

Median = $73,750 $47.84

2000-2007 (3-4 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Smithfield	71.-1-47.12	4538	MILE STRIP RD	4.92	1,144	4/13/2000	$63,680	1997	$55.66
Madison	Fenner	88.-1-27.3	4272	MUTTON HILL ROAD	2.07	1,720	7/28/2000	$84,200	1984	$48.95
Madison	Smithfield	71.-1-47.3	4522	MILE STRIP RD	1.00	1,323	9/21/2000	$65,000	1974	$49.13
Madison	Fenner	88.-1-13.123	3646	MUTTON HILL RD	0.91	1,380	10/13/2000	$69,900	1974	$50.65
Madison	Fenner	88.-1-13.128	3662	MUTTON HILL RD	0.92	960	5/4/2001	$40,000	1990	$41.67
Madison	Fenner	70.-1-59	6200	OXBOW RD	7.58	1,680	5/31/2001	$107,000	1970	$63.69
Madison	Fenner	77.-2-22.5	2434	CARNEY HILL RD	6.86	1,847	6/13/2001	$108,000	1977	$58.47
Madison	Fenner	78.-1-10	2829	BINGLEY RD	23.78	2,068	8/6/2001	$147,000	1900	$71.08
Madison	Smithfield	80.15-1-	5304	PETERBORO ROAD	1.71	1,452	8/15/2001	$90,000	1880	$61.98
Madison	Fenner	87.-1-12	4595	DAVIS ROAD	1.19	2,480	8/31/2001	$150,000	1803	$60.48
Madison	Fenner	88.-1-27.42	4300	MUTTON HILL RD	7.00	1,008	10/16/2002	$125,000	1984	$124.01
Madison	Smithfield	71.-1-30.2	4691	E MILESTRIP RD	88.13	1,299	11/20/2002	$115,000	1980	$88.53
Madison	Fenner	88.-1-13.126	4538	FRANCIS ROAD	2.77	1,500	9/29/2003	$75,500	1987	$50.33
Madison	Fenner	77.-2-40	2657	BINGLEY ROAD	1.85	2,073	10/24/2003	$135,000	1870	$65.12
Madison	Fenner	87.-1-10.4	4610	SHEPHARD ROAD	0.42	1,372	12/16/2003	$161,000	1974	$117.35
Madison	Fenner	77.-2-40	2657	BINGLEY ROAD	1.85	2,073	10/28/2004	$158,000	1870	$76.22
Madison	Fenner	88.-1-14.123	3743	MUTTON HILL ROAD	1.29	1,560	11/1/2004	$72,500	1989	$46.47
Madison	Fenner	88.-1-13.123	3646	MUTTON HILL RD	0.91	1,380	11/30/2004	$79,900	1974	$57.90
Madison	Fenner	88.-1-8	4614	FRANCIS RD	0.83	1,040	3/14/2005	$76,850	1975	$73.89
Madison	Smithfield	80.15-1-	5304	PETERBORO RD	1.71	1,452	6/22/2005	$107,000	1880	$73.69
Madison	Smithfield	89.00-1-4	4747	RICH RD	96.07	1,535	8/29/2005	$56,000	1870	$36.48
Madison	Fenner	87.-1-10.121	2910	FENNER RD	5.71	2,961	12/7/2005	$310,000	1991	$104.69
Madison	Fenner	77.-2-38	2625	BINGLEY RD	2.75	2,272	6/12/2006	$269,900	1978	$118.79
Madison	Fenner	96.00-2-34	4364	NELSON RD	0.64	912	9/7/2006	$108,000	1940	$118.42
Madison	Lincoln	51.00-1-5.1	3265	COTTONS RD	0.54	1,148	11/22/2006	$49,900	1920	$43.47
Madison	Fenner	77.00-2-52.1	5214	IRISH RIDGE RD	2.82	1,860	2/28/2007	$245,000	2000	$131.72
Madison	Lincoln	51.-1-7	3229	COTTONS RD	0.59	1,590	7/25/2007	$113,300	1878	$71.26
Madison	Fenner	52.1-1-45	3853	TIMMERMAN RD	0.42	1,124	10/19/2007	$48,000	1920	$42.70

Median = $107,000 $62.84

This distance bin had some available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 6.94% annually which is a slightly higher rate than the 5.13% for the entire view shed. It is impossible to conclude that this higher appreciation is based on distance to the wind farm.

1995-1999 (4-5 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Fenner	77.-2-14	5195	EMHOFF	1.50	1,875	10/20/1995	$74,900	1890	$39.95
Madison	Fenner	68.1-1-39.2	5615	RT 13	0.39	1,436	11/6/1995	$75,000	1978	$52.23
Madison	Smithfield	89.-1-28	4799	GILL ROAD	5.03	1,664	10/8/1996	$78,000	1989	$46.88
Madison	Fenner	77.-2-17	5099	EMHOFF RD	2.00	1,159	6/29/1998	$60,000	1969	$51.77
Madison	Fenner	68.1-1-18	2424	STABLES	0.98	1,322	9/16/1998	$54,500	1965	$41.23
Madison	Smithfield	80.20-1-1	5173	SWAMP ROAD	6.13	1,743	9/24/1998	$50,000	1850	$28.69
							Median =	$67,450		$44.05

2000-2008 (4-5 Miles)

County	Municipality	SBL	Address	Street	Land Area	SF	SaleDate	SalePrice	Yr Built	$/SF
Madison	Smithfield	80.19-1-9	4538	ELIZABETH ST	1.15	420	1/18/2000	$47,500	1940	$113.10
Madison	Fenner	87.-1-8	2894	MORAINE RD	0.94	2,380	1/20/2000	$120,000	1974	$50.42
Madison	Fenner	68.1-1-25	5626	FOSSIL ROCK RD	4.28	1,710	5/1/2000	$84,000	1956	$49.12
Madison	Smithfield	80.15-1-46	4708	PARK ST	0.49	2,642	7/18/2001	$40,000	1797	$15.14
Madison	Smithfield	80.-1-60	5183	BUYEA RD	0.68	960	8/23/2001	$64,600	1970	$67.29
Madison	Smithfield	89.-1-8	4651	PLEASANT VALLEY RD	7.94	3,380	10/3/2001	$150,000	1850	$44.38
Madison	Fenner	77.-2-10.1	5237	EMHOFF RD	2.26	1,740	10/24/2001	$78,000	1954	$44.83
Madison	Smithfield	80.15-1-63	4559	ELIZABETH ST	0.48	928	11/30/2001	$25,000	1875	$26.94
Madison	Smithfield	71.-1-37	5928	BUYEA ROAD	2.03	864	7/10/2002	$100,000	1998	$115.74
Madison	Smithfield	80.15-1-64	5223	SWAMP RD	1.74	1,880	4/30/2003	$43,500	1850	$23.14
Madison	Fenner	68.1-1-16	2446	STABLES RD	0.74	1,627	8/1/2003	$53,500	1985	$32.88
Madison	Smithfield	80.15-1-30	4619	PETERBORO ROAD	0.69	1,611	11/28/2003	$51,500	1865	$31.97
Madison	Smithfield	80.20-1-6	5224	SWAMP RD	0.58	1,365	7/27/2004	$80,000	1900	$58.61
Madison	Fenner	77.-2-14	5195	ENHOFF RD	1.50	1,875	5/27/2005	$93,000	1890	$49.60
Madison	Smithfield	89.-1-8	4651	PLEASANT VALLEY	7.94	3,380	6/30/2005	$185,000	1850	$54.73
Madison	Smithfield	80.-1-65.1	5302	BUYEA RD	22.54	1,040	11/23/2005	$60,000	1998	$57.69
Madison	Smithfield	80.15-1-46	4708	PARK ST	0.49	2,642	1/30/2006	$60,500	1797	$22.90
Madison	Smithfield	80.-1-74	4642	GLASSFACTORY RD	1.58	1,196	5/2/2006	$97,500	1974	$81.52
Madison	Fenner	68.-1-10	2710	NYS RT 13	0.82	1,488	8/10/2006	$45,000	1985	$30.24
Madison	Fenner	77.-2-8	1200	FALLS RD	0.75	1,932	8/25/2006	$35,000	1930	$18.12
Madison	Lincoln	44.00-2-36.7	6828	FORBES RD	2.20	4,384	11/13/2006	$385,000	2004	$87.82
Madison	Fenner	86.00-2-34.1	4570	ROBERTS RD	1.11	1,456	1/3/2007	$142,000	1987	$97.53
Madison	Lincoln	52.00-1-33.2	4021	CLOCKVILLE RD	5.54	2,056	3/22/2007	$140,000	1995	$68.09
Madison	Lincoln	44.00-2-42.5	4034	SEEBER RD	0.79	1,444	3/29/2007	$93,000	1974	$64.40
Madison	Fenner	77.00-2-28.1	5082	EMHOFF RD	2.22	1,428	5/7/2007	$131,000	1986	$91.74
Madison	Smithfield	71.00-1-47.3	4522	E MILESTRIP RD	1.00	1,323	5/11/2007	$72,500	1974	$54.80
Madison	Lincoln	44.00-2-11.2	7586	OXBOW RD	0.61	1,344	6/14/2007	$114,000	1991	$84.82
Madison	Lincoln	86.-2-30.3	2767	FENNER RD	0.90	1,079	7/20/2007	$86,000	1850	$79.70
Madison	Fenner	44.-2-42.3	4016	SEEBER RD	0.68	1,334	11/20/2007	$108,500	1974	$81.33
							Median =	$84,000		$54.80

This distance bin had some available data; however it is still a small sample size and may produce unreliable results. The median home value appreciated at approximately 3.77% annually which is a significantly slower rate than the 5.13% for the entire view shed. It is impossible to conclude that this lower appreciation is based on distance to the wind farm.

In this instance the paired sales analysis revealed no sales that demonstrated a decrease in value and therefore the paired sales analysis was not broken down by distance.

Noble Bliss Windpark
Wyoming County, New York

The Noble Bliss Windpark went online in the spring of 2008. Sales data from 2005 to November 2007 in the subject market area will be compared to median sales data from the County. The following sales data was researched and analyzed in order to derive the conclusions drawn from this analysis.

Sales 2005-2007

County	Municipality	SBL	Address	Street	Land Area	SF	Sale Date	Sale Price	Year Built	Price/SF
Wyoming	Eagle	166.01-1-44	6587	NORTH PEARL ST	1.03	1,488	2/7/2005	$53,000	1890	$35.62
Wyoming	Eagle	165.00-2-13	3313	COOLEY RD	9.50	1,464	8/15/2005	$85,000	1968	$58.06
Wyoming	Eagle	188.00-1-22.132	7880	POCHUCK RD	7.86	704	9/30/2005	$26,000	1970	$36.93
Wyoming	Eagle	175.00-2-6.1	7294	EAGLE RD	3.68	2,536	10/7/2005	$173,000	1900	$68.22
Allegany	Centerville	1.00-1-30	0	CADWELL RD	5.00	1,400	10/14/2005	$106,000	1998	$75.71
Wyoming	Eagle	165.00-2-12	3347	COOLEY RD	0.64	1,200	3/31/2006	$36,500	1890	$30.42
Wyoming	Eagle	166.03-1-1	6644	RAILROAD AVE	0.28	1,450	4/28/2006	$34,000	1925	$23.45
Wyoming	Eagle	175.00-2-20.31	7322	EAGLE RD	7.30	1,749	5/1/2006	$95,000	2000	$54.32
Wyoming	Eagle	166.03-1-33	6648	RAILROAD AVE	1.03	1,996	6/16/2006	$61,900	1900	$31.01
Wyoming	Eagle	187.00-1-17	3963	PATTRIDGE RD	5.64	1,444	7/31/2006	$106,500	1992	$73.75
Wyoming	Eagle	166.03-1-9	3389	SCHOOL ST	0.23	1,482	11/29/2006	$75,000	1921	$50.61
Wyoming	Eagle	176.00-1-17	3343	TELEGRAPH RD	4.59	1,196	12/21/2006	$62,000	1985	$51.84
Wyoming	Eagle	166.01-1-23	3411	MAIN ST	0.44	2,325	1/17/2007	$82,150	1890	$35.33
Wyoming	Eagle	176.00-2-27	2847	STATE ROUTE 39	1.72	1,352	5/18/2007	$60,000	1980	$44.38
Wyoming	Eagle	186.00-1-13.111	3147	WING ST	101.50	2,626	6/1/2007	$295,000	1900	$112.34
Wyoming	Eagle	166.03-1-7	3397	SCHOOL ST	0.34	1,242	6/13/2007	$35,000	1922	$28.18
Wyoming	Eagle	186.00-1-4.2	2818	WING ST	7.23	2,100	7/18/2007	$245,000	2002	$116.67

Average =	**$95,944**	**$54.52**
Median =	**$75,000**	**$50.61**

The previous sales are located within a five mile radius of the proposed wind farm. The sales indicate a wide range of value which is typical in a rural market with limited homogeneity as compared to city or suburban properties. The sales area considered a representative sampling of the property types in the market. According to the 2005 census estimates, the median house value in the Town of Eagle was $74,400.

The median house value in the target area was indicated at $75,000 from 2005-2007.

The median house value for Wyoming County from 2005 to 2007 is as follows:

Wyoming County:

2005		2006		2007	
# Sales	**Median**	**#Sales**	**Median**	**#Sales**	**Median**
439	$80,000	367	$84,800	348	$82,900

The county median sales price was $80,000 in 2005 trending upward in 2006 to $84,850 and then to $82,900 in 2007, according to the New York State Office of Real Property Services. This indicates a 1.21% annual increase, however it should be noted that countywide the median value dropped by -2.24% from 2006 to 2007.

The median house value for the target area from 2005 to 2007 is as follows:

Target Area:

2005		2006		2007	
# Sales	**Median**	**#Sales**	**Median**	**#Sales**	**Median**
5	$85,000	7	$62,000	5	$82,500

Although the target area indicates a .98% annual decrease in median home value over the three year period, the extremely small sample size and proposed/under construction status of the project makes the analysis inconclusive. It is impossible to conclude that there is any significant influence on property values since the wind farm proposal, construction and activation. In addition, as printed in a Buffalo New's article by John F. Bonfatti dated May 19, 2008 the Eagle Town Supervisor is quoted as saying the following:

- "Concerns about declines in property value have proven unfounded", he said. "In fact, people are moving in and demand for housing is solid."

- "We were averaging one new home a year if we were lucky the last couple of years," he said. "We've had 10, 11 homes built over the last two years."

In conclusion, there is no conclusive evidence which would indicate any impact or potential impact on residential real estate values in the market area analyzed due to being in close proximity or in the view shed of a operational wind farm. As can be seen by the three studies performed on the respective comparable operational wind farms there appears to be no evidence which would indicate that these facilities have had a detrimental effect on real property values. Each of the studies concluded that prices continued to increase in value within the respective sub markets after construction and the on going operation of the facility. Additionally sales and re-sales of the same property within the respective submarkets indicate that the majority of the properties were unaffected by the existence of the wind farm. The sales data indicated increases in property values consistent with typical market fluctuations. Limited data rendered an analysis by distance bin ineffective in ascertaining whether a closer proximity to the wind farm has a unique effect on property values as compared to being located 5± miles away. This conclusion is in concert with much of the quantitative research available today on wind farm development effects on property value. While it is impossible to definitively say that there will be no effect on every affected properties value, it is apparent from studying similar areas where wind farms have been developed that no broad based value effects have occurred in those markets.

Respectfully submitted,

Klauk, Lloyd & Wilhelm Inc.

Darrel R. Lloyd Jr.
New York State Certified General
Real Estate Appraiser
Certificate #46-5539

Addenda

General & Contingent Limiting Conditions

Certification

Definitions of Significant Terms

Qualifications of Darrel R. Lloyd Jr.

GENERAL CONTINGENT AND LIMITING CONDITIONS:

- That the date of consulting to which the opinions expressed in this report apply is set forth in the letter of transmittal. The appraiser assumes no responsibility for economic or physical factors occurring at some later date which may affect the opinions herein stated.

- That no opinion is intended to be expressed for legal matters or that would require specialized investigation or knowledge beyond that ordinarily employed by real estate appraisers, although such matters may be discussed in the report.

- That no engineering survey has been made by the appraiser. Except as specifically stated, data relative to size and area were taken from sources considered reliable.

- The maps, plats, and exhibits included herein are for illustration only, as an aid in visualizing matters discussed within the report. They should not be considered as surveys or relied upon for any other purpose.

- That testimony or attendance in court or at any other hearing is not required unless such arrangements are made a reasonable time in advance.

Certification

I certify that, to the best of my knowledge and belief:

- the statements of fact contained in this report are true and correct.

- the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, unbiased professional analyses, opinions and conclusions.

- I have no present or prospective interest in the property that is the subject of this report, and I have no personal interest or bias with respect to the parties involved. Furthermore, this appraisal report was not based on reporting a minimum valuation, specific valuation or approval of a loan.

- my compensation is not contingent on an action or event resulting from the analyses, opinions or conclusions in, or the use of, this report.

- the reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Code of Professional Ethics and the Standards of Professional Appraisal Practice of the Appraisal Institute which include the Uniform Standards of Professional Appraisal Practice of the Appraisal Foundation and its competency provision.

- I am competent to undertake the appraisal assignment that is the subject of this report based on my achievement of voluntary certification as a General Real Estate Appraiser within the State of New York, previous experience in valuing similar properties, attendance at seminars and courses relating to the specific subject matter or related matters and also based upon personal study and readings relative to the subject property type.

- I am currently certified as a General Real Estate Appraiser with the State of New York's Voluntary Certification Program. This certification indicates competency to perform residential and non-residential appraisals.

- no one provided significant professional assistance to the person signing this report.

- use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.

Date: June 3, 2008

Darrel R. Lloyd Jr.
New York State Certified General
Real Estate Appraiser
Certificate #46-5539

Definitions of Significant Terms:

Market Value: The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale with the buyer and seller each acting prudently, knowledgeably, and for self-interest, and assuming that neither is under undue duress. (The Appraisal of Real Estate, 10th ed., published 1992 by the Appraisal Institute.)

The following definition has been agreed upon by agencies that regulate federal financial institutions in the United States including the Resolution Trust Corporation (RTC).

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeable and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

a) Buyer and seller are typically motivated;
b) Both parties are well informed or well advised, and each acting in what he considers his own best interest.
c) A reasonable time is allowed for exposure in the open market;
d) Payment is made in terms of cash in U. S. dollars or in terms of financial arrangements comparable thereto; and
e) The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. (USPAP, 1992 edition)[1]

Fee Simple Estate: absolute ownership, unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.[2]

[1]Ibid. , pg. .222-223

[2]Ibid., Pg. 140

QUALIFICATIONS OF DARREL R. LLOYD, JR.

KLAUK, LLOYD & WILHELM INC.

Education:

- Valencia College, Orlando, Florida
- State University of New York at Buffalo

Technical Training:

- Society of Real Estate Appraisers-Course 101, "Introduction to Appraising Real Property", Buffalo, New York, 1989
- Society of Real Estate Appraisers-Course 102, "Applied Residential Property Valuation", Buffalo, New York, 1987
- Society of Real Estate Appraisers-Course 201, "Principles of Income Property Appraising", Buffalo, New York, 1988
- Society of Real Estate Appraisers-Course 202, "Applied Income Property Valuation", Tarpon Springs, Florida, 1989
- Society of Real Estate Appraisers, "Professional Practice Seminar", Kingston, NY, 1989
- Marshall & Swift Cost Valuation Seminar, "Calculator Cost Method", Buffalo, NY, 1988
- Appraisal Institute, "Standards of Professional Practice", Buffalo, New York, 1991
- Appraisal Institute - Course 520, "Highest & Best Use and Market Analysis", West Palm Beach, Florida, 1994
- American Society Appraisers, "Machinery and Technical Specialties", Chicago, IL, 1994
- American Society Appraisers, "Business Valuation", Toronto, Canada, 1994
- National Golf Foundation, "Golf Course Development and Revaluation", San Francisco, California, 1995
- Appraisal Institute, "Appraisal of Nursing Facilities", Syracuse, New York, 1997
- Appraisal Institute, "Standards of Professional Practice", Buffalo, New York, 1996
- Appraisal Institute, "Standards of Professional Practice", Boca Rotan, Florida, 12/2002
- Appraisal Institute, "Evaluating Commercial Construction", Tampa, Florida, 11/2003

Professional Affiliations:

- MAI Candidate - Appraisal Institute
- Greater Buffalo Board of Realtors
- National Association of Realtors

Licensure/Certifications:

- New York State Certified General Real Estate Appraiser #46-5539
- Pennsylvania State Certified General Real Estate Appraiser #GA003387
- Licensed New York State Real Estate Salesperson

Appraisal Assignments:

- Apartment Complexes
- Automobile Dealerships
- Certiorari Actions
- Community Shopping Plazas
- Condemnation Properties
- Feasibility Studies
- Funeral Homes
- Gas and Service Stations
- Golf Courses
- High Rise Condominiums & Office Bldgs.
- Hotels
- Industrial Complexes
- Lease Analysis
- Medical Offices
- Nursing Homes
- ROW Projects
- Rehabilitation
- Restaurants
- Retail Department Stores
- Residential
- Special Purpose Properties (Bowling Alleys, Mobile Home Parks & Banks)
- Temporary and Permanent Easements
- Urban Renewal
- Vacant Land and Subdivision Analysis
- Waterfront Properties

Prepared & Participated in Appraisals For:

- AT&T Financial Services
- Affiliated Capital Corporation
- Bank of New York
- Benchmark Financial, Inc.
- Buffalo Urban Renewal Agency
- Central Trust Company
- Citibank (NYS) N.A.
- Citizen Associates, Ltd.
- Diversified Capital
- Empire of America, FSA
- Erie Cnty. Industrial Development Agency
- Fleet Bank, N.A
- Future Funding Mortgage Co., of NY, Inc.
- ITT Small Business Finance Corporation
- KPMG Peat Marwick
- Key Bank of New York
- Liberty Mutual
- First Niagara Bank
- Manufacturers & Traders Trust Company
- HSBC Bank
- Midas Realty Corporation
- Niagara Frontier Transportation Authority
- NYS Housing Finance Agency
- NYS DOT
- Sibley Mortgage Corporation
- Statewide Capital Corp.
- The Chase Manhattan Bank
- Town of Queensbury
- UAW Legal Services
- Various attorneys & private clients

Prepared Appraisals in:

- California, Delaware, Florida, New York (including New York City), Ohio, Pennsylvania and Canada.

Qualified As Expert Witness:

- The appraiser has appeared as an expert witness regarding real estate valuation in New York State Supreme Court.
- The appraiser has also appeared before municipal assessment review boards.

Employment History:

- **Klauk, Lloyd & Wilhelm Inc., Buffalo, NY, Vice President/Partner, 1995-Present**
- Upstate Appraisal, Inc. - Commercial, Buffalo, NY, Vice President/Manager, 1993-1995
- International Appraisal Associates (Commercial, Industrial, and Residential), Tonawanda, NY, President, 1990-1993
- Northeastern Appraisal Associates - Commercial Division, Amherst, NY, Associate Appraiser, 1986-1989
- Century 21 M.J. Peterson, Sales Associate, 1982-1986

Q Decommissioning Plan

Noble Ball Hill Windpark Decommissioning Plan

Wind Energy Conversion Facilities/Systems Decommissioning Process Description

Equipment Removal

1. Turbine Removal – Appropriate sized cranes will be mobilized and the hub, along with blades and nacelle, will be removed to ground level for a scrap company to breakdown and strip high-value components. The remaining material will be reduced to shippable dimensions and transported off site for proper disposal. The internal cabling will be removed and stored prior to delivery to a scrap company for recovery of high-value copper conductor materials. The tower sections will be lowered to grade so they can be cut into transportable sections for delivery to a scrap iron purchaser. Control cabinets in the base will be stripped of high-value components and the balance will be turned over to a scrap company for haul and disposal. The area will be thoroughly cleaned and all debris will be removed.

2. Pad Mount Removal – Cables will be disconnected from the transformer and high-value reusable components will be recovered from the terminations. Cables between the turbine base and transformer will be removed and stored prior to delivery to a scrap company for recovery of high-value copper conductor materials. The pad mount will be removed from the base and placed on a truck that will deliver the unit to a specialty company for scrap out or refurbishment depending on the market. The area will be thoroughly cleaned and all debris will be removed.

3. Overhead Collection Lines – Conductors will be removed and stored prior to delivery to a specialty scrap company for recycling. Switches and other hardware will be removed and delivered to a processing company for recycling of materials. High-value cabling will be salvaged. Poles will be removed and holes will be filled with native materials and graded to match adjacent contours. Poles will be delivered to a facility for proper disposal. The area will be thoroughly cleaned and all debris will be removed.

4. Substation Transformer(s) – Transformers will be removed and depending on the condition will be sold for re-use or sent to a specialty scrap company for recycling where any hazardous materials would be properly disposed of.

Foundation Removal

1. Turbine and Substation Equipment Foundations – Topsoil will be removed to a proper storage pile to expose subgrade materials, and that area will be excavated to expose the turbine foundation pedestal. All anchor bolts, rebar, conduits, and concrete in the pedestal will be removed to a minimum depth of 48 inches below grade in agricultural lands in accordance with New York State Department of Agriculture and Markets (NYSDAM) guidelines, and a minimum depth of 36

inches below grade in all other areas. After removal of all noted foundation materials, the holes will be filled with clean compatible subgrade material that is compacted to a density similar to the surrounding fields, covered with the topsoil from the protected stockpile of material, and then graded to match adjacent contours. All unexcavated areas compacted by equipment used during decommissioning shall be tilled in a manner adequate to restore the topsoil and subgrade material to the proper density consistent with the surrounding fields. The area will be thoroughly cleaned and all debris removed. All restoration activities in agricultural fields will be done in accordance with NYSDAM guidelines.

2. Pad Mount Base - Topsoil will be removed to a proper storage pile to expose subgrade materials. The area excavated to expose the pad mount foundation or pre-cast support vault. All anchor bolts, rebar, conduits, and concrete in the foundation or pre-cast support vault will be removed to a depth of 48 inches below grade in agricultural land, and 36 inches below grade in all other areas. After removal of all noted foundation materials, the holes will be filled with clean compatible subgrade material that is compacted to a density similar to the surrounding fields, covered with the topsoil from the protected stockpile of material, and then graded to match adjacent contours. All unexcavated areas compacted by equipment used in the decommissioning shall be tilled in a manner adequate to restore the topsoil and subgrade material to the proper density – consistent with the surrounding fields. The area will be thoroughly cleaned and all debris will be removed. All restoration activities in agricultural fields will be done in accordance with NYSDAM guidelines.

Underground Electrical Collection System

The underground electrical collection system will be designed and installed such that the main conductors will have a minimum of 42 inches of cover and at least 48 inches of cover in agricultural lands (see Appendix A). The design includes the installation of a warning tape and a tracer cable system to warn anyone who may be digging in the area both during plant operations and after decommissioning. The design is planned for safety by getting sufficient cover to ensure that they will not be disturbed during normal agricultural operations.

Cables will be cut back in the area of the pad mounts to minimum depth of 48 inches below grade in agricultural land, and a minimum of 36 inches below grade in all other areas. The remaining cabling may be removed for recovery of high-value copper and aluminum conductor material.

Roadways/Rigging Pads

After completion of decommissioning activities at each turbine site, access road and rigging pad removal shall commence. Gravel will be removed from road and rigging pad surfaces and transported from the site to an approved disposal location. The disposal location will be approved by the appropriate governing authority prior to the start of the decommissioning program. Geo-textile fabric (a tightly woven separation fabric placed during construction on the subgrade under the gravel to keep the gravel from being pushed down into the subgrade during

wet periods) will be recovered and hauled off site to an appropriate disposal site. All drainage structures, including culverts, rip-rap, etc., will be removed, hauled off-site to an appropriate disposal site, and these areas will then be backfilled with clean, compatible sub-grade material. All road and other areas compacted during original construction or by equipment used in the decommissioning shall be tilled in a manner adequate to restore the subgrade material to the proper density and depth consistent with the surrounding fields. Low areas will be filled with clean, compatible subgrade material. After proper subgrade depth is established, topsoil will be placed to a depth, density, and finished contour consistent with the surrounding field. All restoration activities in agricultural fields will be done in accordance with NYSDAM guidelines.

Access security gates will be maintained at all times until the road removal process is complete and the area is ready to be demobilized. The gate shall be removed and all materials recycled to the greatest extent possible. The ditch crossing will be removed if requested by the landowner and approved by the appropriate authorities having jurisdiction over roads and drainage. The area will be thoroughly cleaned and all debris will be removed.

All decommissioning activities shall be performed in accordance with all applicable federal, state, and local requirements in effect at the time of decommissioning.

Financial Security for Decommissioning Costs

As detailed below, the costs of decommissioning Project components, average salvage values for various components, and a net decommissioning cost per turbine have been carefully estimated by LVI Services, the nation's largest remediation and facility services firm. In accordance with the Town of Villenova and Town of Hanover local laws regulating wind energy facilities, Noble will establish financial security in a form and amount acceptable to the Town. The net decommissioning costs based on 2005 to 2008 average salvage values and projected labor rates are estimated to be $13,829.96 per wind energy conversion system (WECS).

Revegetation and Reseeding

All Project areas not under cultivation or reserved for some other use by property owners will be revegetated or reseeded, as appropriate. Revegetation of the disturbed areas will be part of the restoration of the area to surrounding land use in the same manner as described for restoring areas temporarily impacted during construction. Reseeding in agricultural areas will be conducted in accordance with NYSDAM guidelines. See Section 2.27, Description of the Proposed Construction Plan for a more detailed discussion of proposed reseeding and planting activities.

Budgetary Estimate/Opinion of Cost for
Ball Hill Wind Energy Conversion Facility Decommissioning

(prepared by LVI Environmental Services, Inc., 7/13/08)

Turbine Equipment Removal

Remove Blades/Hub

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	8	hour	85.00	680.00	
Crane w/ Operator	1	day	2,900.00	2,900.00	
Operators	16	hour	80.00	1,280.00	
Labor	8	hour	65.00	520.00	
Support Equipment*	1	day	900.00	900.00	
Consumables/Fuel	8	hour	160.00	1,280.00	
Concrete/Clean Fill Recycling	0	ton	7.00	0.00	
C&D Waste Disposal	25	ton	65.00	1,625.00	
Steel Salvage	0	ton	(220.00)	0.00	
Aluminum Cable Salvage	0	pound	(0.45)	0.00	
Copper Cable Salvage	0	pound	(2.38)	0.00	
Component Salvage	0	each	0.00	0.00	
		Sub Total		9,185.00	**9,185.00**

*Support Equipment consists of one (1) 100K Lb. excavator with attachments, one (1) loader, one (1) skidsteer, one (1) pickup truck and one (1) site trailer.

Remove Nacelle

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	4	hour	85.00	340.00	
Crane w/ Operator	1	day	2,900.00	2,900.00	
Operators	16	hour	80.00	1,280.00	
Labor	8	hour	65.00	520.00	
Support Equipment*	1	day	900.00	900.00	
Consumables/Fuel	8	hour	160.00	1,280.00	
Concrete/Clean Fill Recycling	0	ton	7.00	0.00	
C&D Waste Disposal	0	ton	65.00	0.00	
Steel Salvage	3	ton	(220.00)	(660.00)	
Aluminum Cable Salvage	150	pound	(0.45)	(67.50)	
Copper Cable Salvage	50	pound	(2.38)	(119.00)	
Component Salvage	1	each	(5,000.00)	(5,000.00)	
		Sub Total		1,373.50	**1,373.50**

Dismantle Tower

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	8	hour	85.00	680.00	
Crane w/ Operator	2	day	2,900.00	5,800.00	
Operators	32	hour	80.00	2,560.00	
Labor	32	hour	65.00	2,080.00	
Support Equipment*	2	day	900.00	1,800.00	
Consumables/Fuel	16	hour	160.00	2,560.00	
Concrete/Clean Fill Recycling	0	ton	7.00	0.00	
C&D Waste Disposal	0	ton	65.00	0.00	
Steel Salvage	138	ton	(220.00)	(30,360.00)	
Aluminum Cable Salvage	475	pound	(0.45)	(213.75)	
Copper Cable Salvage	130	pound	(2.38)	(309.40)	
Component Salvage		each		0.00	
		Sub Total		(15,403.15)	**(15,403.15)**

Foundation Removal

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	8	hour	85.00	680.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	32	hour	80.00	2,560.00	
Labor	0	hour	65.00	0.00	
Support Equipment*	2	day	900.00	1,800.00	
Consumables/Fuel	16	hour	160.00	2,560.00	
Concrete/Clean Fill Recycling	676	ton	7.00	4,732.00	
C&D Waste Disposal	0	ton	65.00	0.00	
Steel Salvage (Rebar)	6	ton	(190.00)	(1,140.00)	
Aluminum Cable Salvage	100	pound	(0.45)	(45.00)	
Copper Cable Salvage	30	pound	(2.38)	(71.40)	
Component Salvage	1	each	(250.00)	(250.00)	
		Sub Total		10,825.60	**10,825.60**

Backfill/Restoration

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	8	hour	85.00	680.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	16	hour	80.00	1,280.00	
Labor	8	hour	65.00	520.00	
Support Equipment*	1	day	900.00	900.00	
Consumables/Fuel	4	hour	160.00	640.00	
Topsoil	45	cubic yard	18.00	810.00	
Re-seed/Vegetation	4700	square foot	0.20	940.00	
Steel Salvage	0	ton	(220.00)	0.00	
Aluminum Cable Salvage	0	pound	(0.45)	0.00	
Copper Cable Salvage	0	pound	(2.38)	0.00	
Component Salvage	0	each		0.00	
		Sub Total		5,770.00	**5,770.00**

TOTAL per Tower/Turbine	**$11,751**

No. of Towers/Turbines	60

TOTAL for Towers/Turbines	$705,057

Collection, Substation & Roads

Overhead Collection

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	8	hour	85.00	680.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	8	hour	80.00	640.00	
Labor	16	hour	65.00	1,040.00	
Support Equipment*	1	day	900.00	900.00	
Consumables/Fuel	8	hour	160.00	1,280.00	
Concrete/Clean Fill Recycling	0	ton	7.00	0.00	
C&D Waste Disposal	5	ton	65.00	325.00	
Steel Salvage	0	ton	(220.00)	0.00	
Aluminum Cable Salvage	20	pound	(0.45)	(9.00)	
Copper Cable Salvage	30	pound	(2.38)	(71.40)	
Component Salvage	0	each	0.00	0.00	
		Sub Total		4,784.60	**4,784.60**

Underground Collection

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	160	hour	85.00	13,600.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	160	hour	80.00	12,800.00	
Labor	160	hour	65.00	10,400.00	
Support Equipment*	20	day	900.00	18,000.00	
Consumables/Fuel	160	hour	160.00	25,600.00	
Concrete/Clean Fill Recycling	0	ton	7.00	0.00	
C&D Waste Disposal	80	ton	65.00	5,200.00	
Steel Salvage	0	ton	(220.00)	0.00	
Aluminum Cable Salvage	186750	pound	(0.45)	(84,037.50)	
Copper Cable Salvage	13275	pound	(2.38)	(31,594.50)	
Component Salvage	0	each	0.00	0.00	
		Sub Total		(30,032.00)	**(30,032.00)**

Substation

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	16	hour	85.00	1,360.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	32	hour	80.00	2,560.00	
Labor	16	hour	65.00	1,040.00	
Support Equipment*	2	day	900.00	1,800.00	
Consumables/Fuel	16	hour	160.00	2,560.00	
Concrete/Clean Fill Recycling	60	ton	7.00	420.00	
C&D Waste Disposal	10	ton	65.00	650.00	
Steel Salvage	5	ton	(220.00)	(1,100.00)	
Aluminum Cable Salvage	1000	pound	(0.45)	(450.00)	
Copper Cable Salvage	150	pound	(2.38)	(357.00)	
Component Salvage	1	each	(2,000.00)	(2,000.00)	
		Sub Total		6,483.00	**6,483.00**

Roads

Item	Quantity	Unit	Unit Cost	Extended	
Supervision	144	hour	85.00	12,240.00	
Crane w/ Operator	0	day	2,900.00	0.00	
Operators	288	hour	80.00	23,040.00	
Labor	144	hour	65.00	9,360.00	
Support Equipment*	18	day	900.00	16,200.00	
Consumables/Fuel	144	hour	160.00	23,040.00	
Concrete/Clean Fill Recycling	8100	ton	7.00	56,700.00	
C&D Waste Disposal	45	ton	65.00	2,925.00	
Steel Salvage	0	ton	(220.00)	0.00	
Aluminum Cable Salvage	0	pound	(0.45)	0.00	
Copper Cable Salvage	0	pound	(2.38)	0.00	
Component Salvage	0	each	0.00	0.00	
		Sub Total		143,505.00	**143,505.00**

GRAND TOTAL	$829,798

Per WECS: $13,829.96

R Health and Safety

Noble Environmental Power
Health, Safety, and Environmental Management System

Noble
ENVIRONMENTAL POWER

HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM

NOTE: ***THIS DOCUMENT IS TO BE READ IN CONJUNCTION WITH THE OWNER'S SITE SPECIFIC HSE RULES AND REGULATIONS, AND ALL GOVERNING LEGISLATION INCLUDING OCCUPATIONAL HEALTH & SAFETY ACT AND REGULATIONS AND ENVIRONMENT ACT AND REGULATIONS.***

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1.0 INTRODUCTION

1.1 General

This Health, Safety and Environmental Management System (HSEMS) program summarizes the health, safety and environmental procedures that will be implemented on the Noble project.

The contents of this manual are not inclusive of all applicable Federal and Provincial Acts, Statutes, and Legislation, therefore all management, staff, employees, consultants, subcontractors and all others shall be thoroughly familiar with these and any other statutory requirements not specifically referenced herein. The latest revision of all documents shall govern.

In case of conflict between the requirements of this manual and governing legislation, the Noble Manager, Corporate Health and Safety (or designate) must be consulted.

This manual will complement all subcontractor's and others' safety plans, programs and all related policies and procedures, and will take precedence in case of conflict.

Wherever the words 'shall' and 'will' are used in this document, the meaning will be a promise or statement of intention and obligation by the Subcontractor, and is included in the contract price. The masculine "he" is used for brevity only and shall be read as "he/she" throughout this program manual.

1.2 Scope

The Noble management team is committed to a healthy and safe working environment. The success of the Health, Safety and Environment Program depends on its implementation at every level throughout the organization and all personnel engaged on the Noble project. Experience shows that sound accident prevention techniques and principles result in a healthy, safe and productive workplace. To ensure the realization of this objective, this HSEMS Program is established to provide awareness and participation by all persons.

The policies, procedures and guidelines contained in this Program manual will apply to all phases of the Noble project under the control or authority of Noble. All Subcontractors engaged in carrying out work under the authority of Noble will comply with the criteria stated herein.

Prior to commencement of any work, all Noble employees, staff, management, its subcontractors, and their supervisors shall review and understand the contents of this HSEMS Program. The use of this manual will promote safety and environmental compliance as well as provide a consistent approach to achieving injury/incident-free performance by all parties.

All Subcontractors will be responsible for safe work practices and conditions of their employees and subcontractors, and will ensure that the work does not result in hazards to themselves or to others. Every worker on the Noble project will be required to adhere to the procedures and safe practices as defined by this HSEMS Program.

The overall goal of the HSEMS Program is to maintain quality and integrity in all facets of construction, operation, and all other activities while maintaining the health and safety of all clients' personnel and the protection of property.

This will be achieved by adopting policies of accident/incident prevention as follows:

- Minimizing unsafe conditions. Accidents are caused by unsafe physical condition of equipment or mechanical exposure to the working environment.
- Minimization of unsafe acts by providing competent supervision to ensure workers use proper techniques and methods.
- Taking advantage of every opportunity to correct unsafe acts or conditions before an injury occurs.
- Implementing procedures to prevent any abuse via filing of false claims of injury or illness.

1.3 Health, Safety and Environmental Objectives

The following are the established project health and safety objectives to which all the project's participants will subscribe and strive to achieve:

- No fatalities.
- Zero lost time incidents (injuries and work-related illnesses).
- Minimum medical treatments and First Aids cases.
- Continuing reduction of incidents which could lead to any of the above.
- Total Recordable Injury Frequency Rate (lost time injuries plus Medical Aid treatments) of less than 1.0.

- ❑ No spills or environmental releases/impacts under their or Noble's control or authority.
- ❑ All wastes disposed of in full compliance with prevailing legislation, Noble and/or client/owner rules and procedures.
- ❑ Minimize wastes whenever possible and feasible through adherence to good engineering practice and sound environmental practices.

1.4 Principles of Safety and Environmental Management

- ❑ The Subcontractor has overall responsibility for the health, safety and environmental elements under its control in accordance with Noble's HSEMS Program. This responsibility will be maintained throughout its association with Noble.
- ❑ The Subcontractor's health, safety and environmental program and its implementation will meet or exceed industry standards and the requirements of all governing regulatory bodies.
- ❑ Copies of its Health, Safety and Environment Program will be made available to the Noble's Management team including their field supervisory staff, HSE personnel, and any Subcontractors for reference and implementation during their scope of work.
- ❑ The Subcontractor will have its current safety and environment programs and historical performance records evaluated, and shall submit a written commitment to such objectives along with its bid submittal, if any.
- ❑ The Subcontractor will be responsible to advise all its personnel and subcontractors of the project's safety and environment goals, policies, requirements and procedures in all orientation sessions. This will be a mandatory precedent before any person commences employment at any project, facility, site or office location.
- ❑ The safety consciousness and performance of all personnel at all sites will be audited on a programmed basis by Noble's Manager, Corporate Health and Safety, and upgraded if required throughout the scope of work performed.
- ❑ Each employee is responsible for his/her own safety and the safety of co-workers by following safe work procedures, and by reporting sub-standard acts and conditions to their immediate supervisor. Every worker has the right to refuse to perform work that he/she considers has unsafe conditions - no penalties will apply for refusing to work in unsafe conditions.

- Noble and Subcontractor management personnel will promote, assist, and participate in safety meetings, audits and reporting to reinforce the importance of safety and environment on this project.

1.5 Subcontractor's Health & Safety Program

The Subcontractor will submit a copy of its written health, safety and environment program and policies prior to the start of any work. These programs shall comply with all prevailing applicable legislation and be approved by the Project Health and Safety Superintendent.

All Subcontractor's health, safety and environmental programs shall include the following elements:

- A written health, safety and environment program document that includes the procedures and policies for effective health, safety and environmental management.
- A current statement of HSE Policy signed by senior management.
- A written health, safety and environment program document that includes specific policies and procedures for effective HSE management
- Implementation of the program with consideration for other contractors.
- Convening regular site safety meetings and pre-work employee orientations.
- Posting safety bulletin boards, signs and posters when approved by Noble and/or client/owner.
- Promoting a consistently respectful, interested and enthusiastic attitude towards Noble's HSEMS Program.
- Ensuring that its supervisors are competent.
- Performing inspections and audits where specified by prevailing legislative jurisdiction and/or Noble's HSEMS program - and correcting all unsafe working conditions that are identified.
- Installing and implementing adequate fire prevention equipment and procedures.
- Provision of appropriate First Aid facilities, equipment and certified personnel to adequately treat its employees.
- Provision of transportation to medical centers (doctors, clinics, hospitals, etc.) when required legislatively or contractually.

- ❑ Applying adequate prevention measures and procedures against spills and other workplace hazards.
- ❑ A copy of the Subcontractor's safety statistics for the previous three years shall be included with the Contractor's health, safety and environment programs. It shall include all recognized statistical information (e.g., WSIB experience ratings) that is applicable in the region where the project is being performed. Refer to Appendix C – Subcontractor Pre-qualification Process for further details.

End of Section 1

2.0 SAFETY & ENVIRONMENT ORGANIZATION & RESPONSIBILITIES

2.1 Noble Project Manager

The Project Manager (PM) has overall responsibility for the development and implementation of the project's HSE program. He allocates resources so that sufficient equipment, materials and staff are in place for safe, environmentally sound, and effective project undertaking. He participates in management reviews of the Project's HSE plan(s) for ongoing suitability, adequacy, and effectiveness. He mandates the focus of all HSE policies, objectives, and targets for the project. He has overall budgetary control and authority for all aspects of the project.

2.2 Noble Construction Manager

The Construction Manager provides senior project direction to supervisors, safety and environmental personnel and contractors in the application of the provisions of this Project Health, Safety, and Environmental Management System (HSEMS) program. He ensures that provision has been made for resources and training necessary to carry out the project safety program, and ensures that the policies and procedures are communicated and applied throughout the project organization.

2.3 Noble Project HSE Superintendent

The Project Health, Safety and Environment (HSE) Superintendent reports to the Noble Manager, Corporate Health and Safety, and implements and administers Noble's Health, Safety and Environment Program at the project. He provides the Construction Manager and Subcontractors with guidance and advice to achieve the project's health, safety and environmental objectives.

The specific functions of the Noble Project HSE Superintendent are as follows:

- ❑ Monitor and report on compliance with the project HSEMS Program by all Subcontractors and their personnel at all sites.
- ❑ Maintain knowledge of current governing regulations, codes and practices, and inform the Construction Manager whenever revisions to the site-specific HSEMS Program are required.

- ❑ Ensure that the Subcontractor's health, safety and environmental procedures are incorporated into the Noble HSEMS Program.
- ❑ Ensure that the (Sub) Contractor supplies, maintains, operates and locates all safety, first aid, medical and fire-fighting equipment in accordance with legislated requirements. Confirm that the (Sub) Contractor has reliable emergency medical transportation available.
- ❑ Ensures undertaking of, or conducts investigations and reviews of all incidents such as accidents, incidents, health exposures, disabling injuries, and fatalities, and produce investigation reports for circulation to the required authorities.
- ❑ Ensure that all personnel employed on the project comply with the applicable regulations, and maintain a co-operative working relationship with the relevant officials.
- ❑ Prepare and file all HSE reports related to the project as required by legislation, and immediately transmit copies of such reports to the Construction and Project Manager as well as the Corporate HSE office.
- ❑ Diligently record, file and keep safe all reports, including those required by governing regulatory agencies, until the end of the project, and then archive same with other project documents.
- ❑ Ensure that the Subcontractor's supervisors conduct daily toolbox safety meetings with their crews.
- ❑ Ensure that the Subcontractor and its subcontractor/s provide health and safety orientation sessions for all their personnel and visitors.
- ❑ Provide a supply of safety and personal protective equipment for Noble personnel, and ensure that it is properly utilized and maintained.
- ❑ Maintain any safety performance records required by corporate safety recognition and rewards programs that may be established, and arrange the appropriate ceremonies to recognize the achievements.
- ❑ Assist, where appropriate, in Subcontractor Job Safety Analysis that may be required, and maintain copies for records.
- ❑ Review daily site health and safety inspection and reporting. Monitor as appropriate.
- ❑ Issuance of stop work instructions when safety conditions require such action.

- ❑ Provide assistance to contractors in the implementation of the Noble HSEMS Program.
- ❑ Initiate site-specific HSE reports as required.
- ❑ When applicable, monitor all aspects of traffic safety concerning staging, detours, illumination, signals, and temporary signs/road markings. Maintain communications with relevant authorities.

2.4 Subcontractor Site Safety Representative (Where Required)

The specific functions of the Subcontractor's site safety representative will include the following:

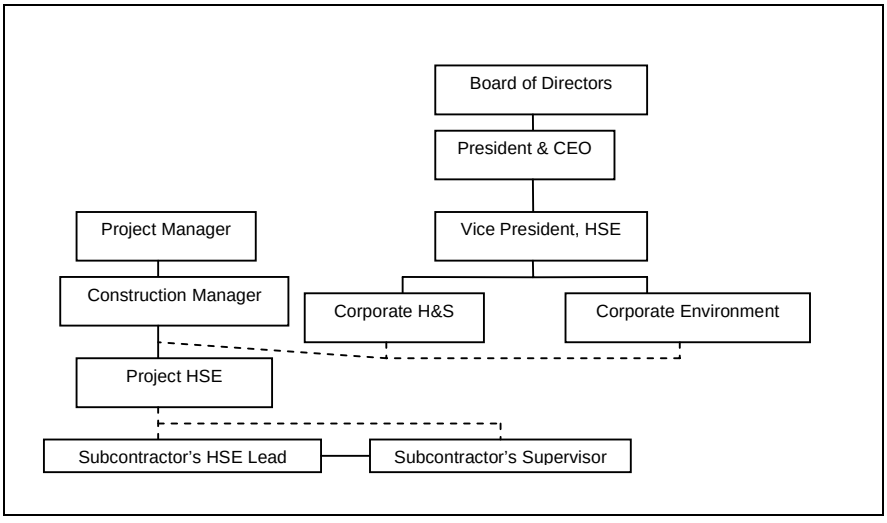
- ❑ Monitor and report to Noble's Project HSE Superintendent on the (Sub) Contractor's health, safety and activities.
- ❑ Make daily health, safety and environmental inspections of work areas, and ensure that all non-compliant and unsafe conditions are made safe and/or compliant immediately.
- ❑ Ensure that supervisors hold daily crew "tool box" safety meetings.
- ❑ Liaise with other subcontractor representatives and monitor their practices where they interface.
- ❑ Assist in accident investigation and reporting.
- ❑ Implement health and safety orientation sessions for their personnel, and conduct employee-training programs.
- ❑ Maintain statistical information and provide it to the Manager, Corporate Health & Safety on a monthly basis.
- ❑ Provide all personal protective equipment (PPE) and devices as required for the work, and ensure that they are properly used at all times.
- ❑ Provide industrial hygiene and work environment monitoring for noise exposure and air quality as required.
- ❑ Ensure that Noble's Manager, Corporate HSE receives all revisions to the Subcontractor's HSE program.
- ❑ Ensure that First Aid/Medical facilities are equipped/staffed in accordance with legislated requirements.
- ❑ Ensure that compliant fire fighting equipment is installed, and that employees have been trained in the proper use of such equipment.

2.5 Subcontractor Supervisors

The specific safety- and environment-related functions of the Subcontractor's supervisors and foremen will include the following:

- Set a good example for workers by enforcing safety, industrial hygiene and environmental rules, regulations and standards.
- Instruct workers under their supervision on safe work practices, and the hazards associated with the assigned tasks at commencement of each work assignment.
- Ensure that workers are properly using the correct personal protective equipment (PPE) and safety devices for the work being performed, and that they are properly trained in the use of their tools and equipment. Perform frequent checks on serviceability of all personal protective equipment (PPE) and tools/equipment.
- Lead in the investigation of Subcontractor's accidents to determine all the facts necessary to take corrective action.
- Conduct daily "tool box" talks to explain the safety measures associated with the tasks for the day, and discuss safety information that is issued by the Subcontractor's site safety representative and the project HSE Superintendent. Encourage safety suggestions from the workers.
- Ensure that workers report all incidents/accidents, and ensure that prompt First Aid is administered to injured workers.
- Conduct, document and implement JSA's and relevant requirements of same.

2.6 Project Organizational Chart



End of Section 2

3.0 ORIENTATION, MEETINGS, AND COMMUNICATIONS

3.1 Pre-Construction Safety Meeting with Subcontractors

The Subcontractor will attend a Pre-Construction Safety Meeting after contract award and prior to the Subcontractor starting work at the work site. The following personnel, as a minimum, will attend any portion of the meeting dealing with safety and environment issues:

- ❑ Noble Construction Manager.
- ❑ Noble Project HSE Superintendent.
- ❑ Subcontractor's Home Office Project Manager or equivalent.
- ❑ Subcontractor's Senior Site Representative.
- ❑ Subcontractor's Safety Representative/s.

3.2 Site Safety Orientation

The Subcontractor shall provide health and safety orientation for all its employees and subcontractors.

This orientation is a prerequisite to entering the site to work, except to those persons entering the site as a Visitor (Visitors must be accompanied by a designated, orientated project person, and will abide by the project safety regulations).

Workers who have attended the Contractor's site safety orientation session shall be given an identification card (or hard hat decal) which will be retained by the employee and shall be produced on demand while on the work site.

During the orientation, the Contractor will provide all additional company or contract specific information to their employees.

The safety orientation will include a review of the following:

- ❑ Health, safety and environment relationships of Noble, (Sub) Contractors and the Owner.
- ❑ Safe Work Procedures.
- ❑ Project security provisions.
- ❑ Emergency Response Plan, including muster points, location of telephones/radios for emergency use.

- ❑ General site layout including location of First Aid/medical facilities and sanitary facilities.
- ❑ Work area hazard awareness.
- ❑ Proper use of personal protective clothing and other safety equipment.
- ❑ Vehicle/equipment operation and safety.
- ❑ All Permit-required work
- ❑ Other site rules and regulations.

The safety orientation will be conducted in the morning, and workers will be allowed to proceed to their work place afterwards. In no event shall any worker commence work prior to having undergone orientation. All workers who attend the orientation session will be required to sign an attendance sheet, and must be issued a copy of the Subcontractor's HSE handbook (if the Contractor does not have a published HSE handbook, then copies of Noble's Employee HSE Handbook are available for sale).

3.3 Occupational Health & Safety Committee

Where required by legislation, Noble and the Subcontractor will form a Joint Health and Safety Committee when the total workforce equals the stipulated number of employees.

On construction sites where the size of the workforce or legislation does not stipulate the establishment of an Occupational Health & Safety Committee, the Subcontractor will formally communicate health and safety related matters to its workforce in the form of meetings and "toolbox" talks.

3.4 Safety Meetings

3.4.1 Tool Box and Pre-job Safety Meetings

A "toolbox" meeting is a short meeting held by each supervisor at the start of each shift to discuss with his personnel the work of the day including special procedures, any potential hazards, all safety issues relating to the work, and any matters raised by the workers. Daily "toolbox" meetings will be recorded in bullet format and an attendance record must be signed by all present.

Where a critical task is planned, a pre-job meeting will also be convened. Attendance should be limited to the workers on the task, their immediate supervisor(s), and HSE personnel as required. A Job Safety Analysis (JSA) will

be initiated, reviewed and then presented to the crew before each critical task begins.

The Noble Project HSE Superintendent will be advised of all scheduled meetings, and may attend if deemed appropriate. He shall receive copies of Subcontractor's minutes and attendance records.

3.4.2 Weekly Noble/Contractor Health, Safety & Environment Meeting

Weekly meetings will be convened to review all health, safety and environment related matters. Noble's Project HSE Superintendent will prepare the agenda, with input from attendees. Attendees will include:

- Noble Project HSE Superintendent.
- Noble Construction Manager.
- Subcontractor's site safety representative(s).

3.5 Health, Safety and Environmental Investigations, and Incident Reporting

All health, safety and environmental incidents will be investigated and reported for the following purposes:

- To meet the requirements of the prevailing Occupational Health and Safety Act and Environmental Legislations. The Project HSE Superintendent will keep copies of all reports on file.
- To ensure that workers affected receive the benefits to which they are entitled.
- To provide information that may be useful in preventing similar occurrences elsewhere.

3.5.1 Responsibilities

Completion of field safety reports and records are the responsibility of the Project Management Team (PMT) and/or the Subcontractor involved in the incident. The following reporting procedures are mandatory to ensure a uniform method of reporting and recording accidents on the project.

- Verbal notification will occur as soon as possible.
- Field reports and records will be completed promptly after each incident or accident. Each reportable Medical Aid (MA), lost time injury (LTI) and

property damage/loss will require the completion of a Noble Accident/ Incident Investigation Report.

- ❑ Accidents involving cranes will additionally require completion of a Crane Accident Investigation Report.
- ❑ Workers' Compensation reports by the Subcontractor and the affected worker will be filed as stipulated in the applicable regulations.
- ❑ Copies of all investigation reports will be sent to the Project HSE Superintendent within 24 hours of the occurrence, who will then issue a completed report for fatalities, critical injuries, lost time injuries, and environmental discharges to the Manager, Corporate Health & Safety and/or Corporate Environmental Manager.
- ❑ For all fatalities, lost time injuries, critical injuries and environmental discharges, the Manager, Corporate Health & Safety and/or the Manager Corporate Environment must be notified within four hours.

The above-mentioned reporting requirements do not absolve the Subcontractor of any legislated reporting requirements.

3.5.2 Safety Reporting/Injury Definitions

Definitions

Fatality: A fatality is a death of a worker on the project or at the workplace resulting directly from an occupational illness or occupational injury. All fatalities will now be classed in a separate category on the accident statistics (zero severity).

Critical Injury:

A critical injury is one of a serious nature that:

- ❑ Places life in jeopardy;
- ❑ Produces unconsciousness;
- ❑ Results in substantial loss of blood;
- ❑ Involves the fracture of a leg or arm but not a finger or toe;
- ❑ Involves the amputation of a leg, arm, hand or foot but not a finger or toe;
- ❑ Consists of burns to major portion of the body; or,
- ❑ Causes the loss of sight in an eye.

Environmental Discharge

A Level 2 environmental incident involves spillage of 25L or more of contaminants and may impair environmental quality. Level 3 is a major spill which has environmental impact. Any incident which requires reporting to regulatory authorities is by definition an "environmental incident", regardless of the quantities involved.

Occupational Injury:

An occupational injury results from a work-related accident or exposure on the project or at the workplace that requires "first aid" or "medical aid" treatment (see following definitions for both)

Occupational Illness:

An occupational illness results from an exposure to a chemical or physical agent on the project or at the workplace that causes illness that requires first aid or medical aid treatment.

First Aid Case:

Any one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters and so forth. This treatment is considered first aid even though provided by a physician or registered medical professional personnel. First aid cases include:

- ❑ Use of non-prescription medication at non-prescription strength.
- ❑ Use of wound coverings such as bandages, band-aids, gauze pads, butterfly bandages or steri-strips.
- ❑ Using any non-rigid means of support such as elastic bandages, tensor wrap, non-rigid back belts, etc.
- ❑ Use of eye patches.
- ❑ Removal of foreign bodies not embedded in the eye using only irrigation or cotton swab.
- ❑ Removal of foreign bodies from a wound, if the procedure is uncomplicated (e.g. by irrigation, tweezers, or other simple technique).
- ❑ Using temporary immobilization devices (e.g. slings, neck collars, back boards), while transporting the injured.
- ❑ Cleaning, flushing or soaking wounds on the surface of the skin.

- ❑ Application of hot or cold therapy (compresses, gel packs, soaking, whirlpools).
- ❑ Using massages (physiotherapy or chiropractic treatment is medical aid).
- ❑ Drilling fingernail or toenail to relieve pressure or draining a fluid blister.
- ❑ Using finger guards.
- ❑ Negative X-ray diagnosis.
- ❑ Drinking fluids for relief of heat stress.
- ❑ Administration of tetanus shot(s) or booster(s).
- ❑ Preventative administration of oxygen or IV fluid in absence of symptoms.

Medical Aid Treatment Case:

A medical aid case is any occupational injury/illness that involves neither lost workdays nor restricted workdays but which requires treatment by a physician or licensed health care professional at the physician's office or at a clinic or a hospital. The following are generally considered to be medical treatment:

- ❑ Use of prescription medication or prescription antiseptics.
- ❑ Medical treatment of second or third degree burns.
- ❑ Application of sutures, staples or surgical glue/tape to close wound.
- ❑ Remove foreign bodies embedded in the eye.
- ❑ Removal of foreign bodies from a wound, if the procedure requires excision or cutting the outer layer of skin.
- ❑ Treatments by physiotherapists and chiropractors with confirmation of a company medical professional that the treatment is in conformance with accepted medical practice.
- ❑ Cutting away dead skin (surgical debridement).
- ❑ Repair of broken or chipped teeth.
- ❑ Injuries that result in loss of consciousness, regardless of treatment, even if the individual resumes work after regaining consciousness.

Lost-time Injury:

A lost-time injury is an occupational injury or illness which renders the affected worker unable to report for work for more than the scheduled two days following

the injury. For example, a worker is injured at work on a Monday and is off work the following two days - Tuesday and Wednesday and returns on the Thursday, the same week, would not constitute a lost time injury.

Lost time Day(s):

Lost time day(s) are the day(s) counted as a result of the injured worker, who is rendered unable to work following (the two day recover period post accident are not counted) and only day(s) counted are for the time the worker is off. Unscheduled work days (i.e. Saturdays and Sunday / Sabbath) are not counted as lost time days.

- ❑ All lost workdays and restricted days associated with a lost time case are assigned to the calendar year and month in which the accident occurred. Reasonable estimates may be made as a final record to close out fiscal year statistics.
- ❑ If a case involves medical treatment or loss of workdays prior to termination or layoff, then the case and days are entered appropriately as a medical aid or lost-time injury. The recording of days against the case stops as of the date of termination or layoff even though the employee may not be released for full duty.

Restricted (Modified) Work Cases:

A restricted work injury is an occupational injury or illness where the worker returns to work and conducts a task that is within his post accident physical capacity. Restricted work cases are classified as a medical aid cases.

Reporting Standards:

Any incident which had the potential to cause serious injury. Fatalities will be classified in a separate category, which will not be included in the injury severity calculations.

Lost Time Injury Frequency Rate *is* calculated by multiplying the number of Lost Time Injuries by 200,000 and dividing that result by the number of work hours expended during the time period of the report.

$$\frac{\text{Number of Lost Time Injuries} * 200{,}000}{\text{Number of hours worked}}$$

Total Recordable Injury Frequency Rate is calculated by multiplying the number of Lost Time Incidents and Medical Aids by 200,000 and dividing that

result by the number of work hours expended during the time period of the report.

Injury Severity Rate is calculated by multiplying the total number of workdays lost to injury and illness by 200,000 and dividing that result by the number of work hours expended during the time period of the report.

$$\frac{\text{Number of Days Lost} * 200{,}000}{\text{Number of Hours Worked}}$$

First Aid & Medical Aid Log is maintained by Noble and the Contractor's Medical Attendant for all treatments administered to site personnel for on-site and off-site treatment respectively.

3.5.3 Occupational Health, Safety and Environmental Reporting

Serious accidents and injuries are required by legislation to be reported to the authorities. The Project HSE Superintendent and the Subcontractor will research the reporting requirements at the start of the project, and prepare a procedure on the reporting of serious accidents and injuries. Examples of accidents or injuries that must be reported include:

- ❑ An injury or accident that results in death.
- ❑ An injury or accident that results in a "critical injury"- viz., one of a serious nature that:
  - places life in jeopardy
  - results in unconsciousness
  - results in substantial loss of blood
  - involves the fracture of a leg or arm
  - involves amputation of a leg, arm, hand or foot
  - consists of burns to a major portion of the body
  - causes the loss of sight in an eye.
- ❑ An unplanned or uncontrolled explosion, fire or flood that causes a serious injury or that has the potential of causing a serious injury.
- ❑ The collapse or upset of a crane, derrick or hoist.
- ❑ The collapse or failure of any component of a building or structure necessary for the structural integrity of the building or structure.

- ❑ Any environmental incident above/beyond the legislatively established threshold level or that established by the client or Noble.

There are additional reporting requirements with respect to other categories of incident, inclusion of prescribed information and/or professional engineer's report, etc. Such prescribed (by Regulation) reporting requirements shall continue to remain the responsibility of the Subcontractor involved. Noble's Project Management Team shall complete the Preliminary Incident Report for critical injuries, lost time injuries, fatalities and environmental discharges and submit to the Manager, Corporate H&S and/or Manager Corporate Environment within four hours of the incident.

3.5.4 Reporting Initial Occurrence (First Aid)

Any occurrence of injury or illness reported to a First Aid station, to supervision or to a medical treatment centre will be recorded in detail in the Contractor's First Aid Treatment Log. Entries in the logbook will be by the Medical Aid Attendant, or the designated First Aid Representative of the Subcontractor and the information will be kept confidential. First Aid Treatment Books of all Subcontractors are subject to audit by the Project HSE Superintendent.

3.5.5 Reporting Medical Aid

Any occurrence that becomes a Medical Aid Case will be recorded on a Medical Aid Treatment Log maintained by the Subcontractor. A copy will be provided to the Project HSE Superintendent.

All Subcontractors are required to promptly advise the Project HSE Superintendent and Construction Manager of the occurrence of a Medical Aid case.

In addition to being recorded on the Medical Aid Treatment Log the Medical Aid case will be investigated by Noble and the Subcontractor will complete an Accident Investigation Report, which will be issued to the Corporate HSE department.

3.5.6 Reporting Lost Time Accident

When an employee experiences an injury or work-related illness, the employee has the right to be examined by a doctor. Should the employee choose not to be so examined, the Medical Aid Attendant may require such an examination in any event, if it is felt to be necessary.

In the event the doctor determines the employee should take time off work in addition to the two days after the day of the accident occurred, the accident

becomes a Lost Time Injury (LTI). Lost Time Injury requires the completion of at least the following forms:

- Preliminary Incident report to be issued to Corporate within four hours by PMT.
- The medical doctor completes the appropriate Worker's Compensation form(s) promptly following his examination, diagnosis, referral, and/or treatment of the worker.
- The Subcontractor (employer) is responsible for filing the Employer's Report of Accident and Illness (normally within 72 hours of the Lost Time Injury occurrence). A copy of this report will be filed with the Project HSE Superintendent.

Each LTI will be reviewed with the Subcontractor's senior site management representative and the Project HSE Superintendent within 24 hours of the occurrence.

All LTI's will be reported by the Project HSE Superintendent to the Construction Manager, and will be recorded on the Lost Time Injury Report that is submitted on a monthly basis (whether lost time injury occurred during the month or not).

3.6 Monthly Statistics Reporting

3.6.1 Subcontractor Reporting

Each month (no later than the 2nd working day of the following month) the Subcontractor will submit to the Project HSE Superintendent a Subcontractor's Monthly Safety Report detailing lost time injuries, Medical Aids, First Aids, near misses, lost work days, man-hours worked, and mobile equipment incidents.

3.6.2 Noble Reporting

Following receipt of the safety statistics from the Subcontractor/s the Project HSE Superintendent will compile the Monthly Safety Statistics Summary, and submit it to the Construction Manager by the 3rd working day of the month following. Details of all lost time injuries, Medical Aids, First Aids, near misses, lost work days, man-hours worked, and mobile equipment incidents will be attached, as well as steps that were taken to prevent further recurrences.

Additionally, minutes of all safety meetings and inspections, a summary of all significant safety achievements and individual Subcontractor statistics reports will be attached.

3.7 Safety Communications, Bulletin Board

In order to promote safety, and to maintain a highly visible safety profile on the work site, the Subcontractor will establish safety bulletin boards of a size suitable to accommodate safety notices, the Emergency Response Plan and phone numbers, minutes of safety meetings, and any other pertinent safety information. The Subcontractor will be responsible for keeping all postings current and up to date.

3.8 Inspections

Noble will perform frequent safety and housekeeping inspections (formal and informal) of the Subcontractor's work and storage areas. These inspections are in addition to the safety and housekeeping inspections that the Subcontractor will perform, and do not substitute the Subcontractor's inspections.

The Subcontractor will be advised of any infraction and/or potentially unsafe condition, and will take corrective action immediately, where possible. If immediate corrective action is not possible, the hazard(s) will be properly barricaded and identified as "unsafe" until proper corrective action can be taken.

Noble's Project HSE Superintendent will follow up on all infractions to ensure that corrective action is taken promptly. The Construction Manager will formally advise the Subcontractor if action is not taken promptly on any unsafe condition - this may result in work stoppage or other contractual action against the Subcontractor.

3.9 Enforcement

In the event that a worker does not follow the safety instructions given to him/her and the worker persists in violating the rules and regulations, the following procedure is to be considered as minimum and mandatory. Noble expects all sub-contractors to implement a similar enforcement policy.

3.9.1 First Offense

Documented Verbal Warning

3.9.2 Second Offense

Written Warning and up to two weeks of suspension or removal of site access privileges during an investigation of the safety violation. Disciplinary action up to

and including termination of employment or removal of site access privileges may be taken due to the results of the investigation.

3.9.3 Third Offense

Immediate Termination of employment or removal of site access privileges.

This sequence may be altered depending on the seriousness or willfulness of the violation. Noble expects all contractors and their supervision to participate in the correcting of unsafe acts and conditions.

End of Section 3

4.0 EMPLOYEE SAFETY HANDBOOK

The following general rules shall apply and may be modified by client, owner or other special conditions where specifically noted. Any violation of these, as well as any other rules, policies or procedures are prohibited and may lead to termination of employment, banning from client/owner facilities or other disciplinary measures.

- ❑ Intimidation or discrimination of any kind
- ❑ Harassment (sexual or otherwise)
- ❑ Assault, physical, emotional or otherwise
- ❑ Horseplay, practical jokes
- ❑ Gambling
- ❑ Theft, which includes "stealing of time" from the employer
- ❑ Sleeping while on duty
- ❑ Possession of or being under the influence of alcohol or drugs (See full Policy elsewhere in this manual)
- ❑ Conveyance or use of firearms and offensive weapons of any kind
- ❑ No smoking is permitted in any area except in designated, approved areas.
- ❑ Vehicle operators will comply with all traffic signs, obey all speed limits, shall wear seat belts, and at all times operate their vehicles in a safe, hazard-free manner.
- ❑ All personnel shall use the proper designated sanitary facilities.
- ❑ The use of radios or headphone-type players will not be permitted on the construction site because they may hinder one's ability to hear emergency alarms, and could be a source of ignition of explosives.
- ❑ For a complete list of HSE rules, please refer to Noble Employee HSE Handbook.

End of Section 4

5.0 DRUG AND ALCOHOL ABUSE

Noble is committed to providing a healthy, safe and secure work environment.

Noble has safety and security obligations to the Owner and the public in general. Therefore, this Procedure prohibits the illegal use, sale, purchase, transfer, possession or presence in an employee's system of drugs, other than medically prescribed drugs, while on Owner's premises. It also prohibits the use, sale, transfer or possession of alcoholic beverages by employees while on the Owner's premises, except as namely and specifically authorized by the Owner.

This Procedure requires an equal commitment on the part of the Sub-'Contractor and its employees to accept responsibility for their own safety and the safety of others.

The Subcontractor shall be required to take all reasonable steps to ensure that its employees, as well as Subcontractors retained by the Subcontractor comply with this Procedure. The Subcontractor shall also implement its own alcohol and drug policies consistent with this Procedure.

The commitment of the Subcontractor, its Subcontractors, and their employees to safety cannot be measured only by their conduct and performance on the job. By necessity, given the nature of Noble's operations on all it's work locations, or the safety risks on construction sites, the Subcontractor, its Subcontractors, and their employees, shall also have regard to conduct or behavior off the job that may adversely affect their ability to safely perform their duties at work. This specifically extends to the consumption or use of alcohol and drugs.

5.1 Standards

The Subcontractor, its Subcontractors, and their employees shall abide by applicable laws and government regulations ruling the possession or use of alcohol and drugs. It is the responsibility of the Subcontractor to keep himself informed of any applicable laws or changes to these laws.

It is the responsibility of each employee to be capable of working in full possession of his/her faculties.

No employee shall report to work or be at work with an alcohol level which exceed (80) milligrams of alcohol in one hundred (100) milliliters of blood, urine or saliva.

No employee shall report to work or be at work with any drug in his/her body, other than that which has been medically prescribed for an employee's particular use.

No employee shall distribute, possess, consume, use or be under the influence of alcohol or drugs, or consume abusively any prescription or over-the-counter medication that affects his/her mental or physical faculties on any lands or premises occupied by Noble or the Owner, or in any vehicle or other equipment.

Notwithstanding these general standards, where specific alcohol and drugs policy or procedures exist by means of a governing authority, employees are required to comply with such policy or procedures.

The use, sale, purchase, transfer or possession of alcoholic beverages by employees is prohibited while on the Owner's premises, except as namely and specifically authorized by Noble.

5.2 Breach of Standards

A breach of any of the above standards by any employee shall be considered a breach of this Procedure and shall result in disciplinary action up to and including discharge.

It is the responsibility of each employee of the Contractor and its Subcontractors to be concerned about alcohol and drug use in the workplace. If supervisors, in their judgment, feel that an employee is in breach of this Procedure, they are expected to take immediate action in consultation with the Subcontractor and Noble.

5.3 Compliance through Education

The Subcontractor recognizes the importance of making employees aware through education of the actual and potential risks, both on and off the job, related to the consumption or use of alcohol or drugs. The Subcontractor shall use employee education and awareness as the principal method of ensuring commitment to and compliance with this Procedure and reducing workplace health and safety concerns associated with non-compliance.

The Subcontractor and its Subcontractors shall distribute to each of their employees an information package on the impacts of alcohol and drugs on employees' health, during orientation for new employees.

The Subcontractor shall also educate its supervisors on monitoring and identification of behavior and performance problems that may be linked to the use of alcohol or drugs.

5.4 Compliance through Alcohol and Drug Testing

To further ensure a safe work environment and compliance with this Procedure, Noble may also request that specific (as opposed to random) alcohol and drug testing is conducted in the following circumstances:

- ***Reasonable Grounds:*** When Noble believes, on reasonable grounds, that the employee's ability to safely and satisfactorily perform his/her job duties is impaired, the Contractor shall require the employee to submit to an alcohol and drug test. (See "Reasonable Cause Checklist which follows below)
- ***Accident or Other Incident.*** When any of the Subcontractor's employees are involved in an accident, a near miss or other potentially dangerous incident, if the Subcontractor or Noble has reasonable grounds to believe that the employee's consumption or of alcohol or drugs was a factor in the occurrence of such accident or incident, the Subcontractor shall require the employee to submit to an alcohol and drug test immediately following the accident or incident or as soon as it is practicable under the circumstances.

For greater clarity and by way of example only, "reasonable grounds" includes:

- Specifically, a situation where the smell of alcohol is detected on an employee's breath at work; and
- Generally, a situation where an employee is acting in a suspicious or unusual manner or where an employee has been unable to correct a chronic performance or behavior problem at work, which gives rise to a reasonable suspicion on the part of the employee's supervisor that the employee may have consumed or used alcohol or drugs at work or may be under the influence of alcohol or drugs, and which suspicion cannot be dispelled by the employee, when confronted, to the satisfaction of the supervisor.

5.5 Testing Procedure

Any employee of the Subcontractor who is required to submit to an alcohol and drug test shall be directed by the Subcontractor to the external health facilities retained by the Subcontractor to conduct alcohol and drug tests. The Subcontractor may then arrange for the employee's transport to home and/or placement onto leave of absence pending the outcome of the test.

The employee shall be requested to provide a sample for the alcohol or drug test administered by the retained health facilities. Results from the first test (screening test) will be provided by the health facilities to the Subcontractor.

In the event a negative result is obtained from the screening test, Noble reserves the right to request the Subcontractor to arrange for a professional assessment of the employee to determine if the situation or incident for which the test was conducted is related to health reasons.

If the employee is found to be fit for work, then the employee will be cleared to return to work. In the event the employee is not totally fit for work, the Subcontractor shall consult with Noble to determine, having regard to the requirements of the job, whether the employee is permitted to return to work or not.

In the event a positive result is obtained from the screening test, the employee shall be required to provide a further sample for a more definitive Alcohol and Drug Test (second test) to be analyzed by the independent and qualified health facility retained by the Subcontractor for that purpose. The Subcontractor, in consultation with Noble shall then send the employee home on leave of absence pending the outcome of the definitive test.

An employee's refusal to submit to, or provide samples for an alcohol and drug test shall be considered a breach of this Procedure and shall result in termination of employment for cause.

The results of an employee's alcohol and drug test shall be the property of Noble, and will be placed in a sealed envelope and kept by Noble.

5.6 Results from Definitive Testing

The results from a definitive alcohol and drug test of a sample obtained in respect of a situation or incident shall be submitted directly to Noble.

Upon receipt of those results and before any action is taken, the Subcontractor shall consult with Noble to ensure that the results are clearly understood.

In the event the results from a definitive alcohol and drug test confirm that the employee did not breach the standards set by this Procedure, the Subcontractor shall send the employee to a drug and alcohol addiction specialist or physician retained by the Subcontractor for a professional assessment to determine if there are health related reasons for the situation or incident for which the test was conducted, unless such assessment was performed following the first screening test.

If the employee is found to be fit for work, then the employee will be cleared to return to work after approval by Noble. In the event the employee is not totally fit, the Subcontractor shall consult with Noble to determine, having regard to the requirements of the job, whether the employee should return to work with restrictions or not.

In the event the definitive test results confirm that the employee did breach the standards set by this Procedure, the Subcontractor shall in consultation with Noble take immediate action up to and including discharge.

5.7 Referral to Counseling Services

Employees may voluntarily seek help from counseling services for any alcohol or drug problem, through their employer.

Any employee who is receiving assistance from counseling services for an alcohol or drug problem shall cooperate with the counselor and shall comply with the terms and conditions of the employee's Rehabilitation Program.

An employee who is under the care of counseling services for an alcohol or drug problem shall not be allowed to return to work unless and until:

- ❑ The employee is cleared to return to work, or receives permission from his/her physician to continue working and;
- ❑ The counselor, following that consultation and taking into account the requirements of the employee's job, is of the opinion that the employee is mentally, physically and emotionally able to work and does not pose a safety risk for either the employee or any other workers.

5.8 Use of Prescription or Non-Prescription Drugs

Any employee of the Subcontractor and its Subcontractor who is using a prescription or non-prescription drug should only take that drug as directed, and should be aware of any potentially unsafe side effects. If the employee is unsure about the side effects of a prescription or non-prescription drug, then the employee shall consult with a physician or pharmacist. If there are potentially unsafe side effects or work limitations then the employee shall advise his/her supervisor of those effects or limitations.

5.9 Authority to Search and Seize

Where there is reasonable and probable grounds that an employee has breached this Procedure, Noble and/or any designated Security function/staff may apply the appropriate search measures to that employee and

the employee's personal property and effects, while on the Owner's premises or in the Subcontractor's vehicle. Any alcohol or drugs found during such search may be seized.

Incidents involving use, possession, sale, or distribution of illicit drugs on the Owner's premises may require Noble to notify appropriate authorities.

5.10 "Reasonable Cause/Grounds" Checklist

Employee: _____ Craft: _____

Date: _____

Place a check mark against the phrases that best describe this employee's behavior. Add as much information as you can that may assist is clarifying the situation, as well as any witnesses to the behavior you are describing.

	Date(s)	Comments
General Appearance ❑ Sleepy ❑ Tremors ❑ Bloodshot or rheumy eyes ❑ Unkempt appearance, hygiene ❑ Other (specify)		
Workplace Behavior ❑ Interrupts other workers ❑ Inflexible about procedures ❑ Argumentative ❑ Inappropriate emotional outbursts ❑ Physically threatening ❑ Alcohol or drug consumption observed		

	Date(s)	Comments
Temperament at Work ❑ Withdrawn much more than usual ❑ Easily upset by everyday events ❑ Agitated and on edge ❑ Excessively worried or fearful ❑ Extreme variations of mood		
Job Performance ❑ Forgets instructions, normal procedures ❑ Works abnormally slowly ❑ Erratic productivity ❑ Missed deadlines ❑ Signs of intoxication (smell of alcohol or drugs, slurred speech, confusion) ❑ Poor judgment ❑ Fails to wear personal protective equipment ❑ Other (specify)		
Relationship with Co-workers ❑ Abnormal reaction to criticism ❑ Imagines criticism where there is none ❑ Complaint received from co-worker ❑ Complaint from client		

	Date(s)	Comments
Absenteeism ❑ Excessive absence ❑ Unlikely excuses for absence ❑ Excuse for absence proven false ❑ Absences follow a pattern ❑ Frequently late returning from breaks ❑ Excessive absence from workstation		
Circumstances of an Accident ❑ No apparent reason for the event		

Further Observations or Comments:		
Investigating Supervisor (print)		
Signature:	Date:	
Construction Manager (or designate) (print)		
Signature:	Date:	
Reasonable Cause for alcohol and/or drug testing exists Yes ❑ No ❑		

DEFINITIONS:

REASONABLE GROUNDS: Includes information established by the direct observation of the employees conduct or other indicators, such as the physical appearance of the employee, his or her attendance record, *circumstances surrounding an accident,* near-miss or potentially dangerous incident and the presence of alcohol, drugs or drug paraphernalia in the vicinity of the employee or where the employee worked.

CIRCUMSTANCES SURROUNDING AN ACCIDENT:

- **Property damage incidents** involving construction equipment or project vehicles. The *default action is* to request an A&D test *unless* the investigation finds significant information that indicates drugs and/or alcohol *did not* play a part in the incident.

- **Injuries -** Where there is reasonable grounds to believe that an employee has sustained an injury, or has contributed to the cause of an injury, with serious or major potential and, where administration of the test will not unduly delay required medical treatment, a request for an A&D test will be the *default action.*

❑ **Near miss incidents -** The *default action is* to request an A&D test for individuals deemed to be significant contributors to near miss incidents that have serious or major potential, other than those incidents reported voluntarily in a reasonable period of time ___by the persons involved.

5.11 Glossary

For purposes of this Procedure, the following terms mean:

Alcohol and Drug Test

A test to determine the presence of alcohol or drugs in the body through laboratory analysis of a blood, saliva or urine sample, and/or a screening test or other preliminary means of detecting the presence of alcohol or drugs in the body without laboratory analysis.

Drug or Drugs

Any harmful substance (including solvents) or any drug, other than a prescription drug that is used by the employee for whom it is prescribed and as directed by the prescription and any non-prescription medication used as directed by the manufacturer. (See Use of Prescription and Non-Prescription Drugs above).

Employee

Any person whose services are retained by the Subcontractor or its Subcontractor for work, as a regular, contractual or temporary employee, a trainee, a representative, an agent or a consultant.

Rehabilitation Program

A program that is tailored to address each individual's particular situation, ranging from education and counseling up to and including residential treatment.

Sample

A blood, saliva or urine sample required for laboratory analysis.

At Work

Any working activity relating to which includes training and any coffee, lunch, supper or other breaks from work while on any lands or premises relating to the project or in any vehicle.

End of Section 5

Section 6.0 Emergency Response Plan

(see Project-Specific Emergency Response Plan)

APPENDIX A

PROJECT OFFICE HEALTH & SAFETY PROGRAM

REV. 0

REVISIONS AND APPROVALS

APPENDIX A - PROJECT OFFICE HEALTH & SAFETY PROGRAM

1.0 COMMITMENT TO HEALTH & SAFETY THROUGH LEADERSHIP

This section outlines the actions required from all levels of management to improve Health & Safety awareness in the project office. Although final responsibility for safety rests with management, it is only through the cooperation and involvement of all employees that excellence can be achieved. A well-planned effort at proving management commitment will have a positive impact on safety performance.

All supervisors are responsible for H&S of their employees. Supervisors will be expected to implement the H&S program, address worker concerns and monitor the health and safety of their employees on a continuous basis.

Supervisors will lead by example, by actively participating in and promoting loss management excellence. They will be required to continuously improve our overall health and safety performance by learning from experience and involving all team members in designing, evaluating and implementing activities that support the H&S management policy, standards and practices.

Project Management will demonstrate their commitment to Health & Safety by the following means:

- ❑ Selecting supervisors based on their commitment to ensuring that safety is maintained as a value.
- ❑ Assign clear H & S responsibilities to every supervisor's position
- ❑ Assign adequate resources to H&S tasks, procedures and activities.
- ❑ Schedule and attend regular Joint Health & Safety Committee meeting to discuss H&S issues.
- ❑ Schedule and staff internal audits to ensure that H&S activities comply with this plan.
- ❑ Establish follow-up practices to ensure that all H&S issues are resolved expediently.
- ❑ Put communication practices in place to ensure that everyone is aware of the H&S goals and issues.

Employees will demonstrate their commitment to Health & Safety by the following means:

- ❑ Each employee is responsible for his/her own safety and the safety of co-workers by following safe work procedures and by reporting unsafe working conditions to their immediate supervisor.
- ❑ Every worker has the right to refuse to perform work which the worker considers has unsafe conditions without reprisals.
- ❑ Reporting all accidents and incidents which occur on the premises.
- ❑ Participate in health and safety training.
- ❑ Know the location, type and operation of emergency equipment.

Silence means consent:

If you witness at-risk behavior and you ignore it or walk by, your silence tells the person that their behavior is acceptable. Speak out. Stop the at- risk behavior.

2.0 HAZARD IDENTIFICATION AND ASSESSMENT

2.1 Office Hazards

Every work environment has the potential to possess certain hazards that must be identified and addressed in order to ensure the safety of life and property. As a result, corrective measures must be taken to ensure that no accidents or incidents occur. If hazards cannot be eliminated/mitigated, then all personnel must be made aware of the hazards and safe working procedures that need to be developed and implemented.

Through the reporting of hazards, Managers/Supervisors may be able to rectify or address the existence of hazardous conditions in the workplace. The reporting of hazards can be made verbally or presented in writing / email to your supervisor and by doing so; all hazards will be investigated and controlled immediately.

The following list of includes many of the major Health Safety, and Environment hazards that may be encountered in an office environment:

SAFETY

Working at Heights:

- ❑ Falling objects

- ❑ Falling or slipping on surfaces
- ❑ Over reaching/stretching

Fire:

- ❑ Flammable material
- ❑ Large accumulation of combustible materials
- ❑ Faulty electrical appliances or equipment

HEALTH

Circulatory Problems:

- ❑ Cardiac arrest
- ❑ Heart attack
- ❑ Nervous breakdown
- ❑ Stress

Musculo-skeletal Disorders:

- ❑ Work stations not ergonomically designed / set-up
- ❑ Repetitive movements / tasks
- ❑ Wrong posture
- ❑ Incorrect lifting

Anaphylaxis

- ❑ Bee stings
- ❑ Seafood
- ❑ Nuts, etc.

ENVIRONMENT

- ❑ Inclement Weather

3.0 HAZARD CONTROL

3.1 Types of Control

There are three basic means of hazard control as listed below. These are listed in the recommended order of application to mitigate hazards. Engineering and administrative controls are preferred over personal protective equipment (which should only be regarded as a last line of defense, not the only method of preventing injury or illness)

- ❑ Engineering out the hazard so that it no longer exists.
- ❑ Providing administrative controls to lower the hazard for workers.
- ❑ Wearing of Personal Protective Equipment when the above control means are unable to be utilized. PPE basic requirements are detailed in the following safety practices.
- ❑ A combination of any of the three aforementioned aspects may be utilized to implement hazard control.

3.2 Safety Practices Through Hazard Evaluation

The following safety Practices & Hazard Evaluation Sheets can be utilized at Office locations to help prevent injuries.

3.2.1 Elevator Safety

As the world's most widely used and safest form of public transportation, elevators provide passengers with incomparable convenience, dependability and efficiency. Although elevator trips outnumber those taken on air, bus or rail systems by several times, elevators are amazingly safe. Nonetheless, there are safe practices we can follow when using elevators:

Enter and exit carefully: Watch for alignment. Today's elevators are designed to stop nearly even with the building floor. A malfunction, however, could cause any elevator to misalign with the floor of the correct destination. Don't just walk in or out of an elevator without looking. Check to be sure that the floor surfaces are even before crossing the doorway. If you witness this situation, be sure to bring it to the attention of Office Administrator so the car can be removed from service.

Watch for closing doors. Only touch or stop them if they are expected to interfere with passage. Although many elevators doors are provided with protective edges designed to reopen when touched they should be treated like any moving equipment. Contact should be avoided unless absolutely necessary.

It is also important to enter and exit quickly. Press or ask another passenger to press the door open button (reversing the doors) to allow a person the time to enter or exit. Stand clear, let the doors close and keep your hands and clothing away from the doors.

If the doors do not open when the elevator stops, ring the alarm button and wait. Never force the doors open or try to exit. Attempting to force the doors open is dangerous because the elevator could resume travel without warning and seriously injure someone. For some it will be difficult to wait, but alternatives are much worse. The inside of the elevator is the safest place. There are plenty of dangers in the hoist way, which are not designed for people. Only trained specialists know how to safely remove passengers or restart the elevator. Chances of the elevator falling are extremely rare as any one of the many required cables can individually hold a fully loaded elevator in place. Use the alarm button or stay on the phone if there is one. Stay calm and most importantly stay inside. When help arrives, follow instructions for a safe exit.

In case of fire, never use the elevator. Use the stairs. Building codes require exit stairwells to provide a good measure of protection in case of fire. Stairwell doors are heavy and usually totally enclosed, well lighted and designed to protect people from smoke and fire. In addition, on stairs you control the option of going up or down to avoid the fire and smoke. Elevator shafts are often not sealed and act as a chimney funneling the smoke upward.

Most modern elevators are programmed to automatically return to the ground floor when the alarm is triggered. They will shut down and remain available for fire fighters only. You may waste precious time in a fire waiting for an elevator that doesn't come. Always use the stairs.

A handicapped individual would be safer moving to the stairwell to await rescue or to be carried down away from the fire and smoke. Those in authority may direct otherwise and their instructions should be followed.

3.2.2 Parking Lot Safety

To protect our property and ourselves there are a few key safe practices to follow:

As a pedestrian...

- ❑ Always walk (never run)
- ❑ Be aware of any moving vehicles
- ❑ After dark avoid walking alone

- ❑ Wear comfortable/appropriate footwear
- ❑ Walk in brightly-lit areas and avoid alleys, side streets, and other short cuts
- ❑ Be sure of yourself and your surroundings

As a driver...

- ❑ Clear obstructions (i.e. snow) from all windows and taillights before exiting your stall
- ❑ Obey posted speed limitations
- ❑ Be aware of pedestrians and give them the right of way
- ❑ Only enter and exit parking lots through designated routes

Noble does not accept responsibility for property damage, theft, or any other loss incurred in parking lots.

3.3 Ergonomics

The science of work, ergonomics removes barriers to quality, productivity and safe human performance by fitting products, tasks and environments to people.

Noble has several objectives in developing this program and can assist employees with ergonomic concerns that may arise.

Our Objectives are:

- ❑ To encourage a comfortable and healthy workplace environment for all of our employees and visitors
- ❑ To reduce the potential of repetitive strain injuries & time off due to work related injuries
- ❑ To promote modified work programs & increase the productivity of employees.

If an employee has a concern, they should first contact their supervisor. Subsequent contact can then be made with the Project HSE Superintendent to further assist the worker and supervisor in resolving any concern.

The Project HSE Superintendent can provide general information on office ergonomics and a guideline for conducting a self-assessment.

Requests for workstation modifications must be supported by documentation from a medical assessment and/or a workstation assessment.

3.4 Personal Protective Equipment

Certain job functions may require that protective eyewear and footwear be utilized. Should your job require that you perform activities with hand power tools then safety glasses meeting Z94.3-99 must be worn while operating this equipment. Office facilities personnel who move furniture are required to wear safety footwear meeting OSHA standards. Footwear with ankle protection is recommended.

#	HAZARDS	POTENTIAL SEVERITY	HAZARD CONTROL MEASURES	RECOVERY
1	Slips and Falls	Injury Disabling Injury Property damage	• Keep floors clean, dry and free of refuse. Also, make sure they're in good repair; • Telephone and electrical cords should not be placed where you or your co-workers could trip over them; • Where collision hazards at blind corners exist, properly angled mirrors could be installed to eliminate this hazard; • Replacement or repair of defective chairs will reduce the number of falls from chairs. Chairs should never be used as ladders; • Ladders should be equipped with non-slip material on the feet and treads; they should also be suited for the purpose intended and properly maintained; (personnel shall not use the top two steps of a step ladder and must be tied off by a fall protection system when exposed to a fall greater than 10 feet) • Stairs are safer when equipped with anti-slip treads, approved handrails and adequate lighting (Corp. Safety & Health department recommends that personnel should use shoes with short heels or flat soles when using the stairways) ;	Conduct regular inspections
2	Repetitive Strain Injuries	Injury Disabling Injury	• Ergonomic assessments of employee workstations • Providing document holders, keyboard & mouse trays. • "Micro" breaks and stretching exercises • Changes of visual focal points throughout the day • Education sessions and materials for employees to perform self assessments. • Ergonomic information on Info zone.	Perform regular ergonomic assessments
3	Improper lighting	Eyestrain Eye damage	• Utilizing window blinds to reduce glare • Adjusting computer monitor to correct angles • Micro breaks and stretching exercises • Changes of visual focal points throughout the day. • Adjusting room lighting when possible.	Provide education and resource materials

#	HAZARDS	POTENTIAL SEVERITY	HAZARD CONTROL MEASURES	RECOVERY
4	Struck by objects	Injury Disabling Injury Property damage	• Close desk or file drawers and other office equipment. Remove keys in file cabinet locks as they can cause severe cuts for someone passing by; • Watch where you are going and don't over fill you coffee cup walking back from the kitchenettes! • Remove sharp burrs on metal filing cabinets and office furniture as they can cause injuries. These burrs may also tear or damage clothing; • Repairs to chipped or broken furniture should be made immediately, to remove splinters. • Be sure to fill a file cabinet from the bottom up and empty it from the top down to avoid it falling over.	Conduct regular inspections
5	Personal Illness Heart Attach, Stroke,	Injury Disabling Injury Fatality	• Train Fire Wardens and other employees in First Aid and CPR • Provide emergency medical oxygen • Emergency response procedures.	Dispatch Emergency Medical Services through 911.
6	Fire Alarms, Bomb Threat	Injury Disabling Injury Fatality	• Fire Wardens trained in emergency response, First Aid & CPR. • Building emergency response procedures • Fire Drills	Dispatch EMS services through 911
7	Caught in or Between	Injury Disabling Injury	• When closing drawers in desks or filing cabinets make sure your hands, with the fingers brought into the palm, are held against the drawer face to avoid caching your fingers • Always use the handle when opening or closing the spring-loaded shelf on a desk, these shelves may open and close rapidly and present a definite hazard; • Utilize guards for large cutting machines, hole punch machines • Wear PPE when necessary	Conduct regular inspections

#	HAZARDS	POTENTIAL SEVERITY	HAZARD CONTROL MEASURES	RECOVERY
8	Improper lifting, Back strains	Injury Disabling Injury	• Utilize proper lifting techniques • Provide employee training on lifting • Avoid sudden movements, lifting and twisting in same motion • Perform observation of area before lifting • Get help for heavy tasks	Provide Education and resource materials
9	Hantavirus	Occupational Illness from inhalation exposure to rodent saliva, feces and urine.	• Identify potential sources of contaminated materials received • Provide employee training on signs and symptoms of exposure, personal protection and cleaning • Wear appropriate respirators and gloves (PPE) • Arrange adequate disposal of contaminated materials	Provide education and resource materials
10	Moulds	Occupational Illness	• Provide employee training on signs and symptoms of exposure, personal protection and cleaning	Provide Education and resource materials

4.0 OFFICE INSPECTIONS

What is a Planned Inspection?

Planned general inspections involve the systematic examination and assessment of the company's facilities, equipment, tools, materials, and the employees' use of them. Inspections are a valuable source of information for management on the effectiveness and efficiencies of purchasing, engineering, methods and procedures, communications, and other aspects of the Health Safety and Environment Management System (HSEMS).

Why Conduct a Planned Inspection?

Inspections are a key proactive management tool which can, if properly conducted, contribute significantly to the prevention of incidents and accidents. Inspections also provide numerous opportunities for operations personnel to take an active interest and role in the orderliness and safety of their own work areas. There are varied types and formats for inspections, each with a specific purpose and advantage. The primary intent of any inspection exercise is to highlight and correct actual and potential health and safety hazards and concerns.

What Should be Observed During a Planned Inspection?

Specifically, inspections conducted before an accident or incident occurs can: determine any deficiencies involving tools and equipment; monitor the progress of previously identified corrective actions; monitor and correct unsafe conditions and the unsafe acts of people; determine actual or potential hazards arising from the installation of new or modified plant and equipment; and demonstrate management's concern for the safety and welfare of our people and the workplace.

Do Planned Inspections Promote Continuous Improvement?

Inspections can be conducted to identify, analyze, and correct deficient or wasteful practices and to evaluate the practicality of work standards and procedures which in effect is the essence of continuous improvement. Health and safety legislation also dictates that inspections are required to ensure a safe and healthy workplace. By implementing a formalized inspection procedure, which addresses a variety of inspection techniques, management can provide the opportunity for all personnel to take a proactive role in improving health and safety at the worksite.

The Project HSE Superintend conducts monthly inspections of the workplace.

MONTHLY OFFICE SAFETY INSPECTION

	Comment on deficiencies and floor area	Corrective Actions by when and whom
Housekeeping of floor areas		
Lighting adequate outside and in office		
Proper access and egress to and from work areas		
Trip hazards (cords, boxes...)		
Fire extinguishers charged and ready for use		
First Aid kit contents adequate		
Emergency exit lights in good working order		
Improperly stacked materials		
Postings adequate and current		
Emergency evacuation plans posted		
Parking lots		
Elevators		
Electrical and utilities rooms		
Doors in good working order		

Inspection team: _____ _____

Inspection Date: _____

5.0 WORKER COMPETENCY AND TRAINING

5.1 Communication

Communication in everything that we do plays an enormous role in the success or failure of our efforts. The management of all losses relies heavily on the delivery of efficient and effective communications. Make communication one of the most frequently used tools at your disposal to improve safety and comfort in your workplace.

5.1.1 Joint Health & Safety Committee

The Joint Health & Safety Committee is an employee driven organization formed to develop and administer the implementation of this HSEMS for each office under the guidance of the Project HSE Superintend. Each Subcontractor should be represented on the Committee. The size of the committee will normally be 6-10 people and can vary depending on the size of the project.

To find more information on the committee see terms of reference posted on the bulletin boards.

6.0 OFFICE EMERGENCY RESPONSE

6.1 Medical Emergencies

- ❑ **Dial 9-1-1 (or local equivalent, if any)**
- ❑ Give the following information:
  - Your name
  - Your phone number
  - The name of the person requiring medical aid
  - The location
  - The nature of the emergency
- ❑ Remain on the line unless instructed otherwise.
- ❑ Dial "Client Mutual Aid Phone Number" (during regular business hours) and notify for EMS arrival (if necessary) and send someone to meet and take the EMS to the incident location.
- ❑ **After scheduled business hours contact Security if one is available at the project.**

- ❑ Reference a local bulletin board for the names of CPR/First Aid trained assistance.

6.2 Fire Emergencies

6.2.1 Fire Alarm and Evacuation Procedures

If you see smoke...

- ❑ Pull the fire station, if applicable.
- ❑ **Dial 9-1-1 or local equivalent, if any**
- ❑ State your name, phone number, location and situation.

Evacuate in a safe and orderly fashion upon the alarm sounding.

- ❑ Leave doors closed and unlocked when exiting, take valuables with you.
- ❑ **Walk calmly to the nearest emergency exit stairwell.**
- ❑ Once outside the building, **proceed to predetermined designated evacuation meeting points.** If advised by Fire Department or other en-scene EMS official, you may be directed to move farther away from the **project. Do not congregate in or around the emergency situation.**

6.2.2 Physically Challenged Persons

- ❑ Any person who requires assistance to make their way down the stairwell must make themselves known to the Project HSE Superintendent.
- ❑ A designated individual will remain with the physically challenged person and take them to an area next to the stairwell and wait for instruction from Project HSE Superintendent.
- ❑ If told to evacuate the floor, the special needs individual should wait for the main flow of people to pass before starting to evacuating site.
- ❑ Otherwise, the Fire Department is responsible for the evacuation of all physically challenged persons.

6.2.3 Fire Extinguisher Usage

Should the use of a fire extinguisher be necessary:

- ❑ Ask for assistance, never fight a fire alone
- ❑ Follow the instructions on the container
- ❑ Once the fire is extinguished move to a well-ventilated area

- ❑ Always back away from a fire

Report any used/empty/under-pressurized fire extinguisher to project HSE Superintendent

6.2.4 Fire Prevention Tips

- ❑ Keep floors and work areas clear of flammable and large accumulation of combustible materials
- ❑ Assure proper disposal of trash, cardboard, etc.
- ❑ Inspect your work area for visibly damaged electrical cords, outlets, etc.
- ❑ **Report any hazards to your Supervisor first, and the Project HSE Superintendent.**

First Aid *&* ***Medical Aid Log*** is maintained by Noble and the Contractor's Medical Attendant for all treatments administered to site personnel for on-site and off-site treatment respectively.

6.3 Recognition

A key motivator in safety success is the development of continuing pride by all work force personnel in the achievements reached. A project, office or industrial establishment may elect to implement a Safety Recognition Program that will include measures for recognition and awards to individuals and organizations who have reached defined, significant safety milestones or who have made outstanding contributions to our health and safety program. All individuals and firms enrolled in the Safety Recognition Program will be eligible for participation.

Safety Awards may include:

- ❑ Certificates noting participation in the accomplishment of specified milestones toward safety program objectives such as no lost time accidents.
- ❑ Verbal or other token of management thanks and gratitude for a job well done.

Presentation of the awards may be made at gatherings as convened by management with emphasis on attendance by co-workers. A publicity bulletin shall note such recognition's and project notice boards will also include the information. Participation at awards presentations will also include, when appropriate, management staff members and other dignitaries.

APPENDIX B — SAFE WORK PROCEDURES

To be used where required in the absence or unacceptability of Subcontractor's Procedures.

The following is not a complete list. These procedures are suggested for project implementation, and the Project HSE Superintendent is to design and implement required procedures. Additional procedures for specific environments or situations are available through Corporate HSE management.

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B.1 COMPRESSED GAS CYLINDERS

All cylinders and related equipment will be handled and stored in full compliance with all applicable legislation.

General

Compressed gas cylinders shall:

- ❑ Be clearly identified in accordance with applicable legislation with regard to contents.
- ❑ Be kept on a specially designed cylinder trolley with retaining chains when in use.
- ❑ If transported by crane, hoist, or derrick, be handled in suitable cradle, nets, or skip boxes - never by rope, chain slings, or slings choked around the body. Ensure securely stored before moving.
- ❑ Have hoses and gauges removed, and valve guards installed whenever cylinders are transported, stored, or not in use.
- ❑ Have cylinder valves and gauges kept clean and free from oil, grease and other hydrocarbons.
- ❑ Be protected from physical damage, and kept away from areas where they can absorb undue heat or be a hazard in a fire situation.
- ❑ Not be placed in confined spaces or non-ventilated areas.
- ❑ Not be placed near electrical panels, or in proximity to welding grounds.
- ❑ Cylinders shall only be refilled by authorized dealers.

Storage

- ❑ Compressed gas cylinders will be stored, used and transported in a secure, upright position, even when empty.
- ❑ Oxygen cylinders will be separated from highly combustible materials, especially oil and grease and other fuel gas cylinders by a minimum of 8 meters, or by a 1.5 meter high non-combustible barrier.
- ❑ Storage areas will be clearly identified regarding contents of cylinders, and empty cylinders are to be marked as such.
- ❑ Storage racks will be specifically designed to keep cylinders upright.

- ❑ "No Smoking" and other appropriate warning signs shall be posted in the area.
- ❑ Fire extinguishers shall be placed in the immediate vicinity.

Regulators and Hoses

- ❑ Flashback devices shall be installed at both the regulator and torch end of oxygen/fuel gas systems used for cutting or torch welding.
- ❑ Before connecting gauges to compressed gas cylinders, the valve shall first be opened (away from personnel or ignition sources) slowly to clear any debris.
- ❑ Grease or oil shall not be applied to any cylinder threads or gauges. Instant combustion will take place if hydrocarbons are exposed to pure oxygen.
- ❑ Before removing hose assemblies the cylinder valves will be closed, and then the hoses will be bled of gas by opening the regulating valves at the torch.
- ❑ Hoses will be inspected for leaks frequently, particularly at the connections.
- ❑ Follow all manufacturer/distributor recommended pre-light and lighting procedures and guidelines.

B.2 RADIOACTIVE MATERIALS

All personnel shall observe any warning signs of radioactive materials and activity and shall stay well clear from any area where they are used.

When passing an area where radioactive materials are being used, personnel shall follow the instructions of the crew utilizing that material, without exception. If in doubt, stop until signaled to proceed.

Ali crews utilizing radioactive materials shall post signs and safety ropes (hung at waist level) and clearly visible from all angles of approach, at a safe limit from the source of radiation in all directions from the work, to prevent other personnel from inadvertently entering areas that have harmful radiation levels. The area to be cordoned off must be thoroughly checked for any workers who may remain inside the cordoned area, prior to radioactive source exposure.

One (or more if required) crew member(s) shall continually patrol the safety barrier to ensure that unsuspecting personnel do not enter the area during the entire period that harmful radiation is being emitted.

At least 48 hours prior to using radioactive materials on the project, the Noble Construction Manager shall be advised (in writing) so that all affected personnel and contractors receive timely notification thereof.

B.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

General

Employees will wear appropriate personal protective equipment (PPE), for their performance of their normal work. MSDS and manufacturers specifications will be carefully checked to ensure that the type of equipment and material is suitable for the hazard.

Close fitting shirts and/or jackets, and long pants (all in serviceable condition, without rips, tears, etc.) will be worn at all times throughout the jobsite work area. Shorts and sleeveless-shirts are prohibited. Work clothes should be fire resistant and free of chemical contamination. Offices, lunchrooms, and other designated areas may be excluded from certain aspects of this policy with prior written authorization of Noble.

Special protective clothing (i.e., coveralls, protective rubber suits, and leg protectors for power saw operators) will be worn, as specified. Clothes that burn easily or melt (i.e., polyesters and nylon) shall not be worn.

Subcontractors will ensure the availability, proper use, care and will require their workers to wear PPE; necessary for the workers' protection. Prior to use, all workers will be trained in the proper use and care of PPE. Workers will properly wear all such items where a hazard is known to exist or in situations where the workers personal safety is enhanced through its use.

All personnel, including visitors entering an active construction site will be properly equipped with approved safety footwear, head and eye protection. All articles of PPE will conform to OSHA standards. The Subcontractor is responsible to ensure that the following approved PPE, at a minimum, is available and used by employees**.

Head Protection

- ❑ Approved hard hats and liners will be legislatively compliant (Ex: ANSI, OSHA) and worn in compliance with all manufacturer's recommendations.

Eye and Face Protection

Eye protection is intended to protect against such hazards as flying particles, chemical splashes, radiation (e.g., welding), sparks, etc. Clean eye and face protection regularly, and replace when lens becomes pitted or scratched.

All eye and face protection must meet OSHA or equivalent impact and compliance requirements.

- ❑ Approved eye glasses* c/w permanently attached side shields (OSHA Z94.3-M88 or equivalent) to be worn at all times except when using other eye safety wear (e.g., welding hood, cutting glasses, etc.). Tinted or shaded glasses shall not be worn at night, indoors or in poor light conditions. Specially designed safety eye protection (OTG) will be worn over any non-approved eyewear.
- ❑ Contact lenses are prohibited in all working/operating project/facility areas.
- ❑ Goggles and face shields must be similarly approved (OSHA or equivalent)
- ❑ Cutting and burning goggles (OSHA or equivalent).
- ❑ Flash glasses (shade 3 or 4) to be worn when working near electric arc welding.
- ❑ Burning goggles to be worn during oxy-acetylene cutting.
- ❑ Approved welder's helmets to be used when welding.
- ❑ Leather (or equivalent protection) hoods to be worn when sandblasting.

Fall Protection

The following legislative requirements shall prevail in selection, use, and maintenance of fall protection in every potential work exposure, unless otherwise stipulated by the local governmental authorities. All such Standard-included requirements and precautions shall be followed in addition to those listed below.

- ❑ OSHA Z259.11-1976 (or equivalent): "Fall-Arresting Safety Belts and Lanyards for the Construction and Mining Industries."
- ❑ OSHA Z259 M1978 (or equivalent):"Fall-Arresting Devices, Personnel Lowering Devices, and Lifelines."
- ❑ OSHA Z259.10-M90 (or equivalent): "Full Body Harnesses."
- ❑ OSHA Z259.111-M922 (or equivalent): "Shock Absorbers for Personal Fall Arrest Systems."
- ❑ Safety harnesses and lanyards complete with shock absorbers and double locking snaps are mandatory requirements for fall protection.
- ❑ Fall protection shall be used at unprotected elevations above 1.8 meters (6 feet), and at all times if the worker may fall into operating machinery, hazardous objects, or liquids.

- ❑ Tie-off shall preferably be well above head height, but no lower than shoulder height, to an anchor point capable of supporting 2,250 kg. (5000 lb.)
- ❑ Fall protection shall be used when erecting or dismantling scaffolds.
- ❑ Fall protection shall be worn when working from a ladder if higher than 1.8 meters (6 feet).
- ❑ Horizontal and vertical lifelines and components shall be of a manufactured system and used in accordance with the manufacturer's specifications. All manufacturers' specifications and documentation shall be kept on site. There shall not be excessive sag in horizontal lines.
- ❑ Fall protection devices shall be inspected prior to each use, and shall be subject to documented preventative maintenance inspections that include checking for cuts, wear, tears, burns, stitching failure, and deformation of hardware. Each device will be uniquely numbered.

Foot Protection

- ❑ Approved* serviceable footwear shall be worn at all times. Footwear shall incorporate box-type toe protection, sole/shank puncture protection, and provide support for the ankle (minimum 6 inches from sole to top of cuff).
- ❑ *Approved = OSHA or ANSI-compliant with no exposed toecap, openings or tears in the footwear's materials.

Hearing Protection

- ❑ Hearing protection shall comply with prevailing legislation. In the absence of sufficiently defining legislation, compliance to the relevant OSHA or ANSI Standard shall suffice.
- ❑ Hearing protection shall be with workers at all times and shall be worn whenever posted signs indicate their use, or when noise levels exceed 80 dBA (i.e., when it is difficult to hear a normal conversation from 1 meter {3 feet}).

Respiratory Selection

- ❑ Respiratory equipment must be selected, worn and maintained in compliance with OSHA/MSHA certifications or shall comply with prevailing legislation. Fit testing, as well as many other requirements and precautions require some competence and expertise in too much detail to be adequately covered herein. Consultation with Corporate HSE office is recommended prior to mobilization to ensure adequate respiratory protection is consistently ensured.

Body and Limb Protection

- ❑ Long trousers and long sleeved shirts (no "muscle shirts", shorts, etc.) will be worn at all times. Fire retardant clothing shall be worn as required by the employer, Noble, and/or client requirements.
- ❑ Gloves will be carried by workers at all times, and shall be worn when performing a job activity that presents a hazard to the hands. Gloves shall be of the correct type, style, material, etc. to adequately mitigate anticipated hazards.
- ❑ Leather jackets and chaps (or equivalent fire-resistant material) in intact condition will be worn for protection during welding and other hot processes.
- ❑ Ballistic pants and chaps will be worn for operation of chainsaws.
- ❑ Metatarsal protectors for compacting, jack-hammering work or other activities that expose the instep and lower leg to hazard.

**The foregoing PPE requirement exclusions are noted:

1. While within office buildings and office trailers.

2. While being conveyed in a bona fide transportation vehicle intended solely for that purpose and only while totally enclosed and protected from external conditions.

3. For specific medically approved physical conditions and with expressed prior written approval of the Construction Manager, Project HSE Manager, or designate.

B.4 EXCAVATING TRENCHING AND SHORING SAFETY

General

- ❑ No person shall enter or be permitted to enter any excavation that does not comply with the requirements of the governing Occupational Health and Safety Regulations for the region.
- ❑ "Excavation" means any dug out area of ground.
- ❑ "Trench" means an excavation where the excavation depth from the highest point of the excavation wall to a point level with the lowest point of the excavation, exceeds the excavation width (width = the least horizontal dimension between the two opposite walls of the excavation).
- ❑ Where required by legislation, no worker shall enter a deep trench (depth as specified in the applicable legislation) unless the relevant authority has been notified and grants approval/variance in writing prior to mobilization.
- ❑ Work shall not be performed in a trench unless another worker is working above ground in close proximity to the trench.
- ❑ Every excavation that a worker may be required to enter shall be kept reasonably free of water.
- ❑ There shall be a space of at least 450 millimeters (1 foot 6 inches) between the wall of an excavation and any formwork or wall inside the excavation, if a worker may be required to enter.
- ❑ All precautions shall be taken to prevent rock, sand, or other materials from entering an excavation.
- ❑ A level area extending at least one meter (3 feet, 3 inches) from the upper edge of each wall of an excavation shall be kept clear of equipment, excavated soil, and rock and construction material.
- ❑ No person shall operate or park any vehicle in such a way to affect the stability of an excavation.

Slope Requirement and Protective Structures

Excavations and trenches deeper than 1.2 meters (4 feet) that require entry by workers will:

- ❑ Except where cut in sound, stable rock, have the walls sloped to the minimum gradient as specified in the applicable legislation; or
- ❑ Have a support structure that will protect the workers.

- ❑ Trenches or excavations greater than 1.2 meters (4 feet) and less than 3 meters (10 feet) in depth will be shored in accordance with prevailing legislation, or a professional engineer must certify and inspect the walls to ensure sufficient stability, thus not endangering the workers.
- ❑ Trenches or excavations deeper than 3 meters (10 feet) will be constructed and installed in accordance with the specifications of a professional engineer.

Barricades/Warnings

If a person could fall into an excavation that is more than 2.4 meters (8 feet) deep, a sturdy barrier at least 1.1 meters (3 feet, 7 inches) high shall be provided at the top of every wall that is not properly sloped.

Barricades, warning of the danger, will be installed around the excavation as long as the hole is open. These will be designed in such a manner that personnel cannot fall into the hole. Warning lights or luminous signs will be installed at those excavations that are left open at night.

Prior to anyone entering an excavation where gas seepage may be present, the air quality will be checked and confirmed as adequate for breathing in the excavation, and that combustible and poisonous gases are not present. See Safe Work Permit Section.

Any person entering the excavation where toxic gases are known to be present will use a self contained breathing apparatus (and be competent to use same), safety harness or belt with a safety line attached, attended by competent observer/spotter.

A competent, designated safety person, properly equipped will be on site whenever anyone is in the excavation.

The Contractor's HSE Plan shall include allocations of men and equipment to affect a rescue should it be required.

Ladders will extend one meter (3 feet 3 inches) above the excavation and be situated not more than 10 meters (32 feet, 6inches) apart. Ramps may be used instead of ladders. These will be cut in the walls at similar strategic intervals to facilitate entry and exit.

Excavation equipment will be positioned such that it does not endanger the integrity of the excavation or any surrounding equipment.

Backhoes or other mechanical excavation equipment will not excavate in such a manner as to risk undermining their ground support.

B.5 EXPLOSIVE ACTUATED TOOLS

General

The use of explosive actuated tools (e.g., Ramsets) is quite common on many work sites. As large amounts of energy can be released suddenly, there is a hazard from flying objects and excessive noise. Whenever these tools are used on the work site special safety precautions, over and above those for other tools, are necessary.

The operator of explosive actuated equipment will be properly trained and qualified to use the equipment. The equipment and all operations will comply with established/recognized industry standards (Ex: OSHA, ANSI). All explosive actuated tools shall be operated and maintained in accordance with the manufacturer's specifications.

Explosive actuated tools shall be designed so that two separate actions are required before it will fire (viz., pressure against the surface of the material, and action of the trigger).

Explosive actuated tools shall be kept unloaded in a locked container with unfired cartridges when not in use or when left unattended.

Operation

Each work area where the tool will be used will be checked to ensure other workers are not endangered by the use of the tool (e.g., shrapnel or deflected fastenings). The operator shall ensure that there is no risk of the fastener passing through the material, causing injury to persons on the other side.

Explosive actuated tools shall be loaded only immediately prior to use. They shall never be pointed at anyone, whether loaded or unloaded. Hands shall be kept free of the muzzle at all times.

The worker is responsible to ensure his actions in the use of the equipment will not cause injury to himself or others by checking:

- ❑ That the tool is in acceptable working condition.
- ❑ That the explosive loads are properly selected for the job to be done.
- ❑ That proper safety equipment, hearing protection, goggles or face shield and safety eyeglasses are worn during firing.
- ❑ That perforations, ricochets or shrapnel will not endanger co-workers.

Explosive actuated tools shall be held firmly at right angles to the surface being driven into. Fastening devices shall be kept in from the edge of the material being driven into by no less than the distance recommended by the manufacturer.

In the event of a misfire the tool should be kept against the material for at least 30 seconds in case firing is delayed. If the cartridge still has not fired remove it from the tool, keeping the tool away from the body, preferably pointed towards a piece of plywood. Place the cartridge in a can of water. Misfired cartridges will be returned to the manufacturer, and not disposed of in the garbage.

Spent shells will be picked up by the Contractor's employee immediately and disposed of without delay in compliance with all manufacturers' recommendations.

B.6 VEHICLE AND MOBILE EQUIPMENT SAFETY

General

Without limiting the Subcontractor/employer's legislated obligations, all work will be performed 'in full compliance with these listed requirements.

- ❑ All personnel using mobile equipment and motorized vehicles shall be in possession of a valid driver's license.
- ❑ Workers will not start any mechanical equipment unless they are thoroughly familiar with its operation and they have been authorized to do so.
- ❑ All equipment shall be operated by qualified, competent personnel.
- ❑ All operators of personnel hoists and platforms shall be trained in the operation thereof, preferably through a program established by the manufacturer.
- ❑ All equipment shall be equipped with a minimum of 10kg (20 lb) ABC fire extinguisher.
- ❑ Safety devices shall not be tampered with, modified, or bypassed.
- ❑ All vehicles one ton and over shall have backup alarms.
- ❑ When stipulated by client/owner/other requirements, wheel chocks shall be consistently used to block the movement of parked vehicles.

Pre-Construction Equipment Check

The Contractor will ensure that inspection of its construction equipment for compliance with regulatory and project safety standards is performed. Deficiencies will be corrected prior to the use of the equipment on the project. Equipment will require a mechanic's certification of worthiness (or appropriate alternate documentation) prior to use. Such documentation will be presented to the Noble Project HSE Lead for audit prior to starting work.

In addition to the pre-construction equipment checks which are a prerequisite for use on the project, all cranes will be inspected by the operator on a daily basis using the appropriate Contractor operator's document or Noble's version. The forms will be retained in the crane for audit by Noble. Copies of completed forms will be forwarded to the Project HSE Lead for retention.

Inspection Before Use

Machinery guards provided for protection against revolving or reciprocating parts will be in place before the engine or equipment is started.

Operators will inspect the unit at the start of the shift to ensure operating reliability and proper functioning of all safety alarms and features.

The operator will not operate the unit if in his opinion it is unsafe to do so. Units with improperly working safety features will be taken out of service until repaired.

Operation

All workers involved with directing the operation of the unit will use a clearly defined method of signaling to the operator.

Signal men or spotters located outside the vehicle will be used for all restricted access and backing up activities (with the exception of back hoes, front-end loaders, and bulldozers where backing up is a regular/routine part of the task) whenever the operator's view of his intended path of travel is visually obstructed. In such instances, and with prior of consultation of Noble, warning signs and/or barricades may be used to keep such work areas safe.

Prior to backing up, the driver shall walk to the back of the vehicle to verify that it is safe to do so (except where signal men or spotters perform this function).

Employees will not ride on any equipment not provided with a manufacturer's designed and installed seat or platform for the purpose.

Loads shall not be left suspended while the equipment is left unattended.

Equipment power units will be shutdown during all refueling and servicing operations.

When maintenance procedures are to be carried out, equipment will be suitably locked out and tagged or rendered immobile during the maintenance work. All pinch points will be blocked or locked open. See Safe Work Permit Section.

All vehicles left unattended will have the parking brake applied and the motor turned off. There may be specific instances where wheel chocking is also required. Consult with Noble Project HSE Lead prior to mobilization.

Each operator will promptly notify his supervisor of any defects in the equipment. No equipment, tool or process shall be allowed to start if any such defects exist.

Personnel Safety

Personnel shall keep well clear of cables or rope being used to pull other equipment.

Personnel present in areas of high equipment traffic, such as the site preparation phase of a project, shall wear a high visibility fluorescent vest.

B.7 OPERATION AND INSPECTION OF CRANES AND HOISTS

General

All persons employed as operators of cranes and hoisting equipment will hold a provincial/ territorial/equivalent journeyman certificate of proficiency (or equivalent proof) in the operation of cranes and hoists. The appropriate supervisor shall review the proficiency and knowledge of operators when assigning work on specific equipment.

No worker shall operate a crane or similar hoisting device that is capable of raising, lowering or moving material that weighs more than 7,260 kilograms unless the worker is certified as a hoisting engineer under the Trades Qualification and Apprentice Act (or equivalent position in the prevailing jurisdiction).

All cranes and hoists shall be operated, tested and maintained in accordance with:

- ❑ Manufacturers Specifications.
- ❑ OSHA Z150-1974, "Safety Code for Mobile Cranes" or equivalent standard
- ❑ OSHA Z150-1977, "Supplement No. 1 to Z150-1974" or equivalent standard
- ❑ OSHAZ256-1987, "Safety Code for Material Hoists" or equivalent standard

Inspections, Testing, and Logbooks

The owner of a crane or similar hoisting device shall keep a permanent record of the full history of all inspections, tests, repairs, modifications and maintenance of each crane or hoisting device. These will be made available upon request.

Each crane or hoisting device will be load tested, and will have all structural components including, boom, hoist/hook assembly inspected and **certified** at least once every twelve months by a quality control company certified by OH&S or OSHA (or local governmental requirements).

Each crane or hoisting device on the project site shall at all times have its own logbook that will include **all** inspections, tests (including load and NDE), repairs, modifications, rope changes, and maintenance for the immediate preceding twelve months prior to first use at the site - and for the entire period that the crane or hoisting device is on the site. ***No crane or hoisting device will be permitted on the project site without such a logbook***

Cranes that enter and leave the project/facility/site on frequent short-term assignments will be **certified** initially, and then every six months thereafter.

Whenever sudden and unusual shock loads or overloading are applied to a crane or hoisting device, it shall be removed from service immediately and shall be subjected to complete inspection, testing and **certification** by a third party agency prior to work.

All *certifications* shall be performed by a professional engineer competent in the area of specific knowledge required for the certification of cranes, and who is registered in the province or region in which the project is located.

Safety Devices

All cranes and hoists 18 ton capacity and above shall have a load monitoring device installed to cut hoisting power in the event of any overload condition.

All cranes and hoists 18 ton capacity and above shall have an automatically engaged anti two-block device to prevent the hoisting block from hitting the boom.

Operation

The operator of a crane or hoisting device will:

- ❑ Familiarize himself/herself with the equipment and its proper care.
- ❑ Perform and log a "Daily Crane Safety Inspection" on electrical, pneumatic, cooling, mechanical, hydraulic, suspension, structural, and safety devices on a daily or more frequent basis in accordance with the manufacturer's requirements.
- ❑ Test all controls at the start of each shift (if any functions do not operate properly, they will be repaired before any operations begin).
- ❑ Notify the next operator of any defects upon changing shifts.
- ❑ Be responsible for those operations under his direct control (whenever there is any doubt as to safety, no operator will operate a crane until all safety requirements has been assured).
- ❑ If there is a warning sign on the switch or engine starting controls, no person will close the switch or start the engine until the warning sign has been removed by the person placing it there.

- ❑ Know that the weight of the load to be lifted is within the capacity of the machine.
- ❑ Not engage in any practice which will divert attention from the operation of the machine.
- ❑ Either have a clear and unrestricted view of the load and the operational area or act upon the instruction of the appointed signalman/radioman.
- ❑ Not hoist any equipment or load until safe working conditions have been assured, or orders to proceed have been issued by the appointed signal man.
- ❑ Respond to signals only from the appointed signalman but obey a **STOP** signal at any time no matter who gives it.
- ❑ Not leave his position at the controls while a load is suspended.

If power fails during operation, the operator will immediately set all brakes and locking devices, and communicate with the individual in charge. If practical, a suspended load should be landed under brake control.

Before leaving his machine unattended, the operator will, insofar as practical:

- ❑ Land any attached load.
- ❑ Ensure boom is not left suspended over operating plant.
- ❑ Tieback hook to the crane.
- ❑ Set all brakes and locking devices.
- ❑ Secure the unit against accidental travel and inadvertent movement.
- ❑ Lock doors to prevent unauthorized access.

When a high wind warning is issued, the crane will be completely secured. On cranes with hydraulic booms, the boom will be fully retracted.

When lifting/moving loads the operator will:

- ❑ Ensure the load is kept under control at all times and, where necessary, one or more guide ropes or tag lines will be used to prevent the rotation or other uncontrolled motion of the load. The length of the tag line will be sufficient to ensure that the worker controlling the tag line cannot be struck by any movement of the load. Workers shall not wrap the life line around their body or hand.
- ❑ Ensure loads are not hoisted when uninvolved workers are within range of the fall envelope.

- ❑ Ensure that (only) manufacturer's lifting beams are plainly marked with their weight and designed working loads, or that they have an engineer's certificate on file. Ensure that operators, riggers and supervisors are thoroughly familiar with the limitations of the equipment.

Obstructed Vision

Whenever the operator has his vision obstructed, a single competent signal man will be stationed:

- ❑ In full view of the operator.
- ❑ With a full view of the intended path of travel of the equipment, load or components, yet clear of the intended path of travel.

He will assist the operator by keeping the obstructed part of the equipment under observation and when it is out of view of the operator, by communicating with him by the use of visual signals or a suitable communication system.

The signalman will:

- ❑ Be fully qualified and competent.
- ❑ Wear high visibility gloves or vest.
- ❑ Use hand signals only when conditions are such that his signals are clearly visible to the operator (the signaler will review the signals prior to starting the operation), otherwise use radio communication.

Traveling with a Load

Extreme caution will be exercised when traveling a crane with a load, and the following precautions will be taken:

- ❑ The traveling procedures will be in accordance with the manufacturer's recommendations.
- ❑ Ground irregularities will subject the carder, boom, and suspension to additional shock loads, which will be compensated for by reducing the hook load; or by leveling the ground.
- ❑ Negotiation of slopes by cranes traveling with suspended loads will be avoided.
- ❑ The boom will generally be carded in line with the direction of motion.
- ❑ Where permitted by the design, the crane operator will remain in the crane cab to control the load and a second operator will be used to drive the

vehicle. The signalman (with the assistance of others, if required) will coordinate the operation, walk ahead of the load, and warn of hazards.

- ❑ The load will be kept as close to the ground as possible such that the length of hoisting cable between the boom point and load is as great as possible.
- ❑ The crane will be snubbed to prevent it from running away if the clutch or brakes fail on steep slopes or in hazardous conditions.
- ❑ Care and awareness when approaching sub-grade structures (culverts, etc.) is required to ensure that the supporting capacity of any structure is not exceeded.

Operation Near Electric Lines

All operations shall be performed in full compliance with applicable legislation. Any boomed equipment (e.g.: crane, backhoe, side boom) operating within the boom length of the minimum safe distance (as specified in the table below) of any electrical line will have a competent signalperson.

When operating, no part of any crane or its load will be permitted to approach any closer to any power line than the distances specified below, unless the electrical authority has been notified and the line de-energized. The following is a guideline for minimum approach separations when operating in proximity to live conductors.

MINIMUM SAFE DISTANCE* FROM LIVE ELECTRIC POWER LINES

Voltage (V)	Closest Approach (meters/feet)
750-150,000	3/10
150,000-250,000	4.5/14
Over 250,000	6/19

*Or legislated requirements where applicable

Use extreme caution when working in proximity to radio transmission towers.

Caution will be exercised when working near overhead lines having long spans.

Cage type boom guards, insulating links, and proximity warning devices have limitations and the use of them does not reduce the requirements above.

It will be the responsibility of the person operating the equipment to ensure that work does not proceed until the following steps have been taken:

- ❑ Provision of qualified signalman.

- ❑ Provision of adequate advance notification to the electrical authority.
- ❑ Fully informing the electrical authorities as to when the operations are to begin and cease and when any location changes are planned.
- ❑ Whenever the specified equipment will repeatedly travel beneath power lines, a route is plainly marked and "rider poles" are erected on each side of the crossing.
- ❑ If the equipment is working in a relatively fixed location, it shall be electrically grounded.
- ❑ Ensure that warning signs are in place on all sides of the overhead power lines from which equipment approach is possible.
- ❑ Report every incident involving contact with a live line to the electrical authority and Noble so that inspections and repairs can be made to prevent damaged live lines from failing at a later date.
- ❑ Completely inspect the machine for possible damage caused by the electrical contact and not use the machine until necessary repairs have been made.

NOTE: Ground rods should be placed as close to the machine as possible, the ground lead should first be connected to the rod and then to the machine and all personnel will be instructed to stay clear of both the lead and rod at all times. When removing the ground, the lead should first be disconnected from the machine. If a ground mat is used, the equipment will be placed on the mat and bonded to it. The ground mat area should be enclosed with a fence to prevent personnel from stepping on and off the mat during operation of the machine.

In the event the equipment or load makes contact with an energized circuit the operator will, if feasible:

- ❑ Remain inside the cab.
- ❑ Instruct all other personnel to keep away from the machine, rope and load.
- ❑ Try, unaided, and without anyone approaching the machine, to back off the equipment until it is well clear of the power line (if the machine cannot be self propelled away or disentangled from the line, remain inside the machine until the electrical authorities de-energize the circuit and confirm that conditions are safe).

NOTES:

1) If the operator decides to leave the machine, he/she must jump clear. The operator must not, under any circumstances, step down allowing part of his/her

body to be in contact with the ground while any other part is touching the machine.

2) Because there may be a hazardous voltage differential on the ground, the operator should jump with his/her feet together, maintain balance and shuffle slowly across the affected area.

3) The decision to stay with the crane or leave it will depend entirely on the circumstances surrounding the incident.

4) After contact with a power line the crane shall be taken out of service and will be subjected to complete inspection, testing and certification by a third party agency prior to working again.

Lift Program

Information regarding loads, vessels, skid units etc., shall be compiled early in the project's planning stages to allow adequate time to arrange for any required lift studies. Timely completion of lift studies will ensure sufficient time to procure the necessary lifting and hoisting equipment and will establish a schedule that will maximize the safety component of such lifting procedures.

Some factors to be considered in scheduling the lifts and determining the required equipment include:

- ❑ Scheduled arrival dates/times of equipment.
- ❑ Location and condition of lay down areas.
- ❑ Stability and grade of area soil/surface.
- ❑ Existence and capacity of sub-grade structures (culverts, etc.)
- ❑ Size, weight and configurations of equipment.
- ❑ Placement of equipment.
- ❑ Access, egress and working area of hoisting equipment.
- ❑ Number of and lifting capacities of hoisting equipment readily available.
- ❑ Completed study of all lifts.
- ❑ All safety requirements and procedures.

Critical Lifts and Rigging Studies

The Contractor will ensure that the Noble Construction Manager or designate are consistently informed, in timely fashion, as to the status of all lifting that will occur on the site. Under no circumstances will hoisting take place without prior knowledge and expressed approval of Noble's Construction Manager or designate.

Critical Lift Study

Critical lift study completion will be the responsibility of the Contractor. The study may be completed using in-house expertise or it may be completed by a Contractor Rigging Specialist or by other competent party.

Lifts as defined hereunder will not take place without a review meeting with Noble and the Owner, and will require Lift Study Drawings and/or Lift Calculation Forms as specified:

		Lift Calculation Form	Lift Study Drawing
a)	All lifts greater than 70%, but less than 90% of rated capacity for boom length and radius combination	YES*	NO
b)	All lifts over 90% of rated capacity for the boom length and radius combination	YES	YES
c)	All lifts in excess of 15 tons	YES	YES
d)	All lifts that require two or more cranes or hoisting devices (e.g. tandem lifts)	YES	YES
e)	All lifts that require special fabricated attachments such as spreaders, lifting beams, or personnel baskets	YES	YES
f)	All lifts required to be hoisted over process equipment or buildings in which people reside	YES	YES

* When multiple lifts are done from the same position, then only one lift calculation form is required - using the highest loading condition of weight and radius, provided 70% of the rated capacity is not exceeded.

The following information will be shown on the lift study drawing:

- ❑ Detailed dimensioned rigging hook-up diagrams for each hook, showing details of hook, rigging, and lifting lugs.
- ❑ Plot plan and elevations showing crane positions, pick positions, placement positions, existing equipment, gravel and wooden mats, etc.
- ❑ Detailed step-by-step written procedure showing sequence of events.

- Data table indicating details and configuration of cranes, maximum and minimum boom lengths, boom angles, maximum and minimum radii, wire rope type and size, counterweight, etc.
- Data table indicating details of equipment to be lifted, including size, weight, centre of gravity, and equipment number.
- Any special notes including maximum allowable wind speed (32 km=20 mph unless otherwise noted), special ground compaction requirements, etc.
- Positions of permanent and temporary equipment, foundations (including those that must be left out to facilitate the lift).
- Access routes for cranes and transport vehicles.

All lift studies will be signed by a Professional Engineer licensed to practice in the province or local region.

B.8 USE AND INSPECTION OF RIGGING

General

This procedure applies to all rigging equipment, including wire rope and slings, chains, synthetic (polyester/Kevlar/nylon) slings, lever hoists (come-alongs), chain falls, tirfors, shackles, hooks, lifting / spreader bars, clamps, and any other load bearing hoisting attachment. Recommendation is made to refer to "B.7 Operation and Inspection of Cranes and Hoists" for the procedure that applies to cranes and hoists.

The safe working loads on rigging shall be based on a 5 to 1 safety factor. The safety factor will be increased if there is any possibility of injury or death due to failure of the rigging.

The working loads of rigging will not exceed the safe limits established by the manufacturer. Any rigging that has been fabricated will be designed and certified by a professional engineer, and will have the safe working load clearly stamped on it.

All rigging equipment will be permanently identified with the safe working load and unique serial number.

Inspection

Rigging equipment shall be inspected by journeymen experienced in rigging a minimum of once per month, but more frequently (weekly or even daily) if used continuously. Damaged rigging equipment will be removed from service and destroyed.

An inspection log will be maintained for all rigging equipment. Manufacturer's recommendations regarding criteria that necessitate repair or replacement will be followed.

Slings and Wire Ropes

Sharp edges of loads will be protected with wood softeners or other soft material to protect the slings.

Wire ropes and slings shall be inspected for corrosion, kinks, abrasion, electric arcing, metal fatigue, bird caging, diameter reduction and broken strands.

Synthetic slings shall be inspected for evidence of exposure to heat, cuts or frays, or if there are indications of wear (internal or external).

Chains

Avoid the use of chains when it is possible to use wire rope. Chains usually give no warning when they are about to fail, whereas wire ropes will normally fail progressively, and frequent inspections will detect damages.

Chains shall be inspected for wear, deformation, cracks, or stretch (against a new chain with master link kept for the purpose).

Come-alongs and Chainfalls

The chain shall not be wrapped around the load for hoisting.

Come-alongs and chainfalls will not be overloaded. The average pull required on a standard come-along handle or chainfall chain varies between 20 and 45 kilograms, and the application of excessive leverage or weight will overload the equipment. Even the body weight of one person hanging from the lever or chain is a sign of overloading. Only one person will pull the chain or operate the lever at a time.

"Cheaters" or handle extensions will not be used on come-alongs to provide more leverage.

Hooks and Shackles

All hooks will be made from forged steel with the safety rating stamped on it, and will have working safety catches.

Shackles will not be used in such a manner that the rope can run over the screw pin. The screw pin will seat fully into the body, and bolts will not be used to replace missing pins.

High Lines

The use of *high lines* is not permitted. A high line is a method used to position a piece of equipment that is not accessible by crane (usually inside a building or structural enclosure). It consists of lashing wrapped around two building members and a wire rope pulled tight between them - a snatch block on the lashing is then used to lift the load and move it laterally.

B.9 CRANE SUSPENDED WORKER'S BASKET

Scope

Personnel baskets will only be used when conventional methods of access cannot be used due to the site configuration or conditions, or specific hazards.

All crane-suspended personnel baskets shall be used and maintained in full compliance with applicable legislation.

Design and Construction of Personnel Basket

The basket will meet the following requirements:

- ❑ Be designed by a professional engineer in accordance with good engineering practice. A signed, stamped drawing will be provided showing empty weight, maximum rated load capacity, maximum number of people, and serial number.
- ❑ Be of welded construction by a certified welder, with a design safety factor of 10.
- ❑ All rigging components shall have a minimum safety of 10.
- ❑ Be of a box design having the lifting points in the top four corners, and enabling the workers to stand upright with sufficient headroom.
- ❑ Have a bridle sling arrangement that evenly distributes the weight between each sling, and will prevent tipping. The bridle sling and other rigging attachments shall be a permanent part of the basket and will not be used for any other purposes.
- ❑ Have a handrail 1070 millimeters from the floor and a mid-rail halfway between the handrail and floor.
- ❑ Have a toeboard 100 millimeters high.
- ❑ Have solid material or expanded metal (with 13 millimeters maximum openings) below the handrails.
- ❑ Have an inward opening gate with a positive closing latch.
- ❑ Have a solid non-slip floor with stiffeners on the underside and some appropriate method of allowing water run-off.
- ❑ Have anchor points for worker's fall arrest systems above the headache ball or other attachment.

- ❑ Have a grabrail inside the handrail to minimize hand exposure.
- ❑ Have the empty weight, maximum rated load capacity, maximum number of people, and a unique serial number legibly and permanently marked in a conspicuous place on it.
- ❑ Be painted in a high visibility yellow color.
- ❑ Have a safety wire rope sling shall be attached to the basket at a separate location from the primary point of suspension. The other end of the safety line will be attached above the ball or above the hook on the block.
- ❑ Be certified every twelve months.
- ❑ Not be used as a materials hoist.
- ❑ If shackles are used as part of the arrangement, ensure that they are cotter pinned or moused to prevent "turn-out".

Crane Set-up

The crane shall:

- ❑ Be inspected by a competent professional engineer (who will be aware of the purpose of the inspection) before use for the first time, and every twelve months thereafter.
- ❑ Be set up within 1% of level grade and located on firm footing.
- ❑ Have all outriggers and pads in use as specified by the manufacturer.
- ❑ Have an anti-two block device fitted.
- ❑ Have positive locking latch fitted to the hook that is in good working order.
- ❑ Not be loaded in excess of 25% of its maximum rated load capacity at the boom angle and radius configuration. Hoisting and lowering speeds will be under power and will not exceed 30 meters per minute.
- ❑ Have a braking system that engages automatically in the event of an engine failure.
- ❑ Have a load monitoring device to verify the lift weights.
  - ■ Trial lifts with the empty basket will be made to the location where the basket will be positioned, and repeated each time the crane is repositioned, and at the start of each shift.

■ The crane operator will remain with the crane at all times, with the engine running, while personnel are suspended in the basket. No other loads may be combined with the basket.

Permits and Operation

A permit and lift calculation form is required each time the basket is used. Multiple lifts from the same crane in the same position only requires one permit, although a new permit is required at the start of each shift. A copy of the permit and lift calculation will be kept by the crane operator.

The following will also apply:

- ❑ A competent worker will inspect the crane's structural elements and the rigging for defects before each use of the crane.
- ❑ Wherever required, notify the prevailing legislative authority before beginning any hoisting operation.
- ❑ Every worker involved in the operation will receive adequate instructions about the requirements, restrictions, hazards, and emergency rescue procedures associated with the hoisting operation at a pre-lift meeting.
- ❑ Radio communication will be maintained between workers in the basket, the crane operator, and the foreman. There will be at least two radios in the basket, and all radios will have fully charged battery units at the start of hoisting. Hand signals to be used in case of emergency will be verified before hoisting commences.
- ❑ Workers shall keep all parts of their bodies within the basket when it is being raised and lowered.
- ❑ Tag lines will be used for all lifts, except where their use constitutes a hazard.
- ❑ No hoisting will take place during high winds, lightning, or other adverse weather conditions.
- ❑ No hoisting will take place near energized electric wires if exceeding the recommended closest approach guidelines found elsewhere in this HSEMS program manual.
- ❑ All workers will wear a fall arrest system attached to the proper anchor points.
- ❑ The basket will be secured to the structure if workers will exit it at an elevated position.

B.10 SCAFFOLDING, LADDERS AND FLOOR OPENINGS

Ladders

All ladders will be grade 1 (heavy duty), and comply with applicable legislation.

Site-built construction ladders will conform to prevailing legislation.

Aluminum or wooden ladders will not be used in proximity to electrical equipment. Only fiberglass ladders will be used when there is a requirement to work in close proximity to electrical equipment.

Wooden ladders will not be painted or treated.

Ladders will be of an appropriate length and material to suit the job requirements.

It is the responsibility of each worker to ensure that prior to each use ladders are checked for:

- ❑ Structural rigidity.
- ❑ Tight and secure joints.
- ❑ Missing or broken rungs.
- ❑ Damaged hardware or fittings.
- ❑ Excessive wear or splints in wood.
- ❑ Free movement of operating parts, particularly for gravity-action ladder locks on extension ladders.
- ❑ Worn non-skid feet.
- ❑ Ropes, cables, hoses on the ladder which could be a tripping hazard.
- ❑ Deteriorated or worn ropes on extension ladders.
- ❑ Dents and bends in side rails and rungs that might weaken a ladder's integrity.

    - ■ Damaged and unsafe ladders will be clearly tagged as unsafe and immediately removed from the work site for repair or scrapping.

    - ■ Workers will not carry loads up ladders. Both hands will be free to grip the rails. Tools and equipment will be carried in suitable tool belts, or drawn up with hand lines separately.

- Ladders will not be placed in front of doorways, unless the doorway is locked or blocked and signs are posted on both sides.

- No tools or materials will be placed at the base of a ladder.

- Footwear will be kept free of mud oil or grease to prevent loss of footing.

Stepladders

Stepladders will only be used on a clean, level and solid base.

Stepladders will only be used in the fully open position with the spreader bars locked.

A worker will not stand on the top two steps of the ladder (the cap is not considered a step).

Workers will not overreach sideways on stepladders; rather, the ladder will be repositioned.

Extension ladders

Ladders will extend a minimum of 900 millimeters (3 feet) above the top of a platform of landing.

The ladder will be situated from the wall or vertical a minimum distance of 25% of the height.

The ladder will be secured at the base by another worker/s until it has been securely tied off at the top and bottom (or as prescribed in the applicable legislation).

A worker will not stand on the top two rungs of the ladder.

The ladder will have a minimum overlap of 1 meter of the sections.

Extension ladders will be equipped with a rope and pulley for raising and lowering.

Ladders will be carried horizontally, never vertically.

Work from extension ladders is not recommended and will be considered only if scaffolds or power elevating platform cannot be used. Workers working more than 1.8 meters (6 feet), unless otherwise stipulated by local legislation, from the base of the ladder will wear a fall arrest system tied to a substantial structure

other than the ladder. The ladder will be held by another worker until tie-off is complete. Workers will not overreach sideways on ladders; rather, the ladder will be repositioned.

Scaffolding

All scaffolds will be erected, used, maintained and dismantled in accordance with the manufacturer's specifications, and prevailing legislation. The information provided hereunder is for general reference.

It is the responsibility of each Contractor to ensure that scaffolding is tagged as acceptable prior to use. Workers will not modify scaffolding without proper authorization and will report any defects promptly.

Erection/Construction of Scaffolds

The constructor of any scaffold shall be aware of the applicable requirements governing design and inspection of scaffolds by a professional engineer before attempting to erect a scaffold.

Scaffolds shall be designed and erected to withstand at least 2.4kilonewtons per square meter (50 psf), but shall also withstand all vertical and horizontal loads (plus any safety factor prescribed in applicable legislation) to which they may be subjected.

Scaffolds shall be constructed on a sound base, and shall be leveled and plumbed using screwjacks mounted to baseplates under each vertical post.

Freestanding scaffolds shall not exceed a height of three times the smallest dimension of its base.

Scaffolds shall be anchored to a sound structure every 4.5 meters (15 feet) vertically, and every 6.0 meters (20 feet) horizontally. Such anchoring shall secure the scaffold against all planes of movement.

Scaffolds shall be provided with proper and adequate access and egress steps or ladders mounted within the framework. Ladders will a minimum of 1 meter above each platform.

Scaffolds equipped with wheels shall:

- ❑ Only be used on level surfaces.
- ❑ Have all wheels equipped with locking devices that are used whenever workers are on the scaffold.

- ❑ Not have workers on them when they are being moved.
- ❑ Not be supported on pneumatic tires during erection, dismantling, or use.

Platform

■ A scaffold platform will meet the following minimum requirements:

- ❑ . Be at least 460 millimeters (18 inches) wide.
- ❑ Be constructed of material at least equivalent to Number 1 Grade spruce planks 48 millimeters (1.89 inches) thick by 248 millimeters (9.76 inches).
- ❑ Will not have a span that exceeds 2.1 meters (7 feet).
- ❑ Planks will overhang the supports by not less than 150 millimeters (6 inches), and not more than 300 millimeters (12 inches).
- ❑. Planks will be cleated or otherwise secured against slippage.
- ❑ Be fitted with 150 millimeters (6 inches) high toe boards along the full perimeter.
- ❑ Be fitted with 1-meter (3 feet 3 inches) high perimeter guardrails, and knee rails midway between the guardrail and platform floor. Vertical supports will be spaced no more than 2.4 meters (8 feet) apart.

Inspection and Tagging

The supervisor in charge of the scaffold erection will be responsible for the inspection and tagging of each scaffold. This responsibility shall not be delegated. All components will be inspected for proper assembly and signs of damage. Damaged, broken or bent components will be replaced prior to use.

The Sub-Subcontractor shall implement the following Scaffold identification tags system:

- ❑ RED - Scaffold incomplete. Do not use. Red tags are placed on the scaffold at the start of erection or whenever a scaffold is deemed to be unsafe.
- ❑ YELLOW - Caution. Yellow tags will identify the reason caution is required (e.g., requirement for fall arrest due to handrail removed due to equipment installation).
- ❑ GREEN - Safe for Use. Scaffold complies with manufacturer's and OH&S requirements.

Tags will be placed at the access entry point. Each scaffold will be assigned a unique serial number. Missing or untagged scaffolds shall be considered as un-inspected and un-approved for use until correctly tagged.

Scaffolds will be inspected by the contractor supervisor immediately after erection and once a week thereafter. The tags will be signed and dated after each inspection. A control log will be maintained by the contractor supervisor.

Use of Scaffolds

Only authorized personnel who are familiar with working at elevated levels will work on a scaffold. Each worker shall take the following precautions when working on a scaffold:

- ❑ Ensure that the scaffold has a green tag and that it has been inspected within the previous seven days.
- ❑ When ascending the scaffold look out for loose, missing or broken components and report these to the contractor supervisor before using the scaffold.
- ❑ Do not carry tools or equipment when ascending the ladder. Use a rope and bucket to raise and lower materials to/from the platform.
- ❑ Stay within the confines of the work platform, or if it becomes necessary to work outside or reach beyond these confines use an approved fall arrest system.
- ❑ Use the proper access and egress ladders or stairs provided.
- ❑ Ensure, and keep the work platform free of tripping hazards, and that all tools, equipment or other items are stored neatly and do not fall from the work platform. Remove any snow and/or accumulated slush, etc.
- ❑ Protect the platform from all hot work, including any tarp and other windbreak structures.

Floor Openings

Floor openings and holes will only be protected by approved guard rails or covers that provide a physical restraint.

Covers will be strong enough to support the loads to be imposed on them (minimum 2.4 kilonewtons per square meter) (50 psf), secured to prevent accidental displacement, and clearly marked to identify that they cover an opening.

Where it is not practical to install a cover, a physical barrier will be provided. The barrier will be constructed to the same specifications as required for a guardrail and will include toe boards. The guardrail will be secured to the floor or to a structure to prevent accidental displacement.

SCAFFOLD INSPECTION CHECKLIST

	Yes	No
1. Is the scaffold:		
o level?	_____	_____
o base solid; sills in place?	_____	_____
2. Is there adequate bracing?	_____	_____
3. Are ties provided:	_____	_____
o every 4.5 m vertically?	_____	_____
o 6.0 m horizontally?		
4. Are proper ladders provided for access to top platforms?	_____	_____
5. Are platforms:		
o made of No.1 grade 50 mmx250mm material?	_____	_____
o cleated or tied down?	_____	_____
o of span less than 3.1 m?	_____	_____
o minimum two planks wide?	_____	_____
o clear and uncluttered?	_____	_____
o cleared of ice & snow?	_____	_____
6. Are guard rails provided:		
o 0.90 to 1.1 m high?	_____	_____
o made of 50mmx250mm lumber?	_____	_____
o standards minimum 3 m apart?	_____	_____
o provided with mid-rail?	_____	_____
o provided with toe-boards?	_____	_____
7. Are all tubes cleared of any materials/tools before assembly?	_____	_____

NOTE: Only those scaffolds meeting all of the above requirements may be tagged as being safe to use. The tag will bear the name of the worker responsible for inspection and tagging of the scaffold.

B.11 FUEL HANDLING AND STORAGE

Above Ground Storage

a) Considerations for location and construction of fuel storage areas shall be in accordance with all applicable legislation and the following:

- ❑ Where possible fuel storage should be located down-wind of the work site.
- ❑ Consideration will be given to the fuel site drainage such that spillage will not have ready access to water courses, gravel beds or campsites.
- ❑ All brush or other flammable material, such as lumber or gas cylinders, will be kept at least 30 m (98 feet) from any storage area.
- ❑ Earthen berms or dikes will be created with suitably impervious material to contain possible spillage. These should be capable of containing 150% of the total storage volume.
- ❑ Ponding inside dikes due to rainfall or run-off will be controlled to avoid floating empty tanks.
- ❑ Adequate access on 360 degrees should be provided for fire control activities.
- ❑ Fuel or oil stored in drums will be segregated and treated as a separate unit or dock.
- ❑ Tanks and containers will be conspicuously marked with the name of the product they contain, and "FLAMMABLE" and "NO SMOKING" signs will be posted in hazardous areas. "SHUT OFF ENGINE" signs will be posted at vehicle fuelling points.
- ❑ All dispensing locations shall be equipped with appropriate grounding cables, clamps and attachment points to preclude any possibility of static discharge.

b) Where 2,000 - 5,000 L (500-1500 gallon) elevated gravity fill-type tanks are installed, the following criteria will be met:

- ❑ Tanks should be located not less than 75 meters (250 feet) from structures and not less than 25 meters (90 feet) from workshops or offices/trailers.
- ❑ The support stands will be in a sound condition - no bent or buckled cross braces or struts.
- ❑ The legs will be on solid spread footings of wood, metal or concrete capable of taking the point loading without settling.

- ❑ Proper ladders and/or access platforms will be available for refilling procedures.
- ❑ The tank will be equipped with a manual lockable shutoff valve, in addition to a self closing valve on the end of the hose and an approved vent.
- ❑ Conductive, bonded fuel hose of at least 5 m (15 feet) in length will be used for fuelling.
- ❑ A Purple K dry chemical fire extinguisher or equivalent of not less than 9 kg will be readily available.

Where one or more 30 to 65 m3 (270-600 sq. foot) portable vertical skid-type tanks with pump-assisted loading are used the following requirements will be followed:

- ❑ Tanks will be located at least 100 meters (300 feet) from any construction buildings and 150 meters (450 feet) from any structure.
- ❑ The tanks will be set on firm ground within the area of the dike.
- ❑ Each tank will have a separate dike.
- ❑ Tanks will be at least 5 meter apart, wall-to-wall.
- ❑ Each tank will be equipped with:
  - an approved volatile liquid vent having a flash resistant screen
  - a small, low-point drain valve (fire rated) for draining water (will be plugged when not in use)
  - access to the tank top for gauging
  - an electrical grounding point
  - valves which will be locked when not in use.

Pump and Piping Installation

At all temporary fuel storage areas, the following piping, pumps and valves requirements will be met:

- ❑ Suction and or fill piping will be steel with welded or threaded joints. Short sections of flexible fireproof hose will be used to connect the pump to the system.
- ❑ The fill point will be equipped with a check valve and a block valve.

- ❑ If a pump is connected via a manifold to several tanks, each tank suction will have a block valve.
- ❑ All pumps used for fuel transfer will be approved for handling volatile fluids and will be equipped with a built-in bypass/re-circulation relief valve.
- ❑ The pump will be mounted on a suitable footing such that no undue stress is placed on the suction lines.
- ❑ The pump will be grounded or bonded electrically to a grounding device.
- ❑ The pump will be at least 5 m from the tank or tanks and outside the dike or in a separate dike area.

  Non-approved equipment (i.e., water pumps) will not be used for the transfer of volatile fuels.

Refueling Stations

In the design of temporary fuel storage fuelling stations, the following procedures will be adhered to:

- ❑ The fuelling station will be at least 20 m from the storage tanks.
- ❑ A suitable approved and electrically bonded flexible hose complete with a self-closing nozzle will be installed.
- ❑ A 67 kg (150 lb.) Purple K Ansul dry chemical, wheeled fire extinguisher or equivalent will be readily available.
- ❑ Adequate NO SMOKING and SHUT OFF ENGINE signs will be posted.
- ❑ A remote stop station for the pump will be installed at the fuelling station.
- ❑ Safe, adequate lighting will be provided for night operations.
- ❑ An adequate storage rack for the flexible hose will be provided.
- ❑ Refueling operations will be attended at all times. Should the operator leave for any reason, the pump will be shut down.

Refueling Vehicles

Where pickups or similar small trucks are used for refueling purposes, the following conditions will be met:

- ❑ The trucks will be equipped with an operable Purple K or equivalent extinguisher of at least 9 kg.

- ❑ The tanks will be solidly secured to the trucks with fastenings capable of restraining the full weight of the loaded tank.
- ❑ Any powered pump used to transfer the fuel will be equipped with a bypass valve to prevent overpressure should the discharge be closed or blocked.
- ❑ All pumps will have OSHA/UL or equivalent approval for flammable hydrocarbons.
- ❑ Only hoses approved for fuel transfer will be used.
- ❑ Trucks will be marked "Flammable" and comply with applicable legislation.
- ❑ Trucks will carry suitable absorbent materials to clean up small spills.

Where trucks with dedicated fixed tankage are used for refueling, the following additional conditions will apply:

- ❑ The trucks will be equipped with not less than one operable 18 kg Purple K extinguisher or equivalent.
- ❑ The exhaust systems of the truck will not pass under any point where fuel leakage may drip or spray onto the hot surface.
- ❑ Fuel dispensing hoses will be of approved electrically conductive types with automatic shut off nozzles.
- ❑ Fuel transfer pumps will have pressure controlled bypass systems and will have OSHA/UL or equivalent approval for flammable hydrocarbons.
- ❑ Trucks will be marked "Flammable" with appropriate Hazardous Product warning signs.
- ❑ Trucks will carry suitable absorbent material to clean-up small spills.

Refueling Procedures

General procedures to be followed when refueling equipment are:

- ❑ Minor spills will be cleaned up promptly.
- ❑ All spills will be reported to the Contractor and the Project HSE Lead.
- ❑ Vehicle engines will be shutdown during refueling operations.
- ❑ Small stationary engines with integral fuel tanks will be shut down during refueling operations.

- If fuel cans are used for refueling, they will be approved metal safety fuel cans with a flash arresting screen, a spring closing lid and a spout cover that will safely relieve internal pressure if the can is exposed to fire.
- There will be no smoking or open flames within 7.6 m (25 feet) of fuel storage tanks, fuel pumps or refueling operations.
- Spill pans/trays will be used wherever possible and feasible.

B.12 WELDING, GRINDING AND CUTTING SAFETY

General: Contractor Requirements

Due to the high temperatures involved in welding, cutting and the forming of hot metal, it is essential that fire prevention precautions be rigorously observed wherever these operations are performed. Welding will not be carried out in enclosed areas where explosive or flammable materials (vapor, liquid or solid) may be present. The appropriate actions will be taken to remove such materials and to ensure they are not present during welding or burning.

The fire risk potential at the location of the work being carried out will dictate the need for full Hot Work Permit/equivalent compliance.

Drums containing, or previously containing, flammable or combustible materials or chemicals will not be used as welding benches and will never be cut using a cutting torch or grinder.

Fire extinguishers will be kept at hand and ready for immediate use in case a fire starts.

A Safe Work Permit (Hot Work) will be obtained in accordance with this HSE Program.

Personal Protective Equipment

The following clothing is recommended for welders:

- ❑ Hard hats will be worn by welders when not actually in the process of welding. Hard hat/hood combinations are required for welding.
- ❑ The head and facial hair will be protected at all times during welding. No hair may interfere with the proper facial seal of any required respiratory protection.
- ❑ Leather is the recommended material for welders' outer protective wear.
- ❑ Synthetic fibers which melt or become flammable on contact with heat shall not be worn.
- ❑ Pants should have no cuffs, and will not be worn tucked inside of boots.
- ❑ Shirt pockets should have flaps and be kept closed.
- ❑ Steel-toed boots shall meet applicable legislated, and be laced to the top.
- ❑ Gauntlet-type gloves should be worn.

- ❑ Clothing will not be frayed, oily or contaminated.
- ❑ Fire retardant coveralls will be required for welding around equipment or piping charged with hydrocarbons (or where required by client) and for which a Hot Work Permit is required.

The welder will have protection for his eyes against the high intensity light rays, ultra-violet light rays, infra red rays, heat, flying metal particles, sparks and slag. Selection of lens shades shall always equal or exceed the manufacturer's ' requirements. It is recommended that the welder uses the highest possible shade number whereby he can still see the weld zone.

Adjacent personnel should be protected by appropriate barriers or screens erected by welding personnel and wear suitable eye protection. Goggles &/or face shield will be worn at all times when cold cutting with a grinder or saw.

Cutting goggles will be worn when torch cutting materials and welding lenses will be worn when cutting with arc air. Do not use regular safety glasses in place of cutting goggles or welding lenses. A clean glass/plastic lens will be positioned in front and behind the filter lens to protect it from damage.

Workers will wear tight/snug fitting clothing, gloves and eye protection while grinding. All employees in the vicinity of a grinding operation will wear the appropriate eye protection.

- ❑ The grinder operator will wear respiratory protection when dusty or toxic metals are being ground.
- ❑ The grinder operator should wear a full-face shield as well as approved safety glasses while operating a grinder.

Welders will be provided with proper ventilation (i.e., fans, air ducts, out-of-doors). Welding screens will be arranged such that they do not restrict ventilation.

When welding on non-ferrous or galvanized metals extra ventilation is required. In some circumstances, it may be necessary for the operator to use a respirator or mask. The fumes of cadmium, lead and many other materials produce toxic fumes. In general, the welding of these materials should be avoided. If the welding of these materials cannot be avoided, particular care will be taken to ensure the area is properly ventilated, or breathing protection is worn.

Special precautions will also be taken into account when welding with argon, CO2 or other asphyxiates Proper ventilation and/or breathing protection will be used.

Welding

When welding on existing tanks, vessels or piping, proper precautions will be taken to ensure that the vessel or pipe has been cleaned, purged, vented and tested for the presence of combustible gases.

Welding ground will be a continuous cable from the machine to the object being welded. The use of the following items for a ground system is prohibited:

- ❑ Any pipeline, especially oil, gas, steam or chemical lines.
- ❑ Stairs or handrails.
- ❑ Structural steel buildings.
- ❑ Steel light or power standards.
- ❑ Pumps or other rotating equipment (particularly with shaft bearings which could seize to the shaft due to arcing).

  - ■ When connecting or splicing lengths of welding cable, substantially insulated connectors of a capacity at least equivalent to that of the cable will be used. If cable lugs are used for joining, they will be securely fastened together by more than one bolt to give good electrical contact. The exposed metal parts of the lugs will be completely insulated.
  - ■ Welders will not strike an arc elsewhere on the work piece or other equipment in order to establish that a welding circuit has been established.
  - ■ A 5 kg (10 lb) ABC dry chemical/equivalent fire extinguisher will remain within 3 meters (10 feet) the welder operator at all times.

Cutting

Workers will prevent sparks, flames, or hot objects from coming into contact with cylinders, regulators or hoses.

Workers will ensure that sparks, flames, or other hot objects do not endanger other personnel.

A proper striker will be used to light a torch. Cigarette lighters or matches will not be used.

A fire extinguisher will remain near the worker who is using the cutting torch at all times.

Grinding

Precautions to be used when grinding include:

- ❑ All grinding wheels will be equipped with a safety guard.
- ❑ Tool rests are required on bench grinders and will be securely attached to the grinder.
- ❑ Tool rests will be set 3 mm (3/16 inch) from the face of the grinder and set below the centre line of the wheel.
- ❑ Grinding stones and wheels will be inspected frequently to ensure no chips or cracks exist which may cause failure.
- ❑ The rated rotational speed of the wheel or disc will exceed that of the grinder to which it is attached.

B.13 HAND AND ELECTRIC POWER TOOLS

Hand Tools

Cutting tools will be kept sharp. Worn or broken tools will be replaced.

Tools will be carried in proper pouches of toolboxes. Tools will not be carried in pockets.

Knives will have retractable blades that will remain retracted when not in use.

Tools with loose or broken handles will not be used.

Ends of metal striking tools such as chisels will have mushroomed ends dressed.

'Snipes' or metal tubes will not be used on wrenches to increase leverage.

Hammers will only be used on special `flogging' spanners designed to be struck with a hammer.

Gloves and safety goggles will be worn when working with hand tools.

Electric Power Tools

A copy of the manufacturer's instructions/specifications will be kept in the project site for each type of power tool.

Portable electric drills, grinders, saws, etc., will be double insulated or equipped with three conductor grounded cords, polarized plugs, and GFCI (Ground Fault Circuit Interrupters) receptacles to ground non-current carrying metal parts.

The ground wire on portable electrical equipment will be checked for continuity not less than once each month. A tag attesting to such test is to be affixed securely to the piece of equipment.

Extension cords and connections shall be OSHA/UL or equivalent designation with a voltage rating of 600V, and will be maintained in good condition.

Manufacturer-installed guards will not be removed or modified, and will be used as equipped by the manufacturer.

Tools will be physically disconnected from the power source when making adjustments or changing attachments.

Trigger locking devices will not be used.

Power tools will not be hoisted or handled by the cord. They will be disconnected from power receptacles by removing the plug, and not by pulling on the cord.

Cutting or abrasive attachments such as blades disc or bits shall be the proper size and rating for the power tool, being used.

Portable power driven circular saws:

- ❑ Will be equipped with guards or hoods which automatically adjust themselves to the work when the saw is in use.
- ❑ Will have a saw guard equipped with a handle so it may be safely temporarily retracted.
- ❑ Will have guards which cannot be blocked or locked in an open position.
- ❑ Will have safety switches, which operate the motor only while the switch is held in the closed position.

Horizontal pull saws (radial arm):

- ❑ Will have a blade which is encased on each side so that the upper half of the blade and arbour ends will be covered.
- ❑ Will have limit chains or stops to prevent the saw from moving beyond the front edge of the table.
- ❑ Will have an effective device to return the saw automatically to the back of the table when released.

B.14 PRESSURE TESTING

General

Prior to a Contractor undertaking any hydrostatic testing, a thorough review of the project specific pipe testing specification will be completed and a testing plan will have been written by a qualified engineer outlining the following:

- ❑ Test medium (water or water/ethylene glycol mixture).
- ❑ Maximum test pressures, taking into account pressure increases due to thermal expansion and static pressure.
- ❑ Blanking required to isolate other vessels or lines from the system to be tested.
- ❑ Water supply point and drainage point.
- ❑ Testing equipment to be utilized.

Appropriate officials from the authority having jurisdiction over the construction of the facility will also have been notified as to the testing procedures and timing.

Testing will not be performed against closed valves or check valves.

Testing with expandable gases (e.g., compressed air) will not be permitted without an approved testing plan.

Piping and vessels that have foundations and supports that are not designed to support the weight of the system with the test medium will be supported temporarily in an adequate manner prior to filling with the medium.

Test Equipment

All temporary test equipment and materials will have an equal or higher pressure rating than the equipment being tested.

Test equipment will have proper calibration certification before it can be utilized on the test. A minimum of three calibrated pressure gauges will be utilized - one on the pump, one at the lowest point on the system, and one at the highest point on the system.

Test manifold and valves will be rated so that the working pressure of the components is not exceeded under the maximum allowable test pressure.

Relief valves will only be considered as a backup method of protection against over-pressurizing the system. The primary method to avoid over-pressurizing the system will be to monitor the system and shut down the pump when the test pressure has been achieved.

Test Process

During the hydrostatic test all personnel not directly involved with the testing will be excluded from the immediate vicinity of the system that is being tested. Warning signs will be posted to restrict unauthorized personnel from entering the test area. The extent of the barricaded exclusion zone will depend on the "TNT factor" (Refer to relevant QA Program procedures as a guideline to determining).

Operation of the pressurizing equipment will only be performed by qualified personnel who are familiar with the test equipment.

Sufficient personnel will be assigned to the test crew to continuously monitor the test section to check for leaks and to ensure that the system is not over-pressurized. They will maintain communications (using two-way radios if necessary) with the pump operator so that the test pump can be shut down immediately if required.

Test sections will be prevented from freezing during the test. In cold weather water will be promptly and completely drained from test sections to prevent damage to piping or other components.

All personnel handling ethylene glycol mixtures will wear the appropriate personal protective equipment as required by the relevant MSDS in addition to any other safety protective required for all work. All ethylene glycol spills will be reported to the Contractor and the Project HSE Lead and promptly cleaned up.

The system will be vented during filling to ensure that there are no air pockets. All fittings which can be dislodged and become projectiles should be directed toward the ground, wall or other appropriate non-personnel impacting surface.

The pressurization process will be stopped at 50% of the intended test pressure so that the system can be inspected for leaks at joints and welds. Prior to tightening any flanged or threaded fittings, the pressure will be relieved from the line.

Caution will be exercised when relieving test medium to prevent injury and to avoid environmental damage.

B.15 SAFETY ISOLATION WITH BLINDS AND VALVES

Blinds are required for pressure testing, vessel entry purposes, and to provide isolation from live systems.

Valves that will be made temporarily inoperable shall be opened or closed under the same requirements for blinds. The use of valves for isolating confined spaces where leakage from the valve may pose a hazard to workers is prohibited. Valves will not be used to isolate sections of pipe for pressure testing. Prior to the removal or installation of any blind the following will take place:

- ❑ A Safe Work/equivalent Permit will be obtained. (See Safe Work Permit Section).
- ❑ The positions where blinds are to be installed or removed will be marked on a mechanical flow diagram and will be attached to the Safe Work permit. Consideration must also be given to boundary isolation blinds. Review piping drawings carefully to ensure security and integrity of blinds and worker protection.
- ❑ A safety meeting will be held with all personnel involved (Subcontractor, Safety Department, Operations, and presiding Superintendent) in the blind removal or installation work to outline methodology, potential hazards, and to establish specific safety precautions.

Installed blinds or blanks will be clearly identified with a red handle and a **"Danger - Do Not Remove"** tag, and will be marked with the blind identification number.

Blinds, studs, nuts and gaskets will meet the required specification for material and rating.

A logbook containing authorized signatures and marked up Process Flow Diagrams and isometric drawings will be kept up to date to indicate the locations of all blinds.

When a blind is removed, the removal will be documented in the logbook and marked up Process Flow Diagrams and isometric drawings. A blind will not be removed unless authorized by the same personnel/department that authorized the installation of the blind (usually the Mechanical/Piping Isolation authority)

Blinds will not be removed before a test has been carried out to prove that the line is not pressurized, and that there is no risk of releasing harmful contents

onto the ground or into the atmosphere. Caution must also be exercised during any "pressure blows", "blow downs", etc.

B.16 HOT TAPPING SAFETY

General

Hot tapping connections are not normally required during the course of new construction; however, in the event hot tapping is required, the operation is potentially very dangerous.

Prior to hot tapping taking place, the following will be done:

- ❑ Perform a study to verify that hot tapping is feasible and is the only option. Study to include technical information relating to the pipe and the contents.
- ❑ Perform ultrasonic tests to verify wall thickness of pipe.
- ❑ Obtain a Safe Work Permit.
- ❑ Convene a safety planning meeting with all parties and workers to discuss safety precautions, and all potential risks and hazards.

Weld procedures shall be documented, approved and will be appropriate for the specific conditions. The welder will be qualified for the procedure and will hold a "B" Pressure Welders ticket.

Appropriate safety equipment including fire extinguishers and breathing apparatus, if required, are on site and in good condition.

The tapping machine will be appropriate for the job and will be operated by an experienced operator who is familiar with its use and familiar with the conditions of the work permit.

Any requirements for purging the equipment during welding or tapping and for partial de-pressurization or flow reduction will be outlined in the work permit and will be compatible with the weld procedure requirements.

Site personnel will ensure that the following requirements have been met:

- ❑ Depressurizing requirements have been met as far as practicable.
- ❑ All energy sources brought to Zero Energy State(s)
- ❑ Determine what, if any process shutdowns can occur in an emergency situation
- ❑ The weld area is thoroughly cleaned and wire brushed.
- ❑ On-site equipment is kept to a minimum.

- ❑ Excavation where required, meets or exceeds legislated requirements and the requirements of this manual.
- ❑ Any on-site equipment which can result in ignition of escaping fluids is equipped with quick kill devices.
- ❑ The welding machine is positioned upwind and as far as practical from the tap location, and is attended by an experienced person who maintains visual contact with the welder. Use of a properly calibrated explosimeter/LEL meter is required to guard against flammable vapor build up.
- ❑ Documentation for welding procedures and hot tapping procedures is available at the site and has been read and is understood by all parties.
- ❑ After welding, leak testing of the pipe, flange fittings and valve will be completed prior to hot tapping.

Prior to the start of hot tapping, the cutter will be withdrawn to its fully retracted position and the valve closed to ensure that the machine can be properly removed after the cutting operation.

The coupon will be saved for further testing and analysis.

A blind will be properly installed after the hot tap has been completed.

B.17 CONFINED SPACE ENTRY

General

A confined space is any enclosed or partially enclosed space having restricted access and egress and which due to its design, construction, location, atmosphere, the materials and substances present in it, or other conditions is or may become a hazard to a worker or rescuer entering it.

Some examples of confined spaces include storm drains and culverts, sewers, ducts, underground utility vaults, pipelines, equipment housing, bins, pits, tankers, tanks, tunnels, silos, process vessels, manholes and boilers.

Potential Hazards

- 'Oxygen Deficiency' due to rust formation, chemical reaction, combustion, or absorption. Any reduction in oxygen in the atmosphere below 19.5% can impair performance by causing fatigue and loss of reasoning ability.
- 'Oxygen Enrichment' through accidental ventilation with oxygen, or leaks in oxy/acetylene equipment. Increases the flammability of materials.
- 'Fire and Explosion' can occur when a flammable substance (e.g., oxy/acetylene equipment, fuel, adhesives) in the form of a liquid or vapor combines with the air in the confined space and comes into contact with a source of ignition.
- 'Toxic Substances' in the form of vapors, liquids or solids that are normally found in the confined space and which cannot be eliminated completely. Toxic vapors can enter the body by inhalation, skin absorption, ingestion or even open sores, causing acute toxicity (immediate effects) or chronic toxicity (appearing long after being exposed, or may take long disperse from the body).
- 'Falling Objects' as a result of material or equipment brought into a limited volume of space that requires more than one working level.
- 'Mechanical Equipment' that forms part of the normal process (e.g., fans, pumps) will be isolated so that it does not energize automatically or accidentally.
- 'Electrical' shock could result from permanent installations or from defective temporary equipment, tools, cords, and lighting.

Permits and Planning

Prior to all confined space entries a Confined Space/Safe Work Permit will be obtained. The pre-requisite for such Permit will be a written procedure detailing the works, which will include:

- ❑ Assessment of the hazards (high hazard entries require a Job Safety Analysis to be done).
- ❑ Zero Energy State (electrical, mechanical, pneumatic, etc.) requirements.
- ❑ Identification of parties responsible to open and close the confined space.
- ❑ Daily permit requirements.
- ❑ Ventilation requirements.
- ❑ Air quality testing procedure.
- ❑ PPE requirements, including respiratory protection.
- ❑ Lighting requirements.
- ❑ Tools and equipment (including assessment of any requirement for explosion proof tools and equipment, GFCI-equipped, etc.).
- ❑ Fire Protection.
- ❑ Rescue equipment and plan.
  - ■ A pre-entry safety meeting will take place, and the procedure will be reviewed by all personnel (including rescue personnel) involved with the confined space entry.

Personal Protective Equipment (PPE)

In addition to standard PPE (e.g., safety boots, hard hats, safety eyewear, gloves, coveralls, and hearing protection) an assessment will be carried out to determine additional PPE requirements such as fall protection, respiratory protection, etc.

Workers will be trained in the proper use of all PPE, and will be familiar with their limitations.

Ventilation

Natural ventilation in confined spaces is usually minimal therefore ventilation by mechanical means shall always be made available.

Common types of mechanical ventilation are fume extractors, electric fans and pneumatic air movers.

Ventilation equipment will be positioned so that contaminated air such as exhaust gases and welding fumes are not drawn into the confined space.

Fresh air should preferably be introduced at the furthermost limits of the confined space to reduce the build-up of hazardous vapors that may not have been completely removed by purging.

Equipment used in or near a flammable atmosphere will be explosion proof.

Steam or inert gas purging is recommended for removing flammable vapors. If inert gas is used, the space must be re-ventilated with fresh air prior to entry (verified by LEL/O2 meter).

Local exhaust ventilation will be used when metals, fluxes, coatings or platings are being used, cut or welded because they may contain toxic fumes.

Where purging and ventilation are not adequate to provide a safe atmosphere, workers will use a suitable breathing apparatus.

Air Quality Testing

Prior to entry into a confined space the atmosphere will be tested, and then again at predetermined intervals. Ideally, air monitoring is continuous for the entire period that a confined space exposure is occupied by workers. A log will be kept of all readings, and times that readings are taken.

- ❑ Objective of the test is to check the quality of the air within the entire space at several locations.
- ❑ All levels will be tested so that light and heavy gases can be detected.
- ❑ All compartments will be tested. The person conducting the

tests will wear a breathing apparatus.

Equipment used for testing will be properly maintained and calibrated weekly, and in accordance with the manufacturer's specifications. Records of calibrations will be maintained. Battery function will be optimal at all times.

Personnel using test equipment will be properly trained in its use.

Lighting

Explosion-proof lighting will be used where there is a potential for flammable products to be present.

All 110 volt lighting will be protected by ground fault interrupters (GFCI's) and "bird caged".

All personnel in confined spaces and the safety watch will carry portable lighting in case of power failure.

Safety Watch

All confined space entries shall have a safety watch posted immediately outside the confined space that will be able to communicate with workers inside. The Safety Watch should be readily visible and identifiable via wearing a red or high-visibility (traffic) vest

The responsibilities of the safety watch include:

- ❑ Maintaining a log of all personnel inside the confined space. Workers will sign in and out each time they enter or leave the confined space.
- ❑ Has in his/her possession, a functioning air horn with which to enunciate any emergency or evacuation procedures.
- ❑ Remaining at the assigned post at all times that personnel are inside the confined space.
- ❑ Ensuring that all personnel who enter the confined space have the appropriate PPE.
- ❑ Being familiar with the emergency reporting procedures and assisting with rescue operations. The safety watch will ensure that the prescribed rescue equipment is on hand.

Isolation

Electrically lockout all related mechanical equipment (e.g., fans, pumps, agitators, etc.) that could energize automatically or accidentally and cause bodily harm.

Mechanically lockout all related valves, and install blinds as prescribed below.

Mechanical Isolations

Blinds shall be installed for the following purposes:

- ❑ To provide isolation from live systems
- ❑ For hydro or pneumatic testing
- ❑ For vessel entry purposes

Safety blinds shall be installed on vessels and other confined spaces as soon as piping is connected, to provide isolation.

Safety blinds that are to be used as test blinds shall be of sufficient strength to withstand imposed pressure.

Safety blinds shall 1) have "T" handles and 2) are painted red. Safety blinds shall be tagged with a "Danger Do Not Remove Tag", and numbered for reference.

Blind Logs

The presiding supervisor shall maintain blind logs. The logs will indicate which blinds are installed and which blinds have been removed or turned over to the client.

Blind Installation

Before blinds are installed the supervisor shall issue the "Danger Do Not Remove Tag" with his name and the log reference number to the worker. Upon being notified the installation is complete the supervisor shall enter it in the log. If isolating piping from a vessel, the vessel number shall be used for the location.

Blind Removal

Blind removals shall be by the written authorization of the supervisor. Before authorization is given for the removal of safety blinds used for the isolation of confined spaces, the supervisor shall check with the Construction Manager for approval. The HSE Manager shall be copied on all authorizations for the removal of safety blinds.

Isolation of Operating Systems

Any safety isolation blinds used to isolate client-controlled operating systems shall be installed and controlled by both parties. Installation and removal of these blinds shall be by written authorization and signing in the safety log. Blinds controlled by the Subcontractor and the client shall have a "Danger Do Not Remove Tag" as well as the client's tag

Turnover of Blinds

Blinds turned over to clients shall be by written authorization of the Construction/Facility Manager and accepted by the client. The blind log shall also be signed by the client for acceptance

Drawings

To facilitate supervision checking the installation of blinds, as part of their responsibility for confined space entry permits; drawings shall be made available for reference

Valves

Valves required to be made temporarily inoperable shall be opened or closed under the same requirements for blinds. All isolations with valves shall be entered in the blind log.

Only positive shut-off valves that can be made inoperable with chains and locks shall be used for isolation.

The use of valves for isolating confined spaces or other systems where leakage from the valve may pose a hazard to workers is prohibited

Safety Precautions

Fires and explosions from flammable vapors can be prevented by:

- ❑ Purging the air out of the space with an inert gas, such as nitrogen or carbon dioxide (creating a potentially oxygen-deficient atmosphere)
- ❑ Ventilating, to keep the fuel vapors below the lower explosive limits (L.E.L.).
- ❑ Eliminating sources of ignition such as friction sparks, open flames, and sparks from exhausts or electrical equipment.
- ❑ Bonding and grounding vessels to reduce static electricity (e.g., when cleaning vessels with high-pressure steam or water).
- ❑ Shutting off of torch valves at a point outside the confined space when the confined space will be left unattended for any length of time, such as a lunch break. Torches and hoses will be removed from the confined space when being left overnight.
- ❑ Employing a No Smoking policy in and around the confined work space.

- ❑ Storing all combustible and flammable material outside the confined space until ready for use.
- ❑ Leaving gas cylinders and welding machines outside.
- ❑ Having appropriately sized and rated fire-extinguishing equipment readily accessible.

The following additional precautions will be taken:

- ❑ There will be radio communication between the safety watch and the site safety supervisors.
- ❑ As a supplement to radio communications, an air horn or portable siren (similar to a personal alarm) will be used by the workers inside the confined space to alert the safety watch in case of emergency. The safety watch will also have an air horn or portable siren which he will sound in case of emergency.
- ❑ The safety watch and all personnel working within a confined space will be proficient in the use of the emergency equipment that has been specified and is made available.
- ❑ Where possible, a lifeline will run from the access/egress point to the location of the workers to facilitate rescue operations.
- ❑ Where practical, each worker will wear a harness attached to the lifeline to facilitate efficient rescue operations.
- ❑ Trained personnel outside the confined space will aid in any rescue operation.
- ❑ Sufficient access to the confined space access/egress point will be maintained for rescue vehicles and personnel.
- ❑ Self-contained breathing apparatus will be available at entry to confined space, or designated adjacent area where H2S or other poisonous gas is involved. Rescue breathing apparatus will have a resuscitator attachment so that air can be administered as soon as the victim is reached, and in cases where there will be difficulties or delays in moving the victim.
- ❑ Erection of signs at the entry of all open manholes, tanks and vessels, stating "Danger, Confined Space: DO NOT ENTER" or similar appropriate wording.
- ❑ Erection of signs at manhole covers, sewers, tanks and vessels stating "Men Working, Confined Space, Do Not Close".

Consideration will also be given to the following:

- ❑ Contents of the confined space.
- ❑ Partitions which may be in the space creating areas with different atmospheres.
- ❑ Potential for dripping of liquids from overhead trays or compartments.
- ❑ Potential for retention of vapor pockets due to partitions.
- ❑ Internal coatings which may give off toxic vapors if heated or damaged.
- ❑ Potential toxic vapors from cleaners or welding.
- ❑ Sludge and scale which may give off vapors when disturbed.
- ❑ Mechanical and structural hazards.
- ❑ Suitable means of access and egress.

"Safety In Transition" (Construction-To-Commissioning/Handover Precautions)

The transfer of ownership, custody and control from Noble and its Subcontractors to the client requires close coordination among all parties. As commissioning to owner hand over is effected, special attention is required to reconcile the owner's safety practices with those detailed in Noble's HSEMS program (herein). All relevant safety procedures routinely carried out by the Sub-Subcontractor (JHA's, pre-job safety meetings, etc. must be attended by the client's relevant representatives to facilitate such transition safely.

B.18 CHEMICAL CLEANING

General

Chemical cleaning may be hazardous due to the chemical agents involved, the necessity to enter confined spaces, and atmospheric pollution during the operation.

Transport, storage, handling and disposal of hazardous materials used for chemical cleaning will be done in accordance with applicable legislation, Material Safety Data Sheets and manufacturer's recommendations.

Permits and Planning

Prior to any worker commencing any cleaning and pickling operation, the following will take place:

- ❑ Development of a cleaning procedure detailing chemicals, concentrations, temperatures, circulation rates, duration and neutralization procedures.
- ❑ Development of a safe work plan including actual work at the site plus transportation and disposal of chemicals to an environmentally acceptable site.
- ❑ Provision of a Safe Work permit for the operation.

Workers will not proceed with the work unless they are familiar with the procedure to be used, trained in the handling of the hazardous chemicals involved, are familiar with the Material Safety Data Sheet outlining the properties of the chemicals, and understand the requirements of the Safe Work permit.

Safe Work Procedures

The following procedures will be applicable:

- ❑ Barricades, flags or warning signs will be installed around the work area before work begins.
- ❑ Appropriate protective clothing will be worn while pickling. This clothing will be designed to prevent liquids from coming into direct contact with the skin and may include a helmet, coat, pants, gloves, rubber boots and a face shield.
- ❑ All workers engaged in the chemical cleaning operation will wear safety goggles while the cleaning procedure is under way.

- ❑ The correct type of hose and piping will be installed for the chemicals and circulating conditions.
- ❑ Prior to pumping hot acid solution into the system being pickled, all hoses and piping will be inspected. Faulty or damaged equipment will be removed.
- ❑ Water should be circulated first as a final means of detecting any system leaks prior to the introduction of any cleaning/pickling solutions.
- ❑ There will be a means of controlling pressures and temperatures during circulation of the pickling solution and preventing any leakage or spills during the operation. Draining of the hoses and piping after the work is complete will be done carefully to minimize exposure of workers to the cleaning and pickling solution.
- ❑ There must be a site-specific emergency/evacuation plan developed, documented and reviewed by all parties involved in the cleaning process. All parties must be well rehearsed in all facets of this plan prior to initiating any chemical cleaning procedures.

Disposal of all acids, solvents and waste materials will follow method outlined in the safe work plan.

B.19 EXPLOSIVE BLASTING

General

The purchase, transportation, storage and detonation of explosives will be done in compliance with all applicable legislation and the manufacturer's specifications for the specific explosives being used.

Definitions for terms used in this section are:

"boot leg"
A borehole, which contains or may contain all or a portion of a non-detonated charge

"collar"

The start of a borehole.

"cushion stick"

A stick of explosive below the primer.

All blasting will be carried out under the direction of a competent person who is a certified blaster.

Permits and Planning

No blasting will be carried out without a detailed site specific blasting plan that will include:

- ❑ Name, address and contact telephone number of the blasting Subcontractor.
- ❑ Name, address, telephone number, and certificate of competence showing certificate number and expiry date of the blaster and details of the blasting crew submitted to the Noble Construction/Facility Manager to prior to any work being started.
- ❑ Names of authorities and bodies that require notification and name of person who is responsible for notifying them.
- ❑ Full description of the explosives to be used.
- ❑ Maximum charge that will be used on any single blast.
- ❑ Type of detonators and the method of detonation.
- ❑ Details of the purchasing, transporting, handling, preparing and loading of the explosives and detonators.

- ❑ Location and details of explosive magazine.
- ❑ Approximate quantity of explosives to be stored and used.
- ❑ Method of disposing excess explosives.
- ❑ Method of isolating and demarcating the blast area.
- ❑ Method of protecting the surrounding environment (if applicable) from damages arising from the blast.
- ❑ Contingency plan in case of a "bootleg" after detonation.
- ❑ Emergency action plan.
- ❑ Marked-up drawings providing details of the blast and affected area, as well as restricted/exclusion zones for RF interference.
- ❑ Schedule indicating times and dates of preparation work and blast.
- ❑ Detailed report and design calculations that consider the consequences of the atmospheric and underground shock waves to the structure, including details of procedures to mitigate any damage when blasting within 100m of any structure.

A specific Safe Work Permit is required before blasting can proceed.

Storage of Explosives

The following will be applicable to the storage of explosives:

- ❑ Magazine will conform to specifications laid down in all applicable legislation.
- ❑ Magazines will be separated from each other, surrounding buildings and rights-of-way according to the table of distances, and properly signed.
- ❑ Caps, high explosives, and blasting agents will each be stored in a separate magazine.
- ❑ Magazines will be kept locked.
- ❑ Only authorized personnel will deposit or withdraw explosives. The number of authorized personnel will be limited to an absolute minimum. An inventory shall be maintained at the magazine and completed each time explosives are withdrawn or added.
- ❑ Explosive stocks will be rotated to ensure freshness and stored neatly to facilitate safe handling.

- ❑ Good housekeeping will be maintained inside and outside the magazine. Fire hazard will be minimized by removing nearby combustibles.
- ❑ Magazine should be clearly identified.

Transportation of Explosives

The following will be applicable when transporting explosives:

- ❑ Use of an approved vehicle, in good repair, and specially outfitted for the job. Perform regular safety checks. The practice of using any available truck for transporting explosives is prohibited. TDG/DOT or equivalent placarding (on all sides of the vehicle) is mandatory at all times.
- ❑ Provision of adequate fire fighting equipment on the truck.
- ❑ Driver will be trained in both safe driving and explosives handling.
- ❑ Separation of caps and explosives. Their transportation on the same vehicle may only be permitted if adequately separated with a proper barrier.
- ❑ Protection of caps from accidental electrical contact.
- ❑ Proper loading and securing of explosives or vehicles.

Handling of Explosives

The safety precautions to be used when handling explosives are:

- ❑ Ensure that area is clear of unnecessary equipment and materials.
- ❑ Disconnect any electrical power that might create a hazard.
- ❑ Personnel not involved in the handling process will keep clear of the immediate area.
- ❑ No smoking will be permitted.
- ❑ Two-way radios, cell phones and pagers will not be permitted anywhere near explosives or detonators.

Primers/Detonators

Safety rules in primer/detonator preparation include:

- ❑ Prepare primer immediately prior to loading. If possible, have one person make up all primers. Dismantle all unused primers.
- ❑ Use non-sparking tools (Ex: brass)

- ❑ Check for electrical hazards if electric caps are used.
- ❑ Cap-and-fuse priming techniques that are recommended include:
  - ■ a diagonal hole through the cartridge (for fuse to pass through) and a second hole for cap emplacement
  - ■ a single side hole with fuse tied to the cartridge; and
  - ■ end priming (fuse will be able to stand 180° bend).
- ❑ Electric cap - always end prime with leg wires half hitched to primer.
- ❑ Ensure cap is fully imbedded. Use special punching equipment if necessary.
- ❑ Do not roll cartridge for softening (cap may not stay secure).
- ❑ Dangers of cap falling out of cartridge include:
  - ■ cap may be struck during loading or tamping
  - ■ primer cartridge may not be initiated.

Loading Charges

Safety during borehole loading includes:

- ❑ Remove all unnecessary personnel and equipment in the area.
- ❑ Double check for electrical hazards.
- ❑ Check boreholes for proper depth. This protects from overloading.
- ❑ If loading cartridges, use non-sparking tamping stick and:
  - NEVER use a cushion stick
  - push primer in securely; do not tamp the primer stick
  - point cap toward collar of bore hole, and
  - tamp firmly but not severely, the remainder of cartridges.
- ❑ If pneumatic loading, use proper equipment, e.g.:
  - loader will be properly grounded to prevent build-up of static charge
  - use semi-conductive loading hose (1 529 - 3 098 ohm/m) (Allows static to bleed off - will not permit stray currents to enter charge.)
  - where electricity is a hazard or where it is illegal to load pneumatically over leg wire, use low energy detonating cord (Primed) delay system.

- ❑ Leave adequate stemming - 19 to 28 borehole diameters depending on conditions.
- ❑ Retreat from blast area during an electrical storm.

Hooking up Detonators

Safety in hooking up detonators for fuse blasting includes:

- ❑ The use of ignite cord is recommended for fuse blasting. Cut all fuses the same length. The path of ignite cord will determine the delay sequence.
- ❑ Make sure the last fuse will be burning inside the hole before the first hole detonates.
- ❑ Know the speed of the fuse.
- ❑ Do not permit ignite cord to cross itself.
- ❑ There is a special hazard with fuse blasting. Once the fuse has been lit, the area will be guarded until the blast goes off.
    - ■ Safety procedures for hooking up detonators for electrical blasting include:
- ❑ Series hook up is easiest, safest, and surest.
- ❑ If several blasts are fired together, or an excessive number of caps in one blast, use series-in-parallel. Make sure series are balanced and do not tie two or three extra caps in as separate series - incorporate them into the main series.
- ❑ Use twisted loop or other secure connection. Wrap up wire between holes. Ensure that connections do not touch.
- ❑ Check circuit for continuity and proper resistance after hooking up.
- ❑ Leave ends of circuit shunted until ready to shoot.
- ❑ A blasting box is recommended for firing all blasts (power line firing presents hazard of arcing except with instantaneous caps).
- ❑ Straight parallel circuits are not recommended as check for shorts or broken wires cannot be made with a galvanometer and current requirement is too high for blasting box - will use power line.
- ❑ If power line firing or using a straight parallel circuit, check with the explosive manufacturer for procedures to minimize problems.
    - ■ Safety rules when detonating cord hook ups include:

- ❑ Use tight, secure knots.
- ❑ Avoid severe angles or tight lines.
- ❑ Do not permit cord to cross itself.
- ❑ Use safety lines to assure total blast detonation.
- ❑ Do not connect cap until ready to shoot.
- ❑ Retreat from blast during an electrical storm, regardless of the type of initiation being used.

Power Source

Safety rules when connecting the blast to a power source include:

- ❑ Use new connecting wire for each blasting. This should be long enough to prevent fly-rock from hitting the blast line.
- ❑ Keep blast wire in good repair. Check it out periodically.
- ❑ Keep blast wire shunted at all times until ready to fire.
- ❑ Avoid power lines, pipes, rails, and other sources of stray current.
- ❑ Stagger the ends of the blast wire to prevent accidental contact.
- ❑ After each stage of electrical connection, check with a galvanometer.
- ❑ Have a fail-safe system to assure blast is not accidentally fired while connecting it, i.e.:
  - keep blast box handle on blaster person
  - keep blasting box locked and retain key
  - keep lock-outs on power line, and
  - keep lead wires shunted at firing end.

Firing

Safety procedures during blast firing include:

- ❑ A blasting box will be preferably used instead of power line.
- ❑ Choosing a safe firing location - at an adequate distance and with sufficient cover. Blaster will have good visibility of all guards and access points.
- ❑ Ensure blast mats, if used, are in sufficient quantity and quality (good repair, no tears, etc.) to properly minimize fly rock, noise, dust, etc. as planned.

- ❑ Have an adequate warning system known to all workers on the site.
- ❑ Evacuate all work areas in vicinity. Consider fumes in mind as well as fly-rock.
- ❑ Evacuate equipment from the vicinity.
- ❑ Check for people in precarious positions. Blast may startle and cause a fall, even though they are at a safe distance.
- ❑ Guard all access points. Signs do not stop people from entering the blast area. Recruit manpower from production crews if necessary.
- ❑ If there is more than one blast, make sure the guards are aware.
- ❑ The recommended signal sequence is:
  - signal all guards to seal off area and wait for return signal
  - make final check to ensure that the blast is ready
  - signal all guards to ensure that the area is secure and wait for return signal, and
  - fire blasts(s).

Post Firing Precautions

Safety procedures after firing the blast include:

- ❑ Stay under cover until fly-rock has all landed. Then wait an additional minute before emerging.
- ❑ Avoid smoke and fumes, even in a well-ventilated area.
- ❑ If you suspect a misfire, wait at least 30 minutes before entering blast area.
- ❑ Inspect face for misfires - also "hanging rock". Pull down or post warning. If there is a misfire, use the blasting company's corrective procedure or consult with the explosives manufacturer. These procedures may include:
  - ■ wet down hole
  - ■ drill and shoot adjacent hole
  - ■ insert another primer, and
  - ■ other corrective procedures.
- ❑ Do not permit others into the area until blaster is sure it is safe.

Risks

The most frequent causes of explosive accidents are:

- ❑ Being hit by fly-rock
- ❑ Inadequate guarding of blasts
- ❑ Insufficient and/or poorly maintained blast mats
- ❑ Drilling into missed holes (bootlegs)
- ❑ Explosive hit by rock (mud capping)
- ❑ Machinery hitting explosives
- ❑ Exposure to blast fumes
- ❑ Firing the wrong blast
- ❑ Poor warning signal systems
- ❑ Lightning struck blast
- ❑ Explosive fires that detonate ("hang fires")
- ❑ Caps contacting electrical power
- ❑ Tamping primers

B.20 EXCAVATING NEAR PIPELINES AND BURIED CABLES

General

Buried pipelines and power & communication cables are frequently damaged during excavations, and workers are often injured when no precautions are taken in areas where underground services are likely to occur.

Permits and Planning

Prior to commencement of any excavation where there is a possibility of buried services:

- ❑ Drawings of underground services and "as builts" will be reviewed, and all underground services that may be affected during the excavation process will be identified.
- ❑ If possible, the underground service should be isolated.
- ❑ The area should be scanned electronically (GPR, EM, etc.) to confirm the U/G area is either "clear" or to determine the existence and extent of any sub-grade structures.
- ❑ A safety meeting will be held with operators of mechanical equipment.
- ❑ A Safe Work Permit will be obtained.

Safe Work Procedures

If an underground service is deeper than 1 meter (3 feet) then the initial excavation may take place using appropriately sized mechanical equipment. No mechanical equipment will be used within 60 cm of a buried pipeline or cable - only hand tools will be used.

Sharp metal probes, picks or any other sharp tools will not be used to locate underground services.

Frozen soil may be thawed using methods appropriate to the work site (i.e., open fires are not permitted in operating facilities without special safety precautions, so steam thawing is recommended for these situations).

Where contact is made with any pipeline or cable, the incident will be reported to the Construction Manager, because even minor scrapes will initiate corrosion that could eventually result in a leak.

Any damage to exposed pipeline wrappings will be repaired prior to burial under the supervision of a representative of the facility owner.

B.21 LOCK-OUT PROCEDURE

General

Equipment lock-out provides a method to ensure the safety of workers while they are working on equipment which is still attached to power sources and may be inadvertently or automatically energized, or while they are working on pipe lines or vessels that contain liquids or gases. A system for ensuring that all isolations and re-energizing are properly managed and controlled will be implemented on all work sites. (Also see Mechanical Blinds sub-section of Confined Space section of this Program manual.)

Whenever plant and equipment can be energized, thereby creating a safety hazard to personnel working on or near it, the lock-out procedure will be followed. This applies during the construction stage as well as during pre-commissioning, commissioning, and operations.

The Subcontractor is responsible to supply all materials including locks, lock boxes, chains, tags, etc.

Responsibility

It is the responsibility of the Subcontractor to ensure that this procedure is adhered to and enforced.

No work will be done on any existing plant and equipment without the Owner's approval.

No work will be done on any plant and equipment that is "Mechanically Complete" without the Commissioning Manager's approval.

Training

Every Subcontractor and its employees who are authorized to perform lock-outs must have received training in isolation and control procedures, and the recognition of associated hazards. All relevant training will be documented and copied to the HSE Manager.

Procedural Steps

1. Apply for a permit to work.

2. Submit a Lock-out Request, clearly identifying the equipment to be worked on.

3. After the appropriate authority has disconnected the main power switches, pulled the fuses, and/or isolated the valves, a safety lock will be applied to the valve and/or switch by each person working on the equipment.

4. A red "DO NOT OPERATE" tag will be attached to each switch or valve that has been locked out. The tag will only be removed after the last lock has been removed.

5. A log book will be kept to record whose locks have been placed.

6. The equipment will be tested to ensure that it has been isolated by pressing the "ON" switch. Valve handles will be operated to ensure that they cannot be opened.

7. Each worker will remove their lock and sign off in the log book after they have completed their task or at the end of their assigned shift/day (unless there is a client-approved, documented variance to this requirement in place).

8. The permit will be signed off by the supervisor after all locks have been removed.

Safety Requirements and Precautions

- ❑ If a large number of workers are working on the equipment making it impractical to place their locks, then only their immediate supervisors need to place their locks - and the keys to the supervisor's locks will be placed in a lock box that will be kept locked by the locks of each employee working on the equipment. The supervisor will only be able to obtain his key after the last worker's lock has been removed. The worker(s) will also sign off on the lock box.
- ❑ The supervisor requesting the lockout will always apply his/her lock first and remove it last.
- ❑ If workers are going off shift and the equipment or valve will remain locked out for another shift, a lock box system as described above will be used. ***The outgoing supervisor will only remove his/her locks after the incoming supervisor has placed his/her locks.***
- ❑ Padlocks will not be keyed alike, and each padlock will have only one key.
- ❑ Padlocks will be stamped with an identification number that corresponds to the respective worker's name in the log book.
- ❑ Each worker will attach his/her lock, regardless of how many other locks there are.

- ❑ A tag shall be used in addition to each lock to indicate the name of the worker and the work to be performed. Each lock will therefore have a tag.
- ❑ Valve locking mechanisms or chains will be installed so that it is not possible to physically operate the valve handle. (See "Blinds" sub-section of Confined Space section for further guidance on this precaution.
- ❑ Pressure will be relieved in a controlled manner on the downstream side of locked out valves.
- ❑ Even though fully closed, valve seats could be leaking.
- ❑ Movable parts will be blocked and propped where their movement poses a threat to workers.
- ❑ Hydraulic systems shall be relieved of pressure.
- ❑ Tags without locks will only be used where it is not physically possible to attach a lock. In every instance where it is physically impossible to install any type of lock out, tagging only may be allowed provided that such instance is thoroughly documented (in the lock out log book).
- ❑ At the end of the work, no switch or valve will be operated until a comprehensive inspection of the workplace has been carried out by the Subcontractor's supervisor, who will notify the appropriate authority that the equipment is ready for operation.

Delinquent Locks

Locks may only be removed by someone other than the person who installed it once it has been confirmed that there is no risk to the safety of the person who installed it (e.g., there is evidence that the person who installed the lock is not on the site). Only the responsible supervisor will remove a delinquent lock, and then only with the permission of the Subcontractor's Site Manager, the Construction Manager, and the owner's/client's Maintenance Manager.

A written report will be submitted for each incident of delinquent lock removal.

B.22 FIRE SAFETY

General

These procedures together with the Subcontractor fire control measures will be used to establish and affect fire safety control at the project site. These procedures cover activities of a supervisory and administrative nature concerned with controlling, directing and instructing site personnel in fire prevention and control. It is intended to protect the safety of all personnel working within the confines of the construction site.

Responsibilities

Noble

Noble will ensure that all applicable regulations concerning fire prevention and control are strictly followed on the construction site.

Subcontractors

Subcontractors will ensure that all mobile equipment, welding machines and other equipment is equipped with proper approved fire extinguishers as required. Subcontractors are required to ensure that all employees have a basic knowledge of fire fighting equipment, especially fire extinguishers. Also ensure that all employees know the location of all fire fighting equipment and ensure that access to all fire fighting equipment is maintained at all times.

The following procedures are intended to serve as easy-to-read guidelines and checks for fire prevention on the construction site. They are not intended to replace any applicable regulations on fire prevention, control, and safety. Copies of the procedure will be posted on all bulletin boards on the construction site.

Any construction of temporary buildings that do not comply with the requirements of the national/provincial/prevailing Building Codes will first receive consent from the Office of the Fire Marshall/applicable authority prior to staffing them.

Fire Fighting Equipment

All fire extinguishers and hose equipment will be installed and maintained according to the prevailing legislative/Fire Code standards. Halon fire extinguishers shall not be used.

Reducing Ignition Hazards

All electrical wiring and equipment will be installed according to the requirements of the Canadian Electrical Code/prevailing legislative authority.

Exhaust systems of all internal combustion engines will be located away from combustible materials, and be safely isolated from building structures.

- ❑ Smoking and open flames will be prohibited in all areas, except where allowed exception areas are posted or where operating under a specified Safe work Permit.
- ❑ Non-sparking or "hazardous location" type battery powered equipment should be used in any potentially hazardous/explosive/flammable atmospheric condition.
- ❑ Nozzles of air, inert gas, steam lines or hoses shall be electrically bonded if used in cleaning or ventilating tanks or vessels used for flammable materials.

Temporary Buildings

Erected no less than 3.5 meters (12 feet) (or legislated stipulated separation) apart, and located in a manner that allows for unobstructed exit. Construction material will have a fire resistance rating of not less than one hour (per applicable legislated requirement).

Storage

Outside Storage

Flammable materials should not be stored within 3.5 meters (5 feet) of any building. Stacked height will not exceed 7 meters (25 feet).

Suitable fire extinguishing equipment shall be located in easily accessible positions.

All outside storage areas will be free of unnecessary combustible materials.

Inside Storage

All exits shall remain unobstructed.

Stacked material will provide free access for fire fighting.

All materials shall be stored, handled, and stacked with due regard to flammability characteristics.

Adequate clearance shall be provided around lights and heating equipment.

Flammable and Combustible Liquids

General

- ❑ Only approved containers and portable tanks shall be used for storage and handling. All activities shall be in full compliance with all prevailing Codes and Regulations.
- ❑ No storage is allowed in personnel access/egress areas.
- ❑ Adequate clearance shall be provided around lights and heating equipment.
- ❑ Separation of materials that react with water to create a fire hazard is mandatory, as with flammable and combustible materials.
- ❑ Drums, tanks, and other containers stored in quantities and with clearances as specified in OH&S standards and applicable Codes.
- ❑ Storage areas shall be graded for safe drainage of possible liquid spillage. Also, adequate drainage will be allowed for storm water and spillage.
- ❑ Portable tanks shall be equipped with emergency venting.
- ❑ Storage areas shall be kept free of weeds, debris, and any unnecessary combustible material.

Dispensing and Handling

- ❑ Isolation of areas used for transference of flammable and combustible liquids by fire resistant structures (1 hour). Drainage provided to control spillage. Ventilation provided to keep vapors below minimum flammability limit.
- ❑ Transference of flammable or combustible liquids only between electrically bonded containers.
- ❑ Transference of flammable or combustible liquids through a closed piping system only, or approved pumping device fitted with a self-closing valve. Transference by applying air pressure to tank is prohibited.

Service and Refueling Areas

- ❑ Storage of all flammable and combustible liquids in approved tanks or containers only.
- ❑ All tanker vehicles to comply with applicable regulations and Codes
- ❑ All hoses and tanks of approved design.

- ❑ No buried tanks allowed on site.
- ❑ Heating equipment allowed in service and refueling areas, provided that:
  - ■ no flammable liquids are dispensed
  - ■ bottom of heating unit 0.5 meter (1 1/2 feet) above grade
  - ■ equipment used for dispensing liquids is approved for garage and is located at least 2.5 meters (6 feet) above grade.
- ❑ No smoking or open flames permitted in areas where flammable liquids are handled. Signs posted to this effect will be conspicuous.
- ❑ Approved number and type of serviceable fire extinguishers in place.

Handling Liquids at Point of Final Use

- ❑ Liquids kept in approved, closed containers.
- ❑ All spillage to be reported to the HSE Manager. Prompt notification required as a result of a spill assessment as "reportable" under prevailing environmental legislation shall be the responsibility of the Subcontractor.
- ❑ Flammable and combustible liquids not used in the open if less than 15 meters (50 feet) from any source of ignition.

Temporary Heating Devices

All heating devices shall be approved for the intended purpose and shall meet relevant NFPA, FM, UL, OSHA, or prevailing legislated standards.

Ventilation

- ❑ Sufficient supply of fresh air to ensure the health and safety of personnel and no undue rise in temperature.

Clearance and Mounting

- ❑ Clearance between heating devices and any combustible material to meet requirements of applicable legislation.
- ❑ Heaters not suitable for mounting on wood floors to be set on heat insulating material equivalent to at least 25 mm concrete, and extending beyond heater at least 0.6 meters (2 feet) in all directions.
- ❑ Heaters located at least 3 meters (10 feet) from potential wind-blown covering material, i.e., tarpaulin, canvas, and securely fastened to prevent upset.

Stability

- ❑ All heaters to be set horizontally and level, unless manufacturer's design permits otherwise.

WARNING: DO NOT USE SOLID FUEL HEATERS OR OIL FIRED SALAMANDERS IN BUILDINGS OR ON SCAFFOLDS.

Oil Fired Heaters

- ❑ Will be equipped with positive flow stop control in case of flameout.
- ❑ Heaters designed for barometric or gravity feed to be used with integral stands.
- ❑ Heaters not designed for flue connection to be equipped with integral tanks not larger than a 9 Liter (2 gallon) capacity.
- ❑ Heaters specifically designed and approved for use with separate supply tanks may be directly connected for gravity feed or by automatic pumps.

B.23 FIRE EXTINGUISHERS

General

Hand operated fire extinguishers are fire-fighting appliances designed to deal with small fires at an early stage. They are available in several classifications, each designed to deal with a particular type of fire. Extinguishers are effective only if the correct classification is used; they are serviceable; placed in the most advantageous positions; and are used by personnel who have had instruction.

All Subcontractor employees who may be required to participate in fire extinguishing emergency response activities must receive training in fire extinguisher use.

Due to versatility 10kg ABC extinguishers will be the minimum standard. Fire extinguishers should be dry chemical and foam types only.

Although fire extinguishers are easily identifiable and bear adequate printed instructions, it is essential that all personnel likely to use them receive regular instruction on their maintenance, operation, and location.

Extinguishers for outdoor use shall be freeze protected. Standard level of acceptance shall be low temperature Purple K.

NOTE: Halon extinguishers shall not be used due to the risks of breathing the hazardous gases in poorly ventilated areas.

The Contractor will be responsible to provide the required fire extinguishers in each work area.

Classification

Every fire extinguisher shall have an Underwriter's Laboratories rating (0. Reg 213/91,s. 53) or equivalent current certification. The full classification identity of a fire extinguisher includes both a numeral and a letter. The numeral indicates the approximate relative fire extinguishing potential of the extinguisher, not its size, or capacity of its contents. It is also an indication of the area of deep layer flammable liquid fire that may be extinguished. The letter indicates the class of fire that may be extinguished.

Class A For fires in normal combustible materials such as wood, cloth, paper, trash, and plastic.

Class B For fires in flammable liquid, oil, grease, tar, oil-base paint, lacquer, and flammable gas.

Class C For fires involving energized electrical equipment or systems.

Class D For fires in combustible materials, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

Special For fires in certain reactive chemicals that fall outside the other four classifications and that, in some cases, require special extinguishing agents or techniques.

Required Locations

- ❑ All office and lunchroom buildings and trailers. At least one extinguisher per 232 M2 (2000 sq. feet) of floor area on each floor.
- ❑ In all warehouse buildings, storage trailers and tool cribs. At one extinguisher per 116 M2 (1000 sq. feet) of floor area on each floor.
- ❑ All construction vehicles (including 1/2 ton trucks), cranes, welding machines, and any equipment that has an internal combustion engine. At least one extinguisher per vehicle or unit.
- ❑ At all fuel and flammables dispensing and storage locations. At least one extinguisher per 58 M2 (500 sq. feet) of floor area.
- ❑ Within 5 meters of sources of ignition such as welding or cutting. At least one extinguisher per unit.

The above requirements are the minimum. The actual quantity of extinguishers required is based on the character of fire anticipated and the units of extinguishing potential necessary to protect the particular property or area.

The location of all fire extinguishers shall be conspicuously marked, especially in large areas. They shall not be obscured by stock, equipment or partitions, etc.

A marked-up drawing will be kept on file showing the locations of all fire extinguishers. Each location will have its own identification number.

Inspections and Discharging

All fire extinguishers will be kept in a serviceable condition. They will be inspected monthly to check for serviceability and damages. An inspection log will be kept on file. Each extinguisher will have its own identification number. Damaged or undercharged extinguishers will be replaced immediately.

A report will be completed each time an extinguisher has been discharged.

B.24 SAFE WORK PERMIT SYSTEM

General

A Safe Work Permit is a written record issued by authorized personnel permitting a specific task for a specified time frame in a defined area.

Safe Work Permits develop, document and communicate understanding between individuals responsible for performing work and the individuals responsible for the work area.

Each Safe Work Permit will identify hazards that may be harmful to personnel, equipment and property, and will identify the safety requirements to be followed while performing the scope of work described in the permit.

Any work activity which by the nature of the proposed work or by the area in which the proposed activity is to be performed creates or may create a hazard to the workers, equipment, environment, production or other construction activities will receive a Safe Work Permit.

Safe Work Permits

Permits are required for the following:

- ❑ Cold work in any existing operational area when performing work that does not create a source of ignition.
- ❑ Hot Work when performing work that may create a source of ignition (cutting, welding, grinding, chipping, heating, etc.) within a restricted area and all existing operational areas.
- ❑ Any excavation.
- ❑ Any critical lift.
- ❑ System(s) requiring lock-out/blanking procedures.
- ❑ Confined space entry.
- ❑ Any system(s) testing.
- ❑ Demolition.
- ❑ Operation of fire hydrants (except in an emergency).
- ❑ Hoisting personnel in a basket attached to a crane.
- ❑ Work on or near High Voltage electrical power distribution.

Permit Issue

To obtain a Safe Work Permit, the Subcontractor's Supervisor responsible will complete a Permit Request and submit it to the HSE Manager (or operations control room as determined) prior to 1:00 p.m. on the day before the proposed work activity is to commence.

As a minimum requirement, the Safe Work Permit will:

- ❑ Document the time and date of issue, and the time limits over which the conditions described in the permit apply.
- ❑ Describe the scope of the work, and identify the operating area and the equipment on which the work is to be performed.
- ❑ Identify any hazardous substances in the work area that may impact on the health and safety of the workers involved.
- ❑ Document that the work area has been prepared and inspected for the safe execution of the specific task.
- ❑ Document all gas test results (if gas testing is required), with test times and gas tester's signature. This may be on a separate sheet, and will be carried out immediately prior to commencement of the work and at specific intervals during the course of work.
- ❑ List the number of workers involved and their skills.
- ❑ Specify all safety precautions and safety equipment required.
- ❑ Identify special personal protective equipment (PPE) to be worn.

Permit Review

Prior to the start of the work specified on the Safe Work Permit, the supervisor will explain to all persons involved with performing the work the conditions as outlined on the permit. The permit will then be posted/displayed at the specified work area.

Permit Duration and Cancellation

All Safe Work Permits will be valid only for the time period shown on the permit. Each site will have its own specific requirements depending on the nature of the construction work, and the Owner's existing permit procedures (e.g., the requirements for construction work within an existing petrochemical refinery will differ to those for bridge construction on a new highway).

The validity of a permit will depend on several factors. Generally, permits within existing operational areas are only valid for one day, while permits on new construction sites may be longer (i.e., 'Blanket' permits). The Noble HSE Manager will determine the exact requirements in consultation with the Owner.

All permits will automatically be voided in the event of a general alarm or at the direction of Noble due to safety non-compliance. If permit(s) have been voided a new permit(s) will be requested and put in place before the work is to resume.

Completion of Work

Upon completion of the shift or permitted work, the supervisor who requested the permit will sign off the permit and return it to the authority that issued it. An inspection of the work site by Noble and/or the Owner may be required, depending on the nature of the work performed.

Prior to signing off the permit, the Subcontractor's supervisor will ensure that the work area has been left in a safe condition and that no further work will be performed until a new permit is issued.

Log Books

The Owner may utilize a log book system to record the movement of personnel within certain areas. The log book system does not replace the permit system, although it may be used to authorize entry into a specific area to perform minor tasks.

Permit Forms

The following (types of Safe Work) Permit forms are included in APPENDIX E and represent a general (non-inclusive) guide to the type of conditions that would require such documentation.

- ❑ Vessel Entry/Confined Space
- ❑ Request for Tagging and Lockout, and Request for Removal/Replacement.
- ❑ Piping Blank Log.
- ❑ Excavation/Trench Surface Penetration Permit.

B.25 HOT WORK SAFETY WATCH

General

The fire risk potential at the location of the work being carried out will dictate the need for a Hot Work Safety Watch. When the fire risk is unclear, the permit issuer will review the hazard and assess the need for a Hot Work Safety Watch.

Responsibilities

The assigned Hot Work Safety watch will understand his/her role of continuous vigilance, awareness, and communication, and will be capable of performing their duties, including:

- ❑ Observe the work being performed and immediately communicate any hazardous condition to the people performing the work, and to the permit issuer.
- ❑ Stop the job if unsafe, and clear the area as appropriate.
- ❑ Ensure that the area is left in a safe state during work breaks and at the end of each shift.
- ❑ Be trained on the use of fire extinguishers and other fire fighting equipment.
- ❑ Certified per H2S requirements for the area of work (if applicable).
- ❑ Understanding the meaning of gas test results.
- ❑ Understand the potential hazards associated with the type of work being performed.
- ❑ Know the meaning of the emergency alarms and the appropriate response. Know how to activate emergency alarms.
- ❑ Know who to contact, and understand the methods of communications to be used to obtain help.
- ❑ Be alert to changing conditions.
- ❑ Correct any minor hazardous conditions which are directly under his/her control (i.e., use of fire extinguisher, fire hose, etc.).
- ❑ Notify the permit issuer of any special condition that occurs (e.g., fire at the jobsite, discovery of any leaks, toxic vapor alarm activation, etc.).

B.26 USE OF PNEUMATIC TOOLS AND COMPRESSED AIR

General

Pneumatic tools shall be operated and maintained in accordance with manufacturer's specifications.

Air powered tools will only be connected to a safe compressed air source. NEVER connect to nitrogen or compressed air.

Before using pneumatic tools the hose, connections and tool will be checked for proper operability. Before connecting the tool to the hose, the hose will be pointed in a safe direction and blown out to remove moisture and dirt.

Hose couplings will be secured with manufacturer's recommended ("whip check") devices (or wire-tied to prevent them from detaching and whipping around.

Compressed air will only be used to blow debris from an area if a Safe Work Permit has been obtained, the area has been clearly demarcated, and all other personnel are at a safe distance.

Compressed air shall not be used to blow off clothing.

Tool switches will be of the "dead man" type. Lock-on switches/pins will be de-activated or removed.

Before changing tools the pressure will be turned off and the hose pressure removed through use of the tool. Hoses will never be kinked to stop air flow.

Supply pressure will always be turned off when not in use.

Safety glasses and face shield will be used with pneumatic tools such as chippers and other tools that produce flying particles.

Hearing protection will be used to suit the task.

B.27 USE OF CHAINSAWS

General

Chainsaws accessories and ancillary equipment shall comply with applicable legislation.

Chainsaws shall be operated and maintained in accordance with manufacturer's specifications.

Only trained and experienced personnel shall be allowed to operate chainsaws. A competent individual shall witness a demonstration of proficiency.

Chainsaws will be equipped with a chain brake and "anti-kickback" chains. Chain brakes shall be tested to ensure that they are functioning before use.

Chainsaws shall be started on the ground or other level area with the chain pointing away from the body and clear of any obstructions. Chainsaws shall not be "drop-started".

Chains shall be kept sharp, well lubricated and have the proper amount of tension. RPM of the chainsaw shall not exceed the RPM rating of the blade.

When carrying and transporting chain saws the chain bar guard shall be in place, the chain brake will be engaged, and the motor will be shut off.

Chain saws will be fuelled and used in well-ventilated areas. Fuelling shall not be done with the motor running or while the saw is hot.

Chain saws shall only be used for cutting wood. Care shall be taken to avoid contact with nails or other metallic objects.

Chainsaws shall not be used for cutting above the shoulder. Scaffolds or other platforms will be used as required to reach the work.

The following PPE will be used when using chain saws:

- ❑ Safety glasses and face shield.
- ❑ Hearing protection to protect against 110 DBA.
- ❑ Ballistic chainsaw pants or chaps.
- ❑ Leather gloves with ballistic material on the backs of the hands.

B.28 CHEMICAL/HAZARDOUS MATERIALS INFORMATION

General

Prevailing legislation (variously known as WHMIS, HazCom, "Right To Know", etc) exists to ensure workers are fully informed of all hazards relating to their potential exposure to chemical substances. Legislation typically requires some form of basic (generic) training as well as site/job-specific instruction which must be documented and kept current.

Subcontractors will be required to ensure that for "controlled products", current/valid Material Safety Data Sheets (MSDS) and supplier labels are obtained prior to, or when the material is delivered to site. "Controlled products" will not be allowed on site unless accompanied by approved labels and MSDS. A legible copy of the MSDS will be submitted to the HSE Manager. Additionally Subcontractors are required to maintain a complete and up to date site file in accordance with prevailing legislative standards, readily available and accessible when required.

The HSE Manager will ensure that all Subcontractors are in compliance with the requirements of the applicable regulations by periodic audit of work areas for controlled products and review of the Subcontractor's MSDS file.

Classes

"Controlled products" are divided into six main classifications:

- ❑ CLASS A - Compressed gases
- ❑ CLASS B - Flammable and combustible material
- ❑ CLASS C - Poisonous and infectious
- ❑ CLASS D - Corrosive
- ❑ CLASS E - Dangerously reactive

Key Elements

There are four key elements of a successful chemical handling program: labeling; material safety data sheets; training; and document control.

Labeling

There are two types of labels required by legislation to alert employers and workers to the dangers of products and basic safety precautions - supplier labels and workplace labels.

Supplier Labels

The supplier label has a hatched border and contains the following information categories: product identifier; supplier identifier; MSDS reference; hazard symbols; risk phrases; precautionary and First Aid measures. Suppliers are responsible to ensure that labels are attached to containers or included with the shipment for attachment at site.

Workplace Labels

Workplace labels have to contain the following three information categories:-name of the product; information for the safe handling of the product; location of the MSDS on the project.

Workplace labels are placed on containers at the workplace when containers are decanted or have illegible or missing supplier labels. No label format is required by legislation, but the label will be clear and easy to read.

Material Safety Data Sheets (MSDS)

Material safety data sheets contain the following information categories:- product information; hazardous ingredients; physical data; fire and explosion data; reactivity data; toxicological properties; preventative measures; First Aid; and MSDS preparation information.

MSDS are important because they are the most comprehensive part of the system. MSDS shall be used by supervision for hazard reviews of controlled products. Legislation requires that MSDS are updated every three years or sooner if new hazard information is discovered. MSDS will be provided by the supplier.

Training

All personnel will receive formal training on chemical handling systems, including information on labeling, hazard symbols and MSDS at least every three years.

The Subcontractor is responsible for its employees' education and implementation of this program for its scope of work. In the event that such training is determined to have been ineffective, expired, or non-existent, Noble

may undertake to provide such training at the full expense of the Subcontractor.

First use of "controlled products" by personnel will involve a review of the MSDS and the precautions to be used when handling. The Subcontractor is responsible to ensure that first use and other reviews are completed.

Documentation

The Subcontractor shall provide documentation of current training/qualifications of its employees, sub-contract employees, consultants and any other individuals under its responsibility prior to commencing work on the project.

The Subcontractor shall ensure that inventory of controlled products is maintained, and that at least one up-to-date MSDS file is maintained at designated posted locations for use by all its personnel.

B.29 COMMON HAZARDS

General

The construction work place can pose many health hazards. Some common occupational health hazards found in the construction industry environment are included below. Subcontractors must remain aware of these aspects of occupational health and safety, and implement preventive/corrective measures to provide required protection for their workers.

- ❑ Oxygen deficiency or noxious gases in confined spaces.
- ❑ Carbon monoxide exposure caused by engines running inside enclosures.
- ❑ Toxic gas emissions caused by use of fuel fired heaters with inadequate ventilation.
- ❑ Release of solvent vapors while using waterproof glues and paints.
- ❑ Inhalation of, or skin contact with, paints, varnishes and coatings particularly those which are urethane or epoxy-based.
- ❑ Inhalation of hazardous dusts occurring from sand blasting and rock drilling activities.
- ❑ Exposure to airborne zinc (symptoms of "Metal Fume Fever") caused by cutting or burning galvanized metal.
- ❑ Chemical burns caused by skin contacts with lime, wet concrete, cement products and acids.
- ❑ Noise-induced hearing loss caused by worker exposure to prolonged excessive noise.
- ❑ Poor air quality, complicated by temporary construction enclosures (proper planning and consideration of equipment types, enclosure size, air changes and ventilation will prevent most air quality problems).
- ❑ Collapse of stored or stacked materials due to improper chocking.
- ❑ A load may shift on a truck during transit and collapse when the tie-downs are released.

B.30 HOUSEKEEPING

In order to provide a safe and productive workplace for all workers, it is essential that Subcontractors recognize the importance of good housekeeping practices in their areas of work.

The Subcontractor is responsible to ensure that its work and lay-down areas are maintained in an orderly fashion and free of debris at all times. Noble reserves the right to maintain good housekeeping by cleaning up the Subcontractor's work area and back-charging for the service.

Floors, platforms, stairs and walkways will be kept free of loose materials at all times.

All equipment, tools and materials used on the site will be removed from the work area and returned to the proper storage area upon completion of each job.

Garbage, material, or tools will not be permitted to be thrown from elevations. Lower in containers or special chutes.

Nails shall not be left protruding from formwork of other material. They will be bent over or removed completely.

Materials will be well secured, especially at elevations, to avoid movement during windy conditions.

Areas in the proximity of emergency equipment such as fire extinguishers, hoses, and emergency personal protective equipment shall be kept clear at all times.

Hoses, cables and cords will be kept in an orderly manner to prevent tripping hazards. Electrical and welding cables will not be allowed to lie in pools of water. Where possible, cables will be suspended above the ground, or will be protected from mechanical damage if they cannot be suspended. Unused hoses and cables will be rolled up and stored. Unless cables and hoses remain in an orderly manner, they will be rolled up on a frequent basis as determined by Noble.

Oily rags will be disposed of in closed metal containers - not with other garbage.

Where ice and snow could create a hazard, salt/sand will be applied at stairways and frequently traveled areas.

Hydrocarbons or chemicals will not be intentionally spilled onto the ground or into the sewer system. Spills will be reported and cleaned up immediately.

Rubbish, debris, and other materials will not be permitted to blow around freely. Daily clean-ups will be performed to collect all wind-blown materials.

B.31 WILDLIFE SAFETY

Refer to site instructions B.40 and B.41.

B.32 TEMPORARY GAS INSTALLATIONS

General

The prevailing legislated Code/Standard shall be used as a minimum standard.

Permits

All necessary permits will be obtained prior to any gas hook up. The permit holder is responsible for supervising and inspecting all installations under his permit. Copies of all permits shall remain on the project and be made available on request.

Installations

All temporary gas installations will be done by journeyman gas fitters whose qualifications are recognized by the territorial jurisdiction.

Cylinders, Tanks, and Vaporizers

All references to cylinder/tank capacity in gallons refer to US water gallons.

All propane cylinders or tanks with a capacity of 123 gallons or greater shall be identified with a weather proof tag indicating:

- ❑ Company name.
- ❑ Cylinder/tank number.
- ❑ Contact person and phone number.
  - ■ Tanks are tagged to ensure that responsible parties can be contacted in the event of an emergency, or if there are problems with the installation.
  - ■ All cylinders, tanks and vaporizers should be placed on a solid base that eliminates direct contact with the ground. Bases for cylinders and tanks with a capacity greater than 123 gallons shall be non-combustible material. Solid bases are intended to prevent problems with movement due to freeze and thaw cycles.
  - ■ 1,000 gallon tanks will be kept a minimum of 8.5 meters (25 feet) from buildings and combustible materials.

B.33 IDENTIFICATION OF HAZARDS

Purpose

The purpose of this practice is to establish the general requirements for the installation of barricades, flagging and identification signs.

Barricades

Barricades shall be used as a physical barrier to prevent employees from coming into contact with a hazard. Barricades can be portable wood types, posts and temporary fencing, or posts and ropes.

Barricades must be of a fixed nature that can restrain employees when used in situations where crossing the barricade poses an immediate and serious hazard to employees.

Flagging Tape and/or Rope

Flagging tape or rope is used as a warning to employees of hazards that exist in work areas. Use of rope is recommended in areas of high winds. There are three types of flagging that are generally used:

- ***Red - "Danger Do Not Enter":*** This type of flagging tape or rope is used where there is danger of an imminent hazard such as falling objects. Only those personnel involved in the work and aware of the hazards are allowed in these areas.
- ***Yellow - "Caution":*** This type of flagging tape or rope provides a warning that a hazard exists in the area. Employees can enter the area only when they have checked and know the hazard.
- ***Radiation Flagging:*** Radiation barriers can be both yellow and magenta colored flagging, or ropes and radiation signs. Personnel shall not enter these areas unless authorized and escorted by the radiographer. The radiographer will install this flagging.

Personnel using flagging shall:

- Flag-off only the areas where the hazard exists (flagging-off too large an area interferes with other work),
- Remove the flagging when complete and recover for further use,
- Use the appropriate type of flagging for the hazard. Check with the supervisor for the installation of red "Danger Do Not Enter".

- ❑ Identify all projected objects or guy wires with high visibility markings/flagging.
- ❑ Identify all oversize, over-dimensional loads with high visibility flagging on the front and rear corners, on both sides of the load.
- ❑ Tag all flagging, identifying name, date and reason for use.

Signs

Warning signs shall be used to indicate specific hazards. For examples, Danger Overhead High Voltage, Slow Moving Vehicle, Oversize Load, etc.

Flashing Lights

Flashing lights are used to bring attention to hazards during periods of darkness, poor visibility, or to attract attention to a specific hazard. Flashing lights shall be used:

- ❑ For slow moving, wide or long loads
- ❑ To identify temporary obstructions in roadways

B.34 DOCUMENTATION & RECORD KEEPING

Scope

Noble site management and the (sub) contractors have a responsibility to ensure that records relevant to verification of compliance to federal, provincial, municipal acts, regulations, statutes, codes, standards and any Site Safety/HSE Plan are properly maintained and readily accessible on the project, facility, or site.

Definition

A health and safety record is a document that provides written or electronic evidence that a given activity/action has occurred. A document may come in the form of a letter, memo, report, health and safety meeting minutes, a log and a form.

Responsibility

The Project HSE Superintendent is responsible to:

- ❑ Ensure that the following list of record keeping documents electronic or hard copy is maintained at the plant or project site.
- ❑ All records shall be retained until the project is completed and upon completion of project then all documents will be boxed and sent to the archive at the business unit office.
- ❑ Administer health and safety record keeping system.
- ❑ Regularly audit health and safety records to ensure compliance with established requirements.

(Sub) Contractor and Project Management are responsible to:

- ❑ maintain records in accordance with this procedure and local jurisdictional requirements.
- ❑ maintain pre-mobilization and equipment inspection records.
- ❑ forward required records to the Project HSE Superintendent.

General Record Keeping Requirements

The project/facility establishes health, safety and environmental record keeping requirements. Records will be stored and maintained so that they are readily retrievable and protected against damage, deterioration, or loss. Due to the

confidential nature of the material (e.g. medical records), certain records will be stored in a secured area.

The Corporate HSE office will determine a record retention policy (i.e. how long specific records must be maintained). As a rule all records will be maintained until the end of the project at which time they will be boxed and transferred to secure, inactive storage. All file boxes will be labeled to identify contents and will include a destruction date, if applicable.

In the case of inspections, investigations, and meeting minutes, records must include follow-up on identified corrective actions.

Noble and Contractor Project Specific Record Keeping Requirements

As a minimum the health and safety record keeping system will contain the following records:

- ❑ HSE Plan
- ❑ HSE Work Practices / Work Procedures / Work Methods
- ❑ Work Refusal Reports
- ❑ Planned HSE Inspection Reports (complete with follow-up)
- ❑ Informal HSE Inspection Reports
- ❑ Pre-use Equipment Checklists
- ❑ Documentation of Inspections by Regulatory Agencies
- ❑ Pre-mobilization Equipment Inspections
- ❑ Crane Certification
- ❑ External Inspections and Audits
- ❑ Accident Statistics
- ❑ Accident/Incident Investigation Reports and associated documentation
- ❑ Project Safety Management Meeting Minutes
- ❑ HSE Meeting
- ❑ Weekly Toolbox Meeting Minutes
- ❑ HSE Orientation Training Delivery
- ❑ Training Records Attendees / Courses

- ❑ (Sub) Contractor specific orientation checklist
- ❑ Safe Handling of Chemicals (WHMIS, HazCom, equivalent subject)
- ❑ Environmental Waste Records
- ❑ Environmental Soil Records
- ❑ Regular Environmental Inspections
- ❑ Monthly Statistical Summary Report
- ❑ Record of administered disciplinary action.
- ❑ Record of training associated with specialized personal protective equipment.
- ❑ Safety Alerts and Postings
- ❑ Emergency Response Plan
- ❑ Occupational Health Services documentation
- ❑ Fitness for Duty documentation issued by the doctor
- ❑ Workers' Compensation and/or other insurance carrier's records
- ❑ Health Services and health and safety staff qualifications and training records
- ❑ Medical Treatment protocols
- ❑ Copies of Material Safety Data Sheets for the controlled products being used by the (sub) contractor

Compliance Monitoring

Spot audit to verify that records are being maintained in accordance with established requirements will be done by the Project HSE Superintendent or designate.

Documentation Requirements

Noble and Contractor management are required to comply with the above document requirements. Final disposition (destruction or permanent retention in achieve) of all records will be determined by senior management.

B.35 STANDARD: PROJECT EQUIPMENT AND TOOL MAINTENANCE

Intent

All project equipment is operated, maintained, inspected, and tested using systems and procedures that manage HSE risks. This standard is applied and mandatory for all construction, and the Noble Project Management Team is to approve all contractors' procedures prior to the mobilization of equipment.

Performance Requirements

- ❑ The contractor shall establish and maintain procedures to ensure that construction and maintenance activities are managed to minimize HSE risks and impacts. These systems and procedures are documented where their absence resulted in deviation from the HSE procedures and manufacturers' recommendations.
- ❑ The contractor shall review the procedures regularly to ensure that they continue to be applicable, relevant, and effective in controlling the hazards for which they were prepared.
- ❑ The contractor shall measure, monitor, analyze, review, and, where the procedure has been modified due to design, make changes in the procedures to reflect the risk reduction methods.
- ❑ Critical equipment, systems, procedures and activities are identified and documented. As a minimum, quarterly inspections are to be conducted by a competent person.
- ❑ Risks introduced by simultaneous operations are assessed and managed by the contractor.
- ❑ Systems are established, documented and maintained to ensure the ongoing integrity of equipment. These include maintenance, inspection, testing, calibration and certification of equipment at frequencies appropriate for the level of risk associated with the equipment and manufacturers' requirements. Certifications, by a third party agency, are to be conducted on all heavy equipment prior to being allowed on site and annually thereafter.
- ❑ All equipment that is mobilized on the project or is out of service for maintenance or modification is subject to documented inspection and testing prior to use to ensure that operational integrity and safety to the operator and all personnel on the project is maintained.

- Equipment or tools damaged on site or involved in an incident shall be quarantined and re-inspected or certified prior to being permitted for re-use on the project.

APPENDIX C — SUBCONTRACTOR PRE-QUALIFICATION PROCESS

C.1 SCOPE

Noble when acting in the capacity of general, prime or client's agent contracted to oversee the successful completion of construction which includes the direction of subcontractors will only select subcontractors that are competent to perform the contracted work in a safe manner and comply with the established project and statutory requirements. The establishment of a subcontractor pre-qualification process will identify the criteria for subcontractor selection, compliance monitoring criteria, and post contract evaluation.

This process will assist management in selecting subcontractors who can safely deliver a quality job, on time and within budget constraints.

C.2 DEFINITIONS

***RFQ* Phase -** Period prior to contract award, during which subcontractor is evaluated and verified as being competent to safely deliver quality work within schedule and budget requirements.

***Contract Supervisor* -** The individual within Noble responsible for supervising and administering a (sub) contract.

***Contract* Phase -** Period when the contract is active and (sub) contractor executes work. Noble will monitor (sub) contractor compliance to established HSE standards, and initiates corrective action as required.

***Post-Contract* Phase -** When contracted work has been completed and (sub) contractor performance is evaluated to determine suitability for future work.

Site *Specific HSE Plan* - *A* plan prepared by the (sub) contractor detailing how the (sub) contractor will manage HSE issues on the project.

C.3 RESPONSIBILITIES

Procurement i s responsible to:

- ❑ Assess (sub)contractors' ability to safely perform contracted work
- ❑ Facilitate (sub)contractor evaluation process
- ❑ Chair the Pre-award meeting

Construction Manager is responsible to:

- ❑ Monitor (sub)contractor compliance within construction area and initiate corrective action on observed non-compliance
- ❑ Approve, in conjunction with the Project HSE Superintendent, management plans for "Acceptable" rated subcontractors

Contract Supervisor is responsible to:

- ❑ Monitor compliance to the established HSE management system
- ❑ Lead a post contract review of the subcontractor project performance
- ❑ Chair the pre-construction meeting
- ❑ Advise subcontractor of site hazards that may have an impact on their work
- ❑ Verify implementation of the subcontractor site specific HSE plan

Project HSE Superintendent is responsible to:

- ❑ Review and approve all nominated subcontractor HSE representatives
- ❑ Conduct evaluation of subcontractor pre-qualification documents and classify subcontractor
- ❑ Conduct review of subcontractor site specific HSE plan and provide feedback on ways and means to strengthen plan
- ❑ During pre-award phase, assess strength of subcontractor's HSE management system
- ❑ Conduct ongoing (sub)contractor compliance evaluations and advise Construction Manager of findings

Subcontractor Site Manager is responsible to:

- ❑ Comply with the requirements as identified in the project HSE management system
- ❑ Prepare and submit for approval a project specific HSE plan
- ❑ Implement approved project specific HSE plan
- ❑ Submit weekly HSE summary report

C.4 SUBCONTRACTOR REQUIREMENTS

(Sub) contractor will take place at three phases of the project from an HSE perspective - RFP, RFQ and post contract.

Request for Proposal (RFP)

Subcontractor Pre-Qualification

During the development of the bid list, potential bidders will be pre-qualified and required to submit their historical HSE performance using Attachment - Health & Safety History.

The HSE department will review and classify contractor submissions. Based on submissions, bidders will be classified as 1) exceed expectations, 2) acceptable, 3) below project standards. The following table provides contractor classification guidelines. "1" rated contractors are preferred, while "3" contractors are the least desirable.

The table allows for some subjectivity and evaluators will assign a rating if two of the three categories fall within the prescribed range.

Category	Medical Frequency	Frequency	WCB/WSIB Experience
1	<2	<1	50% rebate or 20% better than industry
2	2-4.99	1-3.12	No rebate or equal to the industry average
3	>5	>3.12	5% surcharge or 5% below industry standard

Copies of submissions and contractor ratings will be retained in the project file.

Request for Quote (RFQ)

The Request for Quote (see Attachment 2 - RFP - Safety Program) is sent to prospective bidders.

Although "1" contractors are always preferred, it is understood that in some cases "2" and "3" contractors may be provided with an opportunity to bid if there are an insufficient number of "1" contractors.

When the RFQ is sent, the Health & Safety History document will be included to allow pre-qualified (sub) contractors the opportunity to update their information.

Awarding to a "3" Rated Subcontractor

If after review there are no suitable "1" or "2" contractors then a "3" contractor may be selected. If a "3" subcontractor has been selected, then the subcontractor must develop a safety and health plan to ensure adequate consideration has been given to HSE issues.

This plan must be developed in advance of award and will likely require some additional subcontractor commitments. Noble management must approve the plan in advance of award.

The client will be advised of "3" rated contractors selected.

Pre-Award Meeting

The Pre-Award Meeting is an opportunity for procurement to meet with the prospective subcontractors to review and clarify HSE issues. Noble Procurement will chair the Pre-Award Meeting. See Attachment for the agenda of the HSE Pre-Award Meeting.

As well as clarifying HSE requirements, the pre-award meeting allows the project management and/or contractor the opportunity to ensure that negotiated requirements are incorporated into the final subcontract.

HSE Program Submittal

The subcontractor is required to prepare and submit a site-specific HSE plan to the Contract Supervisor and Project HSE Superintendent within 30 days of award and/or 10 days prior to commencement of construction. The site and/or office HSE department will review and approve the program, or if required, feedback recommendations to address deficiencies.

Subcontractor Written Program

Subcontractors shall provide for Noble review a copy of their company HSE program and site-specific HSE plan.

(Sub) contractor plans will be expected to comply with the requirements as identified in Attachment HSE Subcontractor Expectations.

The contractor's written HSE program will be required to address the following:

❑ Leadership Issues: policy, audit, authority

- ❑ Specific HSE Responsibilities Assigned to Each Project Job Title. (E.g. site manager, line supervisor, HSE specialist, worker etc.)
- ❑ Planned Inspection & Audit Guidelines
- ❑ HSE Communication Requirements
- ❑ Incident Management (reporting, recording & investigation)
- ❑ Training (company, project and skill specific requirements)
- ❑ Environment;
- ❑ (Sub)contractor selection and monitoring
- ❑ Hiring & Placement
- ❑ Security
- ❑ Record keeping
- ❑ Safe Work Procedures (specific standards and procedures for work activities that the (sub)contractor will conduct on site)
- ❑ General Rules
- ❑ Office Safety
- ❑ Incentives for safety
- ❑ Emergency Response Planning
- ❑ Occupational Health Services

The (sub) contractor will supply a copy of their company HSE program and site specific HSE plan to both the Contract Supervisor and Project and / or office HSE Manager prior to starting work on site.

Designation of (Sub) contractor HSE Representative

Each (sub) contractor is required to appoint a qualified HSE representative, if required by contract.

The Project HSE Manager will review and approve the resumes of all nominated HSE candidates for the project. The Project HSE Manager will advise the Construction Manager of all selected candidates.

Active Contract Phase

This is the phase of the project where work is ongoing. Noble's Contract Supervisor has a responsibility to ensure (sub) contractors continue to comply with project requirements.

Pre-Construction Meeting

This is the kick-off meeting for the contract and will take place the first day the (sub) contractor mobilizes on the project. The Contract Supervisor and the Project HSE Manager will meet with successful bidders to review requirements of the HSE management system. See Attachment 5 - Tentative Agenda - Contract Pre-Construction Meeting.

Minutes will be maintained using the approved project format.

(Sub) contractor HSE Surveillance Plan

This Plan will help verify that HSE requirements remain effective throughout the construction project. The responsibility for administration of the HSE Surveillance Plan rests with the Contract Supervisor, who will verify that specific program components are in place and provide feedback of their observations to the (Sub) contractor.

When non-compliance is identified the Contract Supervisor will advise the (sub) contractor in writing of their non-compliance. The (sub) contractor will then review the situation and initiate corrective action and document this action on the same form.

The completed document will be filed on the (sub) contractor's project file.

The Contract Supervisor and area HSE specialist will use three methods to verify compliance to the established HSE plan, specifically:

- ***Documentation:*** Evaluate records relevant to the activity. These may include, but are not limited to policy statements, meeting minutes and training records. Areas of focus include document date, attendance records, follow-up on concerns raised or assigned actions.
- ***Interview:*** Provides the opportunity to confirm whether the plan has been implemented and workers, supervisors and managers understand their role within the plan.
- ***Observation:*** Field observation will provide verification that the plan has translated into action in the field. Analysis of the results of information

gathering may lead to further questions or examination of questionable findings.

(Sub) contractor Weekly Report

On a weekly basis subcontractors will submit an HSE summary report detailing their activities for the past week to the Contract Supervisor. See Attachment - Weekly (Sub) contractor HSE Activity Summary. This report will include the following:

- ❑ Number of personnel on site
- ❑ Number of hours worked, including (sub)contractors
- ❑ Number of incidents by type
- ❑ Training program delivered and number of attendees
- ❑ Number of Orientations conducted
- ❑ Number of HSE Meetings conducted
- ❑ Number of inspections conducted
- ❑ Details of outstanding actions from inspections, investigations, and HSE&S communications meetings.

(Sub) contractor Selection of Sub-Subcontractor

In some situations, the subcontractor may further subcontract work to other contractors. In this case, the subcontractor is expected to follow a similar screening process as the Noble including classifying contractors according to the 1-2-3 ranking. The (sub) contractor will advise the Contract Supervisor of any (sub) contractor they will be using and their ranking.

In its site-specific HSE plan, the (sub) contractor will be expected to include consideration for the sub-subcontractor.

In the event a "3" contractor is selected, the (sub) contractor will provide the Contract Supervisor with a HSE management plan to address any shortfalls in the sub-subcontractor HSE program.

Post Contract Phase

After the completion of a project the project HSE manager and Contract Supervisor will review the (sub) contractor's project performance.

The result of the evaluation will be forwarded to Noble procurement department for their reference. This information will be used to determine future suitability of a (sub) contractor.

Compliance Monitoring

The following actions will take place while monitoring (sub) contractor compliance to the plan:

- ❑ Verify (sub)contractors' compliance to the established HSE management system
- ❑ Verify (sub)contractors' compliance to their own project specific HSE plan
- ❑ Verify all issued "non-compliance of Contract HSE Requirements" been followed up and closed out.

C.5 DOCUMENTATION REQUIREMENTS

The following documents will be filed in the (sub) contract:

- ❑ Copies of subcontractor pre-qualification Minutes from Pre-Award
- ❑ Minutes from Pre-Construction Meeting
- ❑ Weekly HSE Summary Report
- ❑ Copies of "non compliance of Contract HSE Requirements" issued to the subcontractor

C.6 ATTACHMENTS

Attachment 1 Health and Safety History

Attachment 2 RFP - Safety Program

Attachment 3 HSE Pre-Award Meeting Check Sheet

Attachment 4 HSE Pre-Job Mobilization Check Sheet

Attachment 5 Non-compliance of Contract HSE&S Requirements

Attachment 6 Weekly Contractor HSE&E Activity Summary

ATTACHMENT 1
HEALTH AND SAFETY HISTORY

1.0	**General**			
1.1	Company Name			
2.0	**HEALTH AND SAFETY PERFORMANCE**			
2.1	Complete the below health & safety performance statistics for the past three years. (including subcontractors :			
	YEAR	**2002**	**2003**	**2004**
	Number of fatalities?			
	Number of lost time accidents?			
	Number of medical aid injuries?			
	WCB /WSIB experience rating			
	Total annual direct hire hours worked			
	LTA = No. of Lost Time Accidents x 200,000 / Hours worked			
	MAF = No. of Medical Aid Cases x 200.000 / Hours worked			
	Total Recordable = No. of Medical Aid + Lost Time x 200.000 / Hours worked			
	Number of reportable environmental spills?			
2.2	Have you received an Occupational Health & Safety (OH&S) stop work order, or equivalent, from the governmental authority in the last three years?	❑Yes	❑No	
	Describe:			
2.3	Has your organization or supervisors been convicted under the OH&S Act in the last three years?	❑Yes	❑No	
	Describe:			
3.0	**HEALTH AND SAFETY MANAGEMENT**			
3.1	Highest ranking safety professional in our organization Attach resume :			
	Name:		Telephone:	
	Title:		Fax:	
3.2	Do you have, or provide: o A full-time health and safety representative? ❑ Yes ❑ No o A full-time site health and safety representative? ❑ Yes ❑ No			
	Number of full-time certified health and safety managers, and what certifications do the have?			
4.0	**HEALTH AND SAFETY PROGRAM AND PROCEDURES**			
4.1	Do you have a written Health, Safety and Environment Program?	Yes	No	
	Does the program address the following key elements: o Health, Safety and Environmental policy? ❑ Yes ❑ No o Management commitment and expectations? ❑ Yes ❑ No o Employee participation? ❑ Yes ❑ No o Accountabilities and responsibilities for managers, supervisors, and employees? ❑ Yes ❑ No o Resources for meeting health and safety requirements? ❑ Yes ❑ No			

	o Periodic health and safety performance appraisals for all employees?	❑ Yes		❑ No	
	o Hazard recognition and control?	❑ Yes		❑ No	
	o Modified work program?	❑ Yes		❑ No	
4.2	Does the program include work practices and procedures such as:				
	o Equipment Lockout and Tag Out (LOTO)?	❑	Yes	❑	No
	o Confined Space Entry?	❑	Yes	❑	No
	o Injury and Illness Recording?	❑	Yes	❑	No
	o Fall Protection?	❑	Yes	❑	No
	o Personal Protective Equipment (PPE)?	❑	Yes	❑	No
	o Portable Electrical/Power Tools?	❑	Yes	❑	No
	o Vehicle Safety?	❑	Yes	❑	No
	o Compressed Gas Cylinders?	❑	Yes	❑	No
	o Electrical Equipment Grounding Assurance?	❑	Yes	❑	No
	o Powered Industrial Vehicles (Cranes, Forklifts, JLGs, etc.)	❑	Yes	❑	No
	o Housekeeping?	❑	Yes	❑	No
	o Accident/Incident Reporting?	❑	Yes	❑	No
	o Unsafe Condition Reporting?	❑	Yes	❑	No
	o Emergency Preparedness, including an Evacuation Plan?	❑	Yes	❑	No
	o Waste Disposal?	❑	Yes	❑	No
4.3	Do you have written programs for the following:				
	o Hearing Conservation?	❑ Yes		❑ No	
	o Respiratory Protection?	❑ Yes		❑ No	
	Where applicable, have employees been: ❑ Trained? ❑ Fit Tested? ❑ Medically Approved?				
	o WHMIS?	❑ Yes		❑ No	
4.4	**Medical:** Do you conduct medical examinations for:				
	o Pre-employment?	❑ Yes		❑ No	
	o Replacement job capability?	❑ Yes		❑ No	
	o Pulmonary?	❑ Yes		❑ No	
	o Respiratory?	❑ Yes		❑ No	
	Describe how you will provide first aid and other medical services for your employees while on site:				
	Specify who will provide this service:				
	Do you have personnel trained to perform first aid and CPR?	❑ Yes ❑ No		Frequency:	

4.5	Do you hold site safety meetings for: o Field supervisors? o Employees? o New hires? o Subcontractors?	❑ Yes ❑ No ❑ Yes ❑ No ❑ Yes ❑ No ❑ Yes ❑ No	Frequency: Frequency: Frequency: Frequency:	
	Are the health and safety meetings documented?		❑ Yes	❑ No
4.6	**Personal Protection Equipment (PPE):** o Is applicable PPE provided for employees? o Do you have a program to ensure PPE is inspected and maintained? o Do you have a corrective action process for addressing individual health and safety performance deficiencies?		❑ Yes ❑ Yes ❑ Yes	❑ No ❑ No ❑ No
4.7	**Equipment and materials:** o Do you have a system for establishing the applicable health, safety, and environmental specifications for the acquisition of materials and equipment? o Do you conduct inspections on operating equipment (e.g., cranes, forklifts, JLGs, etc.) in compliance with the regulatory requirements? o Do you maintain operating equipment in compliance with the regulatory requirements? o Do you maintain the applicable inspection and maintenance certification records for operating equipment?		❑ Yes ❑ Yes ❑ Yes	❑ No ❑ No ❑ No
4.8	**Subcontractors:** o Do you use health and safety performance criteria in the selection of subcontractors? o Do you evaluate the ability of subcontractors to comply with applicable health and safety requirements as part of the selection process? o Do your subcontractors have a written Health, Safety and Environmental Program? Do you include your subcontractors in: o Health and safety orientation? o Health and safety meetings? o Inspections? o Audits?		❑ Yes ❑ Yes ❑ Yes ❑ Yes ❑ Yes ❑ Yes ❑ Yes	❑ No ❑ No ❑ No ❑ No ❑ No ❑ No ❑ No

4.9	**Inspections and audits:**							
	o Do you conduct health and safety inspections?	❑	Yes	❑	No			
	o Do you conduct Health and Safety Program audits?	❑	Yes	❑	No			
	o Are corrections of the deficiencies documented?	❑	Yes	❑	No			
	o Do you have your Health and Safety Program audited annually? If yes, by whom?	❑	Yes	❑	No			
4.10	**Craft training:**							
	o Have employees been trained in the appropriate job skills?	❑	Yes	❑	No			
	o Are employees' job skills certified, where required, by regulatory or industry consensus standards?	❑	Yes	❑	No			
	List crafts which have been certified:							
5.0	**HEALTH AND SAFETY TRAINING**							
5.1	**Safety Orientation Program:**	**New Hires**				**Supervisors**		
	Do you have a Health and Safety Orientation Program for new hires and newly hired or promoted supervisors?	❑Yes		❑No		❑Yes		❑No
	Does this program provide instruction on the following:							
	o New worker orientation?	❑	Yes	❑	No	❑	Yes	❑ No
	o Safe work practices?	❑	Yes	❑	No	❑	Yes	❑ No
	o Safety supervisors?	❑	Yes	❑	No	❑	Yes	❑ No
	o Toolbox meetings?	❑	Yes	❑	No	❑	Yes	❑ No
	o Emergency procedures?	❑	Yes	❑	No	❑	Yes	❑ No
	o First aid procedures?	❑	Yes	❑	No	❑	Yes	❑ No
	o Incident investigation?	❑	Yes	❑	No	❑	Yes	❑ No
	o Fire protection and prevention?	❑	Yes	❑	No	❑	Yes	❑ No
	o Safety intervention?	❑	Yes	❑	No	❑	Yes	❑ No
	o WHMIS training?	❑	Yes	❑	No	❑	Yes	❑ No
	How long is the orientation program?				Hours			Hours
5.2	**Supervisor's Health and Safety Training Program:**							
	Do you have a specific Health and Safety Training Programs for supervisors? Describe:					❑Yes		❑No
5.3	**Training Records:**							
	Do you have health and safety and crafts training records for your employees?					❑Yes		❑No
	Do the training records include the following:							
	o Employee identification?	❑	Yes	❑	No			
	o Date of Training?	❑	Yes	❑	No			
	o Name of Trainer?	❑	Yes	❑	No			
	o Method used to verify understanding of the training?	❑	Yes	❑	No			
	How do you verify understanding of the training? (Check all that apply) ❑ Job monitoring ❑ Written test ❑ Oral Test ❑ Other (list) ❑ Performance test							

6 0	INFORMATION SUBMITTAL
6.1	Please provide a copy of the contractor's Health and Safety Manual and copies of any of the following if not included as part of the manual. Indicate enclosures with a check (✓). ❑ Accident/Incident Investigation Procedure ❑ Employee Discipline Procedure ❑ Example of Employee Health and Safety Training Records ❑ Health and Safety Audit Procedure or Form ❑ Health and Safety Incentive Program ❑ Health and Safety Inspection Form ❑ Health and Safety Orientation Outline ❑ Health and Safety Policy ❑ Health and Safety Program ❑ Health and Safety Training for Supervisors (Outline) ❑ Health and Safety Training Program (Outline) ❑ Health and Safety Training Schedule (Sample) ❑ Housekeeping Policy ❑ Respiratory Protection Program ❑ Resume of Highest Ranking Safety Professional ❑ Substance Abuse Program ❑ Unsafe Conditions Reporting Procedure ❑ WHMIS Program
6.2	Submit a current copy of a Certificate of Clearance / Letter of Good Standing from the WCB or insurance carrier. Certificate of Clearance / Letter of Good Standing attached? ❑ Yes ❑ No

ATTACHMENT 2

RFP - SAFETY PROGRAM

Bidder is to complete attached Safety and Health History.

Bidder is to provide a summary description of the Safety and Health Program to be implemented in performance of the work. This summary shall include information on the organization of the program, including the authority and responsibility of all involved personnel. Include a copy of the actual Table of Contents from the Corporate Safety and Health Program Manual with this summary.

In addition, within fifteen (15) days after Notice of Award, the contractor agrees to and shall furnish for Project approval, its detailed Corporate Safety and Health program, including all procedures specifically requested in the contract. The same information shall be provided for all subcontractors that are planned for use in the performance of the work.

ATTACHMENT 3

HSE&S PRE-AWARD MEETING CHECK SHEET

Tender Number: _____

Work Scope Description: _____

The following items will be reviewed during the pre-bid meeting with all contractors who are potentially going to perform 'hands on' work activities. Additional items may be added as required.

	DISCUSSION ITEM	Not Applicable	YES	NO
1	Introductions — Purpose of Meeting			
2	Noble's commitment to Health, Safety, Environment & Security			
3	Statutory Requirements / Owner / Employers / Worker / Competent Worker Obligations			
4	A thorough work scope review has been completed			
5	A walk through of the work location has been completed			
6	Contractor Management Process			
7	• Contractor Qualification			
8	Subcontractor Qualification			
9	Compliance by subcontractors to Noble — H&S Reference Manual requirements			
10	Contractor Non-compliance / exceptions to Noble — H&S Reference Manual			
11	• PPE Requirements (including Welder hard hats)			
12	• Environmental Due Diligence			
13	Emergency Procedures / Response			
14	• Audits / Inspections			
15	Accident / Incident Reporting / Investigation			
16	Training — Management / Employee Plan			
17	• Security — site access / vehicle passes / route of travel / swiping / traffic rules / consequences			
18	• Drug and Alcohol Policy			
19	• Modified Work / Medical Accommodations Program			
20	• Meetings — Pre-Job / Tool Box			
21	Permitting			
22	Compressed Gas Cylinders			
23	Smoking Policy			
24	• Industrial Hygiene			
25	• QMP Requirements (Building / Gas / Electrical / Fire / Radiation / Elevators / ABSA)			
26	All on-site employees have completed WHMIS training			
27	Material/Equipment Inspection and Certification program is in place			
28	Age of workforce / English literate			
29	Licensing of vehicles and operators			
30	Reporting Requirements — accidents / hours / inspections / citations			
31	Record Keeping Requirements			
32	Rule Violations - consequences			
33	Hazards will be reviewed with employees performing the tasks			

34	Hazards – Hazard review has been completed and communicated			
35	• Will loads or material pass over proposed work areas			
36	• Will equipment operate or pass over or through proposed work area			
37	Is there existing operating equipment/piping in proximity of proposed work area			
38	• Chemical, gas, fume, spill contact hazards in proposed work area			
39	• Area hazard classification or proximity to hazardous area issues			
40	Radiation sources mounted or utilized on or around job areas			
41	Heat or bum sources in proximity of the proposed work areas			
42	• Risk of physical energy / movement / contact after lock-out			
43	Mechanical movement of parts or equipment possible			
44	Residual hydraulic/pneumatic pressure			
45	Stored electrical energy			
46	• Cross / sub trades working in proximity of proposed work area			
47	Possibility of falls to lower levels			
48	Adequate platforms, guards, scaffolding, handrails			
49	Trained personnel – fall protection, harnesses, anchor points			
50	Risk of fall to open water			
51	Risk of material falling from overhead			
52	Limited access or confined spaces			
53	Area / Job Specific Standards / Work Practices / Procedures / Rules			
54	Safe work plans will be developed and reviewed with employees doing the tasks			
55	The contractor will participate at scheduled progress review meetings			
56	Are there any Contractor Questions or Concerns			
57	Letter of Commitment to Project H&S requirements			
58	Contractor Job Specific Organizational Structure – names / contact numbers / e-mail			
59	Contractor Project Specific H&S Plan			
60	Contractor compliance mechanism for own H&S Management System			

By signing this form the Contractor agrees:
• that the items listed above have been discussed,
• the Contractor is aware of the H&S risks/requirements associated with the work that is going to be bid upon,
• and hereby agrees to comply by ALL Noble and OSHA regulation requirements

Contractor (Name): _____

Contractor Representative (Signature): _____

Noble — Construction Co-coordinator (Signature): _____

Noble — H&S Representative (Signature): _____

Date: _____

ATTACHMENT 4

H&S PRE-JOB MOBILIZATION CHECK SHEET

Contract Number: _____

Work Scope Description: _____

The following items will be reviewed during the kick-off meeting with the successful bidder for a contract that involves 'hands on' work activities. Additional items may be added as required.

	DISCUSSION ITEM	NOT APPLICABLE	YES	NO
1	Introductions – Purpose of Meeting			
2	Contractor understands reporting structure and who they report to			
3	Contractor has provided Noble with job specific organization chart; names, phone numbers, e-mail addresses of key contacts			
4	Contractor has provided Noble with a copy of their H&S Manual			
5	Contractor has submitted document outlining exceptions/non-compliance items when comparing their H&S program to Noble – H&S Reference Manual			
6	Contractor agrees to abide by the requirements of the Noble – H&S Manual			
7	Contractor understands that non-conformance to H&S requirements may result in the contractors removal from site			
8	Contractor will have a H&S professional 'on site', where required by contract			
9	Contractor will not bring a subcontractor on site without having first completed the Noble – Contractor Management requirements on that subcontractor prior to starting work			
10	Contractor has provided WSIB CAD-7 / Clearance Letter			
11	Contractor is familiar and understands Noble 's commitment to H&S			
12	Contractor is knowledgeable about the Occupational Health and Safety Act and associated regulations			
13	Contractor understands his/her obligations under the Act and associated regulations			
14	Contractor understands the work scope; work location and any related hazards associated with the work location			
15	Contractor has obtained the regulatory permits required to execute the work			
16	Contractor understand site security requirements / vehicle operation requirements / rules / traffic control			
17	Contractor agrees to perform all work in such a manner that 'zero' losses will take place			
18	Hazard reviews / assessments will be performed prior to all "High Risk" tasks being performed. "Safe work plans" will be developed for all high risk work			
19	Contractor understands and will follow identified 'Emergency Procedures'			
20	A Tool Box Talk must be held on a weekly basis			
21	Contractor has provided a list of trades that will be involved in work activities			
22	Contractor has demonstrated that all personnel are deemed competent (training plan)			
23	All employees will complete Client's Orientation and a 'site-specific orientation' prior to starting work			
24	Contractor will ensure that ALL employees are WHMIS trained. Contractor understands MSDS requirements.			
25	Contractor understands and will comply to PPE requirements / smoking policy			
26	Contractor has provided Noble with a list of equipment that will be used on site			

	DISCUSSION ITEM	NOT APPLICABLE	YES	NO
27	Contractor has provided required certification of equipment as per Noble Procedure			
28	Contractor is aware of manufactures servicing / maintenance requirements for all equipment			
29	Contractor equipment maintenance procedures/systems are in place and auditable			
30	Contractor has identified all hazardous material that will be brought on site and has received required approval from Noble			
31	Contractor has reviewed and will follow requirements of Client's Spill Reporting Procedure			
32	Contractor will report all accidents / incidents to the Noble on site contact			
33	Contractor will have a 'Modified Duties program' for injured workers			
34	Drug and alcohol policy will be strictly enforced by the Contractor			
35	Contractor will conduct a monthly H&S Inspection and will provide the report and follow-up action plan to Noble			
36	Contractor will inform Noble of any regulatory inspection and provide a copy of any notice to comply or orders within 24 hours of the inspection			
37	Contractor agrees to participate in Noble — H&S Audit as/when request by Noble H&S personnel			
38	The contractor will participate at scheduled progress review meetings			
39	The Contractor's H&S performance will be evaluated by the Construction Coordinator on a agreed upon basis as art of scheduled Progress Review Meetings			
40	The contractor will submit monthly safety statistical information to Noble no later than the second day of the following month.			
41	Contractor agrees to abide by area/site specific standards / work procedures / practices / rules			
42	Does the contractor have any questions/concerns regarding the items covered above			

By signing this form the Contractor agrees:
- that the items above have been discussed,
- the Contractor is aware of the H&S risks/requirements associated with the work that is going to be bid upon, and hereby agrees to comply by ALL Noble H&S and Occupational Health and Safety Act and applicable regulation requirements The undersigned agree that the identified work can be performed in a safe manner:

Contractor (Name): _____

Contractor Representative (Signature): _____

Noble H&S Representative (Signature): _____

Construction Coordinator (Signature): _____

Date: _____

Signed off forms and related documentation will be maintained by the Noble Health and Safety Department

ATTACHMENT 5

NON-COMPLIANCE OF CONTRACT HSE REQUIREMENTS

Number:	Client:	Page ____ of ____
To:	Contract No.:	
(Sub) Contractor:	Date:	

On _____ you were advised orally of the below listed violation(s) of the contract Health, Safety and Environmental requirements.

Please indicate the corrective action(s), which you have or intend to take on each of the above-noted violation(s) and the dates that each item has been or will be corrected. Also, please sign this form and return the original to the undersigned by (Date) . A copy has been included for your files.

Site Manager:	Date:
Cc: Contract Supervisor, HSE Manager	
To:	(Sub) Contractor Letter Serial Number:

The below listed corrective action has been or will be taken by the dates indicated:

Signature and Title:	Company:	Date:

ATTACHMENT 6

WEEKLY (SUB) CONTRACTOR HSE ACTIVITY SUMMARY

(SUB) CONTRACTOR:	PROJECT NO.:	MONTH:	
	Monthly Total	**Year-to-Date Total**	**Project Total**
No. of HSE Orientations conducted			
No. of HSE meetings conducted			
No. of HSE Inspections conducted			
Lost Time Accidents			
Medical Aid			
Near Misses			
Lost Work Days (Actual or Estimate)			
Man-hours Worked (All Onsite Personnel)			
Automotive accidents			
List type and no. of HSE training conducted:			
Description of Lost Time Injuries (Including Date, Incident Resulting Injury and Recommendation for Future Prevention):			
ATTACH MINUTES OF ALL SAFETY MEETINGS AND INSPECTIONS			
(Sub)Contractor Safety Representative (print):	Date:		
Report Developed By:	Date:		
Contract Safety Representative:	Date:		

APPENDIX D — SAFETY FORMS

AF-023	Project & Safety Orientation Program Register
AF-101	Monthly Safety Statistics Summary
AF-01	Daily Field Report (Pre-Shift Inspection)
AF-06	Physician's Medical Status Report
AF-07	First Aid Treatment Record
AF-07A	Medical Aid Treatment Record
AF-08	Pre-Construction Safety Meeting Checklist
AF-09	Pre-Construction Hazard Identification Checklist
AF-10	Construction Occupational Health Issues Checklist
AF-11	Weekly Safety Meeting Report
AF-12	Safety Meeting Attendees
AF-13	Toolbox Safety Meeting
AF-14	Job Safety/Hazard Analysis (JSA/JHA)
AF-15	Safe Work Permit
AF-16	Hot Work Permit
AF-17	Confined Space Pre-entry Meeting Document
AF-18	Confined Space Entry Permit
AF-19	Confined Space Entry Log
AF-19A	Gas Test Record
AF-20	Excavation-Trench Permit
AF-21	Respirator Fit Test
AF-22	Request for Tagging and Lockout

AF-23	Request for Removal / Replacement of Lockout
AF-24	Lock-out Logbook
AF-25	Piping Blank Record
AF-26	Safety Audit
AF-27	Construction Inspection Checklist
AF-28	Joint Worksite Inspection Checklist
AF-29	Scaffold Inspection
AF-33	Incident / Accident Investigation Report
AF-34	Crane Accident Investigation Report
AF-35	Environmental / Spill Report
AF-36	Major / Serious Accident - Root Cause Investigation
AF-37	Crane Safety Inspection Record
AF-38	Mobile Cranes and Hoists - Daily Inspection Checklist
AF-39	Hand Signals
AF-40	Lift Evaluation
AF-41	Critical Lift Checklist
AF-43	(Sub)Contractor Hours Safety Summary
AF-44	Lost Time Frequency Rate
AF-45	Lost Time Accident Report Summary (Sub)
AF-46	Contractor's Weekly First Aid Summary (Sub)
AF-47	Contractor's Monthly Safety Report
AF-48	Weekly Safety Inspection Checklist - Motor Vehicles
AF-49	Construction Equipment Safety Inspection - All Units

AF-50 Safety Inspection Checklist - Crawler Tractors, Dozers

AF-51 Safety Inspection Checklist - Scrapers, Graders, Heavy Haul Units

AF-52 Site Radiography Notice

AF-53 First Aid Kit Inspection

AF-54 Fire Extinguisher Inspection

AF-55 Smoke Detector Inspection

AF-56 Employee Certificate/License and Training Report

AF-57 Preliminary Incident Report

PROJECT & SAFETY ORIENTATION PROGRAM REGISTER

I hereby confirm that I have attended the Project Safety Induction Program and that I have received instruction on matters relating to safety in general, and safety issues pertaining to this construction site. All the requirements, rules and regulations were explained to me, and the contents thereof fully understood. By signing this form I also agree to abide by the existing and future safety rules and regulations on the construction site, and that I agree to be subject to the disciplinary actions in force if I do not comply with the safety rules and regulations.

DATE	NAME	I.D. No.	CONTRACTOR	SUB / SERVICE CONTRACTOR	SIGNATURE

I, _____ THE UNDERSIGNED, IN MY CAPACITY AS _____

ACTING ON BEHALF OF _____ (THE CONTRACTOR), DO HEREBY CONFIRM THAT THE ABOVE EMPLOYEES HAVE ATTENDED THE PROJECT SAFETY INDUCTION PROGRAM, AND THAT THE CONTRACTOR SUPPORTS AND UNDERSTANDS NOBLE'S HEALTH & SAFETY PROGRAM AND/OR SITE SAFETY PROCEDURES, AND THE OWNER'S RULES & PROCEDURES, WHICH SHALL BE ENFORCED BY ALL CONTRACTORS AND THEIR SUB-CONTRACTORS. *I ACCEPT THAT THE CONTRACTOR REMAINS DIRECTLY RESPONSIBLE FOR HIS OWN SAFETY PROGRAM AND TRAINING AND INDUSTRIAL RELATIONS, AND SHALL DILIGENTLY MANAGE HIS SAFETY PROGRAM AND INDUSTRIAL RELATIONS IN COMPLIANCE WITH THE LAW, AND ALL NOBLE AND OWNER PLANS, PROCEDURES, RULES, REGULATIONS.*

SIGNATURE: _____ DATE: _____

DAILY FIELD REPORT (Pre-Shift Inspection)

Date _____ Contract _____

Contractor _____ Supervisor _____

Weather _____ Accidents _____

Temp Max Min °C Incidents _____

Safety Issues/Corrective Action Taken

Activities

Problems / **Delays**

Prepared by (name): _____ Title: _____

Prepared by (sign): _____ Date: _____

CM Signature: _____ Date: _____

HEALTH QUESTIONNAIRE

NAME: **EMPLOYEE NUMBER:** **DATE:**

THE FOLLOWING QUESTIONNAIRE IS OPTIONAL. IT IS SUGGESTED THAT YOU FILL IT OUT IN CASE OF EMERGENCY. THE INFORMATION WILL BE KEPT IN A CONFIDENTIAL FILE.

1. ARE YOU TAKING ANY MEDICATIONS ON A REGULAR BASIS? IF YES, LIST THEM.

2. DO YOU HAVE ANY ALLERGIES? IF YES, TO WHAT AND WHAT REACTION DO YOU HAVE?

3. HAVE YOU HAD MAJOR SURGERY RECENTLY? IF YES, WHAT?

4. DO YOU HAVE A HISTORY OF ANY OF THE FOLLOWING?

HEART DISEASE	❑	RHEUMATIC FEVER	❑
BLOOD VESSEL DISEASE	❑	HEPATITIS	❑
LUNG DISEASE	❑	MALARIA	❑
KIDNEY DISEASE	❑	HIGH BLOOD PRESSURE	❑
DIABETES	❑	ULCERS	❑
JOINT OR BONE DISEASE	❑		

IF YES TO ANY OF THE ABOVE, PLEASE EXPLAIN.

EMPLOYEE SIGNATURE

EMPLOYEE TRAINING LOG

NAME	NOBLE ORIENTATION	FIRE EXT.	PERMIT RECEIVER	CONFINED SPACE TRAINING	RESP. PROT. EQUIP	FALL ARREST	EVAC. PROT.	AIR PUR. RESP.	GAS DETECT	WHMIS	FIRST AID	FIRE WATCH	SAFETY WATCH	SIGNAL MAN	O/E	OTHER

PHYSICIAN'S MEDICAL STATUS REPORT

CONTRACTOR:	PROJECT NAME:	LOCATION:
EMPLOYEE'S NAME:	BADGE NO.:	TELEPHONE NO.:
ADDRESS:		
DATE OF INJURY:	TRADE:	

Physician's Diagnosis:

Treatment Rendered:

( )	Evaluation	( )	Physical Therapy
( )	Wound Repair	( )	Foreign Body Removal
( )	Immobilization	( )	Tetanus Immunization
( )	X-ray	( )	Crutches/Cane
( )	Complete Eye Exam	( )	Other:

Employee to Return to Clinic for the following:

( )	Re-evaluation	( )	X-ray
( )	Suture removal	( )	Physical Therapy
( )	Cleaning/Redressing	( )	Other:

This employee has been given full instruction on care and work status. Employee is to:

( ) Return to work - Regular Duty

( ) Return to work - Foreign Duty within tolerance

( ) Return to work - Modified Duty with following instructions:

Remain off work until:

Must keep _____ elevated until:

Avoid chemical exposure until:

Referred to:

Employee to return to clinic on:

Prognosis:

Physician's Name: _____ Date:

Address:

Telephone No.:

FIRST AID TREATMENT RECORD

DATE / TIME OF INJURY	TREATED PERSON		INJURY	NATURE OF TREATMENT GIVEN	DATE / TIME TREATMENT ADMINISTERED	TREATED BY:
	NAME	COMPANY	HOW / WHAT / WHERE?			

FIRST AID TREATMENT RECORD

DATE / TIME OF INJURY	TREATED PERSON NAME	 COMPANY	INJURY HOW / WHAT / WHERE?	NATURE OF TREATMENT GIVEN	DATE / TIME TREATMENT ADMINISTERED	TREATED BY:

PRE-CONSTRUCTION SAFETY MEETING CHECKLIST

We have discussed and understand the safety requirements of the Noble Safety Program.

Contractor Representative (Name) _____ Date _____

Contractor Representative (Signature) _____ Company Name _____

SAFETY EQUIPMENT TO BE MOBILIZED/PROVIDED BY THE CONTRACTOR:

		Yes / No / NA
Signs	Caution	
	Men Working Above	
	Danger H_2S	
	Caution Construction Area	
	Danger Open Excavation	
	No Smoking	
	Yellow/Red Flagging	
	Confined Space	
	Danger	
	Power Lines	
	X-ray	
	Welding in Progress	
	Other	
Breathing Apparatus	SCBA	
	SABA	
Fire Extinguishers	**Quantity/Size -** ABC	
	Quantity/Size - CO_2	
Toilets (1 per 20 men) Additional for Female Workers		
Normal/Average Hours of Work Per Day (no more than 16 hrs. per shift)		
Peak Manpower		
Ladders	Extension	
	Step	
Safety Harnesses/Shock Absorbing Lanyards		

PRE-CONSTRUCTION SAFETY MEETING CHECKLIST **Yes / No / NA**

Personnel Protective Equipment	Hearing Protection	
	Hard Hats	
	Safety Glasses	
	Gloves	
	Proper Footwear	
	Fire Retardant Clothing	
First Aid Facility and Supplies		
Workers Having a Valid First Aid Ticket		
Dedicated Safety Officer(s)		
Security - Photo I.D./Brass Tag System		
Transportation In/Out of Site (buses)		
Lunchroom Facilities		
Identification of Company Employees (hard hat sticker)		
Scaffolding including Tag System and Tags		
Lockout System in place including Tagging/Sign-out Log Book		
Vehicles - Proper Safety Equipment	Back-up Alarm	
	Fire Extinguisher	
	First Aid Kit Strobe	
	Light	
Vehicles – Licensed, Insurance Coverage		
Other (attach additional sheets if necessary)		

Contractor agrees to provide, and ensure the proper use thereof, all required safety equipment including that specified on this checklist.

Personal protective equipment supplied by Noble to contractor's workers in order to perform their work safely, will be back charged to the contractor.

Contractor Representative (Name and Signature) _____ Date _____

Noble Safety Coordinator (Name and Signature) _____ Date _____

PRE-CONSTRUCTION HAZARD IDENTIFICATION CHECKLIST

CONSTRUCTION LOCATION/JOBSITE: **DATE:**

	YES	NO	
REMOTE LOCATION	❑	❑	
• POWER LINES - BURIED	❑	❑	NO. PARALLELING _____ NO CROSSING _____
- OVERHEAD	❑	❑	NO. PARALLELING _____ NO CROSSING _____
• TELEPHONE LINES - BURIED	❑	❑	NO. PARALLELING _____ NO CROSSING _____
- OVERHEAD	❑	❑	NO. PARALLELING _____ NO CROSSING _____
• BURIED GROUNDING SYSTEM	❑	❑	NUMBER _____
• SURFACE PIPING	❑	❑	
• BURIED PIPING - PARALLELING	❑	❑	NUMBER _____ PRODUCT(S) _____
- CROSSING	❑	❑	NUMBER _____ PRODUCT(S) _____
CREEK CROSSINGS	❑	❑	NUMBER _____
ROAD CROSSINGS	❑	❑	NUMBER _____
• COMPUTER PROCESS CONTROL	❑	❑	
H_2S GASES	❑	❑	DESCRIPTION _____
OTHER GASES	❑	❑	DESCRIPTION _____
COMBUSTIBLE GASES OR LIQUIDS	❑	❑	DESCRIPTION _____
HIGH PRESSURE SYSTEMS	❑	❑	DESCRIPTION _____
HIGH TEMPERATURE SYSTEMS	❑	❑	DESCRIPTION _____
HAZARDOUS/DANGEROUS CHEMICALS	❑	❑	DESCRIPTION _____
ROCK/BLASTING	❑	❑	DESCRIPTION _____
CONFINED SPACE OR DITCH ENTRY	❑	❑	DESCRIPTION _____
MULTIPLE CREWS	❑	❑	DESCRIPTION _____
ELEVATED STRUCTURES	❑	❑	DESCRIPTION _____
STEEP SLOPES	❑	❑	DESCRIPTION _____
AVALANCHE CONTROL	❑	❑	DESCRIPTION _____

• ENSURE THAT ALL LINES ARE MARKED ON CONSTRUCTION DRAWINGS.

PRE-CONSTRUCTION HAZARD IDENTIFICATION CHECKLIST

CONSTRUCTION LOCATION JOBSITE: **DATE:**

	YES	NO	
ROCK/SOIL STABILITY	☐	☐	
MUSKEG	☐	☐	DESCRIPTION _____
TREES/CLEARING	☐	☐	DESCRIPTION _____
EMERGENCY PROBLEMS	☐	☐	DESCRIPTION _____
ROAD HAZARDS - TRAFFIC, DUST	☐	☐	DESCRIPTION _____
OTHER HAZARDS	☐	☐	
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____

SPECIAL WORK PROCEDURES

CONFINED SPACE ENTRY	☐	☐	DESCRIPTION _____
RESPIRATORY PROTECTIVE EQUIPMENT	☐	☐	DESCRIPTION _____
HOT TAPPING	☐	☐	DESCRIPTION _____
PRESSURE TESTING	☐	☐	DESCRIPTION _____
BLINDING	☐	☐	DESCRIPTION _____
EXCAVATING NEAR A LIVE LINE	☐	☐	DESCRIPTION _____
ELECTRICAL LOCKOUT	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	DESCRIPTION _____
_____	☐	☐	

REVIEW CONDUCTED BY

NOBLE: _____ CLIENT (OPERATIONS): _____

CLIENT (PROJECTS): _____ CONTRACTOR: _____

CONSTRUCTION OCCUPATIONAL HEALTH ISSUES CHECKLIST

CONSTRUCTION LOCATION/JOBSITE: **DATE:**

HEALTH HAZARD	YES	NO	TYPE
RESPIRATION	☐	☐	
TOXIC GASES	☐	☐	
ASPHYXIANT GASES	☐	☐	
IRRITANT GASES	☐	☐	
TOXIC/IRRITANT DUSTS	☐	☐	
ASBESTOS DUST SILICA	☐	☐	
DUST	☐	☐	
OTHER	☐	☐	
_____	☐	☐	
_____	☐	☐	
_____	☐	☐	
CHEMICALS			
TOXIC CHEMICAL ACID CHEMICALS	☐	☐	
CAUSTIC CHEMICALS	☐	☐	
TEMPERATURE EXTREMES	☐	☐	
SKIN IRRITANTS	☐	☐	
ABRASIVE MATERIALS	☐	☐	
HEAVY LIFTING	☐	☐	
FIRST AID FACILITY REQUIREMENTS	☐	☐	
FIRST AID ATTENDANT REQUIREMENTS	☐	☐	
WORKER MEDICAL ASSESSMENT	☐	☐	
REQUIREMENTS	☐	☐	
REGISTERED NURSE REQUIREMENTS			
MEDICAL EVACUATION METHODS	☐	☐	
MEDIVAC EQUIPMENT REQUIREMENTS	☐	☐	
RESCUE SYSTEM REQUIREMENTS	☐	☐	
RECORD KEEPING REQUIREMENTS	☐	☐	

HEALTH & SAFETY - MONTHLY REPORT

PROJECT:	
PROJECT No.	MONTH:
REMARKS:	

PREPARED BY:	SIGNATURE:	DATE:

WEEKLY SAFETY MEETING REPORT

SUBCONTRACTOR:			
CREW:		**LOCATION:**	
DATE:	**NUMBER PRESENT:**	**CONTRACT:**	**TIME TAKEN:**
SUBJECT:		**CONDUCTED BY:**	
BRIEF OUTLINE OF DISCUSSION:			

SAFETY RECOMMENDATIONS:

ACTION TAKEN:

STATUS OF PREVIOUS MEETING RECOMMENDATIONS:

SAFETY MEETING ATTENDEES

	DATE	NAME (PRINT)	TRADE	SIGNATURE
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				

TOOLBOX SAFETY MEETING

CONTRACTOR:			
CREW:		**LOCATION:**	
DATE:	**NUMBER PRESENT:**	**CONTRACT:**	**TIME TAKEN:**
SUBJECT:		**CONDUCTED BY:**	
BRIEF OUTLINE OF DISCUSSION:		**ATTENDEES PLEASE PRINT NAME AND INITIAL**	

SAFETY RECOMMENDATIONS:	
ACTION TAKEN:	
STATUS OF PREVIOUS MEETING RECOMMENDATIONS:	

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TASK SAFETY ANALYSIS

CONTRACTOR:	JOB DESCRIPTION:	PAGE: 1 of
REVIEWED BY:	SIGNATURE:	TITLE: DATE:
JOB TASKS	HAZARDS/POTENTIAL HAZARDS	CONTROL OR SAFE WORK PRACTICES

The above controls or safe work practices will be applied where practical and reasonable.

SAFE WORK PERMIT

LOCATION:	NO. OF MEN ON JOB:	W.O. NO.:
DESCRIPTION OF WORK:		
SPECIAL INSTRUCTIONS:		
SUBCONTRACTOR REQUESTING PERMIT:		DATE:

NORMAL SAFETY PRECAUTIONS

1. In the event of an emergency:
   a. Shut down equipment being used.
   b. Proceed to designated assembly area.
   c. Do not resume work until advised by supervisor.
2. Stop work on operator's request.
3. Smoking only in designated areas.
4. No running in plants except in emergency.
5. All hazardous work requires a permit.
6. If work is in progress on shift change, incoming operator must check conditions, and initial workman's permit.
7. Stop work if any unusual odor, sound or vapor is detected. Check with supervisor.
8. All electrical equipment must be grounded type.
9. Speed limit as posted.

SPECIAL PRECAUTIONS AND EQUIPMENT REQUIRED

❑ REVIEWED "SAFETY" INSTRUCTIONS FOR CONTRACTOR	❑ SIGNS TO BE POSTED	❑ BARRICADES AROUND OPEN EXCAVATION
❑ SAFETY MEETING	❑ FIRE EXTINGUISHERS ON HAND	❑ BLOCKS - BLEEDS CHECKED
❑ SAFETY WATCH REQUIRED	❑ SAFETY GLASSES REQUIRED	❑ ALL BLINDS INSTALLED
❑ WORKERS TRAINED IN S.C.B.A.	❑ FACE SHIELD REQUIRED	❑ DRAINS COVERED
❑ S.C.B.A. READILY AVAILABLE	❑ PROTECTIVE CLOTHING REQUIRED	❑ VESSELS/LINE STEAMED
❑ MEDICAL AID READILY AVAILABLE	❑ EAR PROTECTORS REQUIRED	❑ STEAM AND WATER HOSES ON HAND
❑ EMERGENCY VEHICLE ON SITE	❑ HARNESS AND HAND LINE	❑ NO OPEN VESSELS IN AREA
❑ FACIAL HAIR OBSTRUCTION/HAIR LENGTH	❑ OVERHEAD CLEARANCES ESTABLISHED	❑ NO VESSELS TO BE DRAINED
❑ GAS TEST REQUIRED	❑ UNDERGROUND LINES LOCATED	❑ NO VESSELS TO BE VENTED
❑ RADIO COMMUNICATION	❑ SUMPS COVERED	❑ NO SAMPLES TO BE TAKEN
❑ _____	❑ _____	❑ _____

APPROVAL TO PROCEED VALID UNTIL	DATE / TIME AM PM	EXTENDED TO	DATE / TIME AM PM	APPROVAL	DATE / TIME AM PM	APPROVAL

COMMENCEMENT STATUS -	COMPLETION STATUS -	SUBCONTRACTOR UNDERSTANDS WORK SCOPE NATURE OF HAZARDS AND NECESSARY SAFETY PRECAUTIONS
❑ OUT OF SERVICE	❑ SERVICEABLE	
❑ ISOLATION VALVES CLOSED	❑ ISOLATION VALVES OPEN	PRINT NAME
❑ BY PASS OPEN	❑ BY PASS CLOSED	DATE
❑ DEPRESSURIZED	❑ PURGED AND REPRESSURIZED	SIGNATURE
❑ DRAINED	❑ LIQUID FILLED	
❑ COOLED	❑ WARMED UP	
❑ LOCKED OUT	❑ LOCK REMOVED	PRINT NAME
❑ TAGGED OUT	❑ TAG REMOVED	DATE
❑ VENTS OPEN	❑ VENTS CLOSED	Noble SIGNATURE
❑ DRAIN OPEN	❑ DRAIN CLOSED	
❑ BLIND INSTALLED	❑ BLIND REMOVED	PRINT NAME
❑	❑	DATE
❑	❑	CLIENT SIGNATURE

JOB COMPLETE _____ TIME DATE _____ PRINT NAME _____ SUBCONTRACTOR SIGNATURE _____

PERMIT RETURNED _____ TIME DATE _____ PRINT NAME _____ SUBCONTRACTOR SIGNATURE _____

HOT WORK PERMIT

CONTRACTOR:	PERMIT ISSUE DATE:
LOCATION:	NO. OF PERSONS ON JOB:
DESCRIPTION OF WORK:	

Each contractor is responsible for worksite safety. This includes fire response preparedness (i.e. fire extinguishers, charge fire hose(s), fire truck etc.) as required by the nature of the work being performed.

The noted work and surrounding area have been inspected and it is presently safe to continue:

❑ Cutting	❑ Burning	❑ Welding
Surrounding Equipment / Facilities Protected	❑ YES	❑ NO
Fire Blankets Required	❑ YES	❑ NO
Welding Shields in Place	❑ YES	❑ NO
Fire Extinguisher at Work Location	❑ YES	❑ NO
Welding Machine Grounded	❑ YES	❑ NO
Area Identified Flagged Off	❑ YES	❑ NO
Oxygen/Acetylene Properly Secured	❑ YES	❑ NO
Cables/Gauges/Hoses/Flashback Arrestors Intact	❑ YES	❑ NO

SIGNATURE NAME (PRINT) (CONTRACTOR)

SIGNATURE NAME (PRINT) (NOBLE)

NOTE: This Hot Work Permit is valid for one (1) day only — and may be cancelled without notice at any time.

PERMIT TO BE SIGNED OFF PRIOR TO END OF WORK SHIFT.

❑ JOB COMPLETE ❑ INCOMPLETE

SIGNATURE NAME (PRINT) (CONTRACTOR)

NOTE: A COPY OF THIS PERMIT WILL BE DISPLAYED AT THE WORK SITE.
PERMIT VALID FOR DATE OF ISSUE ONLY.

A COPY OF THE COMPLETED PERMIT MUST BE KEPT ON FILE IN THE NOBLE OFFICE

CONFINED SPACE PRE-ENTRY MEETING DOCUMENT

PROJECT:	**PROJECT NO.:**	**CONTRACTOR:**
DATE OF ISSUE:	**PERIOD OF WORK:**	**BUSINESS** UNIT:
IDENTIFICATION OF CONFINED SPARE TO BE ENTERED:		

GENERAL WORK SCOPE		**CONTRACTOR**
Mechanical:		
Sandblast:		
Cleaning:		
Scaffolding:		
Inspections:		
Other:		

NOTE: A SAFE WORK PERMIT MUST BE ISSUED PRIOR TO ENTRY !!!

THE FOLLOWING ITEMS HAVE BEEN DISCUSSED:

	Y	**N**	**N/A**	**COMMENTS**
Identification of the confined space				
Location of the confined space				
Access route to the confined space				
Available safety shower/eye wash location				
Permit issuing location				
Are the workers qualified?				
Have the workers any medical limitations?				
Have any workers any communication limitations?				
Scope of work to be performed?				Attach documents and drawings
Type of permits required				Hot ❑ Cold ❑ Other ❑
Notification of Shift Supervisor				
Notification of Fire Marshall				

CONFINED SPACE ISOLATION AND PREPARATION:

	Y	**N**	**N/A**	**COMMENTS**
Blanking				
Are blank locations procedures in place?				Review and attach
Normal process stream contents				
Has the confined space been chemical cleaned?				
Chemical cleaning agents				
Neutralizing agents				
How is the confined space steamed?				
Has the confined space been water washed?				
How is the confined space ventilated?				
02 test required prior to entry?				Specify
L.E.L. tests required prior to entry?				
H_2S test required prior to entry?				
Are other tests required prior to entry?				Specify
Are additional tests required during the shift?				Specify
Is continuous monitoring required for the above tests?				Specify
Confined space internal physical hazards				
Confined space external physical hazards				
Are any asbestos containing materials present?				

CONFINED SPACE PRE-ENTRY MEETING DOCUMENT

CONFINED SPACE EQUIPMENT AND PROCEDURES:

	Y	N	N/A	COMMENTS
Have you checked your electrical cords? (plug/insulation damage)				
Are electrical cords plugged into external G.F.I.?				
Have you checked your welding cables?				Required for hazardous entry
Have you tested your oxyacetylene & inert gas hoses?				Remove when not in use
Are pneumatic tools/hoses secured?				Remove when not in use
Have you inspected the pneumatic hoses/gaskets?				
Will cable/hoses/cords be protected at manway?				
Is electrical lockout or disconnect required?				
Will exhaust fumes from equipment be a hazard?				Keep away from manway
Do you have a method of breaking vacuum to the vacuum hose from the truck?				
Diesel equipment emergency shutdown				Automatic ❑ Manual ❑
All equipment shutdown when unattended				
Do you have the required fire protection at the work site and for your equipment?				Specify

PPE REQUIRED FOR CONFINED SPACE OTHER THAN MINIMUM STANDARDS:

	Y	N	N/A	COMMENTS
F. R. rated disposable coveralls				
F. R. rated rubber clothing				
H_2S personal monitor				
Hearing protection				
Gloves				Rubber ❑ Leather ❑ Other ❑
Air purifying respirators (FIT testing)				Type: Cartridge
Supplied breathing air or S.C.B.A. use				
Body harness c/w life line				
Other				

CONFINED SPACE SAFETY WATCH RESPONSIBILITIES:

	Y	N	N/A	COMMENTS
Has the safety watch been identified?				How
Has the safety watch the required PPE?				
Do you have the I.D. card entry board?				
Communication in place with workers?				Type
Emergency request communications				Radio ❑ Channel ❑ Air Horn ❑
Is instruction required on radio/horn operation?				
Discuss emergency evacuation procedures				
Does the safety watch know the E.A.A. location?				
Is the safety watch trained?				
Housekeeping at entrance of confined space?				
Permit posted at job site?				

VERTICAL CONFINED SPACE ENTRY AND/OR EMERGENCY RESCUE EQUIPMENT.
CHECK OFF ITEMS REQUIRED AT WORK SITE

	Y	N	N/A
Tripod/winch for vertical entry of confined space			
Secondary fall protection for tripod			
Body harness and spreader bar for tripod use			
Stretcher ❑ or help harness			
S.C.B.A. for standby and emergency rescue (no unassisted rescue)			

CONFINED SPACE PRE-ENTRY MEETING DOCUMENT

IF SUPPLIED BREATHING AIR IS REQUIRED FOR CONFINED SPACE ENTRY WORK, COMPLETE AND SIGN THE FOLLOWING CHECKLIST

	Y	N	N/A
Are all workers adequately trained?			
Has the equipment to be used been inspected?			
Is the area secure, signs, barricades, etc.?			
Is an additional backup person required?			
Is bottle watch to act as confined space entry watch?			
Does the backup or watch person have the required PPE?			
Are the required communications/warning devices at the work site?			

ADDITIONAL INFORMATION OR COMMENTS:

DATE	NAME (PRINT)	SIGNATURE	COMPANY

We (the undersigned), understand the terms of the discussion from the pre-entry meeting.

DATE	NAME (PRINT)	SIGNATURE	COMPANY	DATE	NAME (PRINT)	SIGNATURE	COMPANY

Forward to Safety Department when work is completed.

CONFINED SPACE ENTRY PERMIT

CONTRACTOR REQUESTING PERMIT: **PERMIT ISSUE DATE:**

LOCATION: **NO. OF PERSONS ON JOB:**

DESCRIPTION OF WORK:

SPECIAL INSTRUCTIONS:

GAS TESTS ARE REQUIRED:

BEFORE THE JOB	❑ YES	❑ NO
DURING THE JOB	❑ YES (IF YES, A LOG MUST BE KEPT)	❑ NO

I EXAMINED THE ABOVE NOTED EQUIPMENT AT HOURS AND OBSERVED THE FOLLOWING READINGS:

OXYGEN % COMBUSTIBLES (LEL)

CARBON MONOXIDE P.P.M. SIGNATURE OF TESTER

THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED:

❑ HARD HATS ❑ SAFETY GLASSES ❑ GOGGLES ❑ RESPIRATORY PROTECTION
❑ HEARING PROTECTION ❑ SAFETY BELT ❑ FACE SHIELDS ❑ SAFETY HARNESS
❑ SAFETY FOOTWEAR ❑ FIRE EXTINGUISHER WORKERS TRAINED IN VESSEL ENTRY ❑ YES ❑ NO
❑ OTHER

❑ STANDBY PERSON-TASK TRAINED PRINT NAME

PERMIT RECEIVER (CONTRACTOR)

I HAVE REQUESTED THE PERMIT AND I UNDERSTAND THE NATURE AND EXTENT OF THE WORK AND I WILL ENSURE THAT THE NECESSARY PRECAUTIONS WILL BE IMPLEMENTED PRIOR TO WORKING.

SIGNATURE NAME (PRINT) TITLE

PERMIT ISSUER

I HAVE REVIEWED THE EQUIPMENT AND AREA THE CONTRACTOR IS REQUESTING TO WORK IN, AND IT MEETS THE NECESSARY REQUIREMENTS.

SIGNATURE NAME (PRINT) TITLE

PERMIT TO BE SIGNED OFF PRIOR TO END OF WORK SHIFT.

❑ JOB COMPLETE ❑ INCOMPLETE IF INCOMPLETE, PERMIT TO BE REISSUED? ❑ YES ❑ NO

SIGNATURE NAME (PRINT) (CONTRACTOR)

SIGNATURE NAME(PRINT) (NOBLE)

NOTE: A COPY OF THIS PERMIT WILL BE DISPLAYED AT THE ACCESS TO THE VESSEL.
PERMIT VALID FOR DATE OF ISSUE ONLY.

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CONFINED SPACE ENTRY PERMIT

CONTRACTOR REQUESTING PERMIT: **PERMIT ISSUE DATE:**

LOCATION: **NO. OF PERSONS ON JOB:**

DESCRIPTION OF WORK:

SPECIAL INSTRUCTIONS:

GAS TESTS ARE REQUIRED:

BEFORE THE JOB ❑ YES ❑ NO
DURING THE JOB ❑ YES (IF YES, A LOG MUST BE KEPT) ❑ NO

I EXAMINED THE ABOVE NOTED EQUIPMENT AT HOURS AND OBSERVED THE FOLLOWING READINGS:

OXYGEN _____ % COMBUSTIBLES _____ (LEL) _____

CARBON MONOXIDE _____ P.P.M. SIGNATURE OF TESTER

THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED:

❑ HARD HATS ❑ SAFETY GLASSES ❑ GOGGLES ❑ RESPIRATORY PROTECTION
❑ HEARING PROTECTION ❑ SAFETY BELT ❑ FACE SHIELDS ❑ SAFETY HARNESS
❑ SAFETY FOOTWEAR ❑ FIRE EXTINGUISHER

WORKERS TRAINED IN VESSEL ENTRY
❑ YES ❑ NO

❑ OTHER

❑ STANDBY PERSON-TASK TRAINED PRINT NAME _____

PERMIT RECEIVER (CONTRACTOR)

I HAVE REQUESTED THE PERMIT AND I UNDERSTAND THE NATURE AND EXTENT OF THE WORK AND I WILL ENSURE THAT THE NECESSARY PRECAUTIONS WILL BE IMPLEMENTED PRIOR TO WORKING.

SIGNATURE NAME (PRINT) TITLE

PERMIT ISSUER

I HAVE REVIEWED THE EQUIPMENT AND AREA THE CONTRACTOR IS REQUESTING TO WORK IN, AND IT MEETS THE NECESSARY REQUIREMENTS.

SIGNATURE NAME (PRINT) TITLE

PERMIT TO BE SIGNED OFF PRIOR TO END OF WORK SHIFT.

IF INCOMPLETE, PERMIT TO BE REISSUED?

❑ JOB COMPLETE ❑ INCOMPLETE ❑ YES ❑ NO

(CONTRACTOR)

SIGNATURE NAME (PRINT)

(NOBLE)

SIGNATURE NAME(PRINT)

NOTE: **A COPY OF THIS PERMIT WILL BE DISPLAYED AT THE ACCESS TO THE PERMIT VALID FOR DATE OF ISSUE ONLY.**

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GAS TEST RECORD

DATE	TIME	TESTER'S INITIALS	%0_2	%LEL	TOXICS (SPECIFY)	DATE	TIME	TESTER'S INITIALS	%0_2	%LEL	TOXICS (SPECIFY)

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EXCAVATION / TRENCH PERMIT

SUBCONTRACTOR: **PROJECT:** **MONTH:**

ORIGINATOR:

NAME (PRINT)_____ DATE _____

AREA _____

LOCATION OF WORK _____

PURPOSE OF EXCAVATION _____

PROPOSED DEPTH _____ LENGTH _____

EXPECTED DURATION OF JOB _____

PERSON OR COMPANY EXECUTING WORK _____

SIGNATURE OF ORIGINATOR _____

ENGINEERING

IS THE AREA TO BE EXCAVATED IN PROXIMITY OF UNDERGROUND PIPELINES AND/OR UTILITIES? ❑ YES ❑ NO

HAVE ALL UNDERGROUND PIPELINES AND/OR UTILITIES BEEN IDENTIFIED AND MARKED/FLAGGED? ❑ YES ❑ NO

ATTACH SKETCH OR DRAWING INDICATING PROPOSED EXCAVATION IN RELATION TO EXISTING FACILITIES

SIGNATURE OF ENGINEER _____

POSITION _____

SIGNATURE OF CLIENT REPRESENTATIVE _____

POSITION _____

RESPIRATOR FIT TEST

A. Contractor: _____ Date: _____

B. Employee: _____

C. Job Title: _____

D. Respirator:

Make _____

Model _____

Condition _____

E. Evaluation of Wearer:

Clean shaven _____ Moustache _____

Facial scars _____ Dentures Yes ❑

Glasses _____ No ❑

Beard growth (2 + days) _____

Others

_____

_____

F. Comments _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

G. Fit Checks:

Negative Pressure: Pass _____ Fail _____ Not Complete _____

Positive Pressure: Pass _____ Fail _____ Not Complete _____

H. Employee Acknowledgement of Test Results

Employee Signature: _____ Date: _____

Employee's Name (please print): _____

Conducted By: _____ Date: _____

Title: _____

REQUEST FOR TAGGING AND LOCKOUT

CONTRACTOR:	DATE:

1. REQUESTER:

I, _____ REQUEST THAT A TAG AND LOCK (STRIKE OUT LOCK IF NOT REQUIRED) BE ISSUED SO THAT WORK CAN PROCEED ON THE FOLLOWING EQUIPMENT. I SHALL ENSURE THAT THE CONTRACTOR TAGS/LOCKS:

A. EQUIPMENT: _____

B. EQUIPMENT NO.: _____

C. LOCATION OF EQUIPMENT: _____

2. REQUESTER'S SIGNATURE

SIGNATURE PRINT NAME DATE

3. THE TAGGING AUTHORITY SHALL COMPLETE THE FOLLOWING:

A. TAG NO. FOR EQUIPMENT: _____

B. PADLOCK NO. AND KEY NO. FOR EQUIPMENT NO.: _____

C. LOCATION OF EQUIPMENT: _____

D. DURATION OF WORK - FROM _____ TO _____

4. THE TAGGING AUTHORITY SHALL ENSURE THAT THE TAGGING AND LOCKING-OUT PROCEDURE IS COMPLIED WITH AT ALL TIMES.

5. TAGGING AUTHORITY'S SIGNATURE:

SIGNATURE PRINT NAME DATE

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REQUEST FOR REMOVAL / REPLACEMENT OF LOCKOUT

CONTRACTOR:	DATE:

1. REQUESTER:

I, _____ REQUEST THAT LOCKOUT NO. _____ ON THE FOLLOWING EQUIPMENT _____

BE REMOVED/REPLACED. THE REASON FOR THIS REMOVAUREPLACEMENT IS _____

_____

_____

_____

REQUESTER'S SIGNATURE:

SIGNATURE	PRINT NAME	DATE

2. THE TAGGING AUTHORITY HAS CHECKED THE REASONS FOR REMOVAL/REPLACEMENT AND APPROVES THE REMOVAL/REPLACEMENT OF

COMMENTS _____

_____

_____

TAGGING AUTHORITY SIGNATURE:

SIGNATURE	PRINT NAME	DATE

3. APPROVAL FOR REMOVAL/REPLACEMENT:

RESIDENT CONSTRUCTION MANAGER SIGNATURE	PRINT NAME	DATE

NOTE: LOCK WILL BE REMOVED/REPLACED BY THE TAGGING AUTHORITY ONLY.

LOCK-OUT LOG BOOK

PROJECT:	**PROJECT NO.:**	**PAGE:**
CONTRACT NAME:	**AREA:**	**SUPERINTENDENT:**
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:
Equipment Tag Number: Lock Number:	Date Locked: Worker:	Date Unlocked: Worker:

Locks issued to an individual worker shall be operable only by that worker's key and by a master key for emergency use, which shall be kept by a Noble delegate. The delegate is the Noble superintendent indicated above.

REPLACES:	**ISSUE DATE:**	**REFERENCE:**

PIPING BLANK RECORD

CONTRACTOR:	**DATE:**
BLANK SIZE:	**BLANK RATING AND NO:**
NAME OF PERSON REQUESTING BLANK (PRINT):	
P&ID NUMBER:	
P&ID LOCATION DESCRIPTION:	
PHYSICAL LOCATION DESCRIPTION:	
SIGNATURE OF PERSON REQUESTING BLANK:	**DATE:**
NAME OF PERSON INSTALLING BLANK (PRINT):	**DATE:**
NAME OF PERSON REQUESTING BLANK REMOVAL (PRINT):	**DATE:**
NAME OF PERSON REMOVING BLANK (PRINT):	**DATE:**
SIGNATURE OF PERSON REQUESTING REMOVAL:	
SIGNATURE OF BLANK AUTHORITY IN RECEIPT OF RETURN TAG:	
BLANK AUTHORITY	

SAFETY AUDIT

❑ New Construction	❑ Upgrade	❑ Shutdown
DATE	TIME	WEATHER
PROJECT	PROJECT COORDINATOR	UNIT
COMPANY	SUPERVISOR	
AUDIT TEAM SIGNATURES (PLEASE WRITE NAME AND TITLE UNDER SIGNATURE)		
TOTAL POSSIBLE POINTS	TOTAL AWARDED FOR INSPECTION	SCORE %

Audit Rating System

Each audit sub-item will be rated from 0 to 4 according to the manner in which the intent or guidelines set down in the Construction Safety and Loss Prevention Plan.

0 = Unacceptable performance and poor attitude. Immediate work stoppage.
1 = Unacceptable performance but positive attitude. Immediate improvements necessary.
2 = Acceptable. Improvements necessary.
3 = Average performance. Improvement desirable.
4 = Above average performance and attitude.

Audit sub-items that cannot be rated because of inactivity in that area will be identified as N/A (not applicable) and will not be incorporated into the rating. The overall acceptability of an audit item is the ratio of the sum of ratings of all sub-items and the total rating sum possible (4 X number of sub-items not marked N/A) expressed as a percentage. This allows different sub-items to be compared so that areas which require attention can be easily identified.

The ratings for specific audit sub-items can be trended from one audit to the next to show improvement or deterioration in safety performance. However, it is important to trend only individual items, not the entire audit contents as a lump sum because the items or areas being audited and the intensity of the audit will vary significantly between audits.

SAFETY AUDIT

Audit Items			Rating	Total Possible Score
1.	**Physical Site Conditions**			
	A.	Conditions of access to site.		
	B.	Conditions of access on site.		
	C.	Dust control.		
	D.	Runoff control (drainage).		
	E.	Conditions of laydown area.		
	F.	Conditions of material storage area.		
	G.	Adequate traffic control.		
	H.	Hazards posted and barricaded.		
				32
2.	**Construction Equipment**			
	A.	Inspection certificates.		
	B.	ROPS devices.		
	C.	Lights.		
	D.	General appearance.		
	E.	Log books.		
	F.	Backup alarms.		
	G.	Operator visibility.		
	H.	Positive air shutoff devices.		
	I.	Roadworthiness.		
	J.	Extinguishers/first aid kits in place.		
				40
3.	**Camp**			
	A.	Access in good condition.		
	B.	Security in place, yard well lit.		
	C.	General condition good.		
	D.	Fire safety equipment adequate and well positioned.		
	E.	Fire brigade organized and trained.		
	F.	Kitchen facilities clean and safe practices observed.		
	G.	Recreation facilities adequate and safely constructed or positioned.		
				28

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
4. Office Complexes		
A. General condition good/clean.		
B. Visitor screening adequate.		
C. Safe work practices evident.		
D. Bulletin board information effective.		
E. Emergency Response Plan posted and understood.		
F. Emergency numbers posted at phones.		
G. Safety is identified as being important and is being promoted during daily activities.		
		28
5. Personal Protection Equipment		
A. Hard hats.		
B. Safety glasses.		
C. Safety boots.		
D. Ear plugs/muffs.		
E. Appropriate clothing.		
F. Gloves.		
G. Leathers.		
H. Fall Protection.		
		32
6. Emergency Safety Equipment		
A. Breathing apparatus - availability/suitability.		
B. Breathing apparatus - maintenance/condition.		
C. Breathing apparatus - knowledge of users/training.		
D. H_2S and gas testing equipment - availability/suitability.		
E. H_2S and gas testing equipment - knowledge of users/training.		
F. Fire extinguishers inspected monthly.		
G. Fire extinguishers - availability/suitability.		
H. Fire extinguishers - maintenance/condition.		
I. Fire extinguishers - knowledge of users/training.		
		36

SAFETY AUDIT

Audit Items			Rating	Total Possible Score
7.	**Housekeeping**			
	A.	Visual impact.		
	B.	Elimination of slipping or tripping hazards.		
	C.	Elimination of fire hazards.		
	D.	Availability of garbage containers.		
	E.	Availability and condition of sanitary facilities.		
	F.	Orderly material storage.		
	G.	Clean lunchrooms.		
	H.	Provision of adequate lighting.		
	I.	Orderly, clean office areas.		
	J.	WHMIS program effective and understood.		
				40
8.	**Rigging/Hoisting Procedures**			
	A.	Compliance with lift study if applicable.		
	B.	Condition of slings and ropes.		
	C.	Signalman identified and utilized.		
	D.	Standard signal used.		
	E.	Handlines utilized.		
	F.	Outriggers used.		
	G.	Area cleared and roped off.		
	H.	No interference with power lines.		
				32
9.	**Emergency Response Program**			
	A.	Effective program is in place.		
	B.	Well publicized/posted/understood.		
	C.	Communication equipment available.		
	D.	Emergency equipment available/positioned.		
	E.	Emergency numbers posted at phones.		
	F.	Program effectiveness tested.		
				24

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
10. General Usage of Tools/equipment		
A. Ladders suitable and well positioned.		
B. Appropriate climbing/material hoisting techniques used for ladders.		
C. Scaffolding properly constructed and stable.		
D. Scaffolding tested/inspected/tagged before use, tag to bear name of responsible worker.		
E. Guardrails, mid-rails, toe boards, work platform acceptable.		
F. Compressed gas bottles properly identified and stored.		
G. Hand tools in good condition.		
H. Proper tools being utilized for job.		
I. Electrical cords properly sized, grounded.		
J. Distribution boxes secured, properly rated explosion-proof if required, and properly installed.		
K. Air hoses properly connected, whip checked.		
L. Welding shields in place around welding areas.		
		48
11. Excavation		
A. Permits in place if required.		
B. Underground hazards identified.		
C. Excavation sloped if to be entered, or shored.		
D. Egress properly positioned.		
E. Spoil properly positioned.		
F. Excavation flagged/barricaded.		
		24
12. First Aid		
A. Proper certified personnel by Subcontractors.		
B. Proper certified personnel by NOBLE.		
C. Condition of first aid trailers.		
D. Proper supplies, inventory control.		
E. Records, first aid logs.		
F. Suitable emergency conveyance.		
G. Suitable communication capabilities.		
H. Emergency eyewash equipment suitably located.		
		32

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
13. Fire Protection		
A. Equipment well located.	_____	
B. Sufficient equipment available.	_____	
C. Smoking areas posted.	_____	
D. Proper maintenance program.	_____	
E. Fire response program available and posted.	_____	
F. Fire response understood by workers.	_____	_____
		24
14. General Safety Inspections		
A. Proper frequency and thoroughness.	_____	
B. Performed by proper personnel.	_____	
C. Subcontractor and Resident Construction Manager properly advised of deficiencies.	_____	
D. Subcontractor eliminated hazards/deficiencies when identified.	_____	
E. Deficiency corrections are verified and recorded.	_____	_____
		20
15. Subcontractor Safety Attitude		
A. Cares about safety.	_____	
B. Controls workers and Subcontractors.	_____	
C. Monitors/inspects own conditions/actions.	_____	
D. Responds quickly to correct identified deficiencies.	_____	
E. Does not allow safety problems to recur.	_____	
F. Provides qualified conscientious supervisors.	_____	
G. Actively trains employees.	_____	
H. Promotes safety.	_____	_____
		32
16. Accident/Incident Investigations		
A. Proper persons participate in investigations.	_____	
B. Verbal and written reports to management are prompt and accurate.	_____	
C. Responsibility for implementing steps to prevent recurrences is assigned.	_____	_____
		12

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
17. Meetings		
A. Pre-construction safety meetings are held with Subcontractors prior to job commencement, properly identify and review issues and are minuted.	_____	
B. Daily toolbox meetings occur, are useful and are properly recorded by Subcontractor.	_____	
C. Weekly toolbox meetings occur, are useful and are recorded by Subcontractor.	_____	
D. Weekly site supervisors meetings occur, are useful, are recorded, and action items are followed up and verified.	_____	
E. Management/supervisor safety meetings are held, address the important issues and have suitable follow-up to identified problems.	_____	_____
		20
18. Records		
A. First aid records are accurate and are cross-referenced with Subcontractor statistics reports.	_____	
B. Accident reports are prompt and thorough.	_____	
C. Lost time reports are accurate.	_____	
D. Incident reports are prompt and results publicized to prevent recurrence.	_____	
E. Subcontractor safety minutes are accurate and available.	_____	
F. Safety minutes are accurate and action items are assigned and verified.	_____	
G. Significant items from safety meetings are shared with all Subcontractors and are publicized on the project.	_____	
H. Orientation records are kept. Worker lists are kept up-to-date.	_____	
I. Audits are timely, problems identified, outstanding items followed up.	_____	
J. Audit recommendations for improvements are acted on by management.	_____	
K. Monthly statistics reports are prompt and accurate.	_____	
L. Field job files are neat and secure.	_____	_____
		48

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
19. Training and Award Programs		
A. Supervisor training effective, accepted by Subcontractors and shows positive results.	_____	
B. Orientation is effective, well accepted, and is a prerequisite to working on site on all cases.	_____	
C. Subcontractors provide effective on-the-job safety and skill training and give adequate instructions.	_____	
D. Specialized training courses, H_2S, WHMIS, Breathing Apparatus, First Aid, are utilized where offered on a volunteer basis, are effective.	_____	
E. Safety award program is well published, supported by Subcontractors.	_____	_____
	_____	20
20. Safe Work Permit System		
A. Well-defined requirements.	_____	
B. Requirements understood by Subcontractors.	_____	
C. Utilized where required.	_____	
D. Conditions properly identified on permits.	_____	
E. Conditions enforced/followed.	_____	
F. Permit available at work site.	_____	
G. Conditions outlined to workers before work started.	_____	
H. Permits returned/cancelled as required.	_____	_____
	_____	32
21. Worker Knowledge/Attitude		
A. Positive worker attitude toward safety.	_____	
B. Worker understands Safe Work procedures.	_____	
C. Worker understands permit requirements.	_____	
D. Worker understands specific job requirements.	_____	
E. Worker understands WHMIS requirements.	_____	
F. Worker is skilled in job assigned to perform.	_____	
G. Worker is aware of fire equipment locations and familiar with use.	_____	
H. Worker is aware of emergency response/evacuation requirements.	_____	_____
	_____	32

SAFETY AUDIT

Audit Items	Rating	Total Possible Score
22. Construction Management Participation		
A. Safety is promoted actively.		
B. Responds quickly to correct deficiencies.		
C. Attends/participates in safety meetings and programs.		
D. Discusses safety as a priority with Subcontractors.		
E. Participates in investigations and audits.		
F. Driving habits.		
		24

Comments

INDUSTRIAL RELATIONS INCIDENT REPORT

CONTRACT No.:				
CONTRACTOR:				
DATE OF REPORT:				
1. HAVE YOU RECEIVED ANY GRIEVANCES?		YES		NO

IF YES, PLEASE LIST GRIEVANCES AND ACTION TAKEN TO RESOLVE THESE.

DATE GRIEVANCE LODGED	NATURE	OUTCOME

2. LIST DETAILS OF ANY SEVERE DISCIPLINARY ACTION (EXCLUDING DISMISSALS) APPLIED TO CONTRACTOR'S PERSONNEL. (E.G., FINAL WRITTEN WARNINGS, SUSPENSIONS)

DATE OF DISCIPLINARY ACTION	EMPLOYEE NAME AND I.D. No.	NATURE OF OFFENCE	LEVEL OF DISCIPLINE	APPEAL LODGED Y/N	OUTCOME

3. LIST DETAILS OF ANY DISMISSALS OF CONTRACTOR'S PERSONNEL

DATE OF DISMISSAL	EMPLOYEE NAME AND I.D. No.	NATURE OF OFFENCE	TRADE UNION AFFILIATION	APPEAL LODGED Y/N	OUTCOME

INDUSTRIAL RELATIONS INCIDENT REPORT

4. LIST DETAILS OF ANY CONTACT WITH TRADE UNION OFFICIALS

DATE	NATURE OF CONTACT	REASON

5. HAVE YOU HELD A MEETING OF THE COMMUNICATION COMMITTEE (EMPLOYEE REPRESENTATIVE) BODY?

_____ YES _____ NO

IF YES, PLEASE LIST MAIN POINTS ON AGENDA. OUTCOME OF THE DISCUSSION AND ANY FURTHER ACTION REQUIRED.

DATE MEETING HELD: POINT OF AGENDA	SUMMARY OF DISCUSSION	FURTHER ACTION

(ATTACH COPIES OF MINUTES)

6. LIST TRADE UNIONS THAT HAVE PAID UP MEMBERSHIP ON SITE (I.E. STOP ORDERS) AND THE NUMBER OF PAID UP MEMBERS.

NAME OF TRADE UNION:							
SITE OFFICE							
SUPERVISORY							
SKILLED							
SEMI-SKILLED							
UN-SKILLED							

7. HAVE YOU EXPERIENCED ANY POTENTIAL / ACTUAL INCIDENT OR TRADE UNION CLAIMS?
IF YES, GIVE DETAILS OF INCIDENT / CLAIM:

INDUSTRIAL RELATIONS INCIDENT REPORT

8. HAVE YOU EXPERIENCED ANY POTENTIAL / ACTUAL INCIDENT?
I.E.: STRIKE, WORK STOPPAGE, STAYAWAY, ETC.

_____

_____

9. DATE: _____ TIME FROM _____ TO _____

10. TRADE UNION AFFILIATION: _____

11. (A) SKILL RATIO

	EMPLOYEES THAT PARTICIPATED	EMPLOYEES THAT DID NOT PARTICIPATE
No. OF SKILLED		
No. OF SEMI-SKILLED		
No. OF UN-SKILLED		

(B) TOTAL HOURS LOST: _____

12. WERE THERE ANY ACTS OF VIOLENCE OR INTIMIDATION REPORTED? YES _____ NO _____

13. IF SO, WAS THIS REPORTED TO SECURITY AND WHAT ACTION IS THE CONTRACTOR TAKING?

_____

14. WHAT FORM OF COMMUNICATION CHANNELS WERE USED BETWEEN MANAGEMENT AND PARTICIPATING EMPLOYEES PRIOR TO AND DURING THE INCIDENT?

_____

_____

_____

15. DESCRIPTION OF THE GRIEVANCE / DEMAND:

_____

_____

16. HAS THE MATTER BEEN RESOLVED WITH A PERMANENT SOLUTION, OR DOES IT STILL REQUIRE FURTHER ATTENTION. I.E. STATE OUTCOME OF DISPUTE, WAS THE MATTER REFERRED TO DISPUTE RESOLUTION?

_____

_____

INDUSTRIAL RELATIONS INCIDENT REPORT

17. WHO WAS THE COMPANY SPOKESMAN / REPRESENTATIVE(S) DURING THE INCIDENT?

_____

18. WHO SPOKE OR REPRESENTED THE PARTICIPATING EMPLOYEES DURING THE INCIDENT? (STATE IF A TRADE UNION WS INVOLVED)

_____

19. LIST DATE AND TIME OF ANY MEETING(S) BETWEEN THE PARTIES.

_____
_____
_____

(PLEASE ATTACH COPIES OF ANY MINUTES TAKEN)

20. HAS ANY WRITTEN BRIEFS, MEMOS, FAXES BEEN EXCHANGED BETWEEN THE PARTIES DURING OR PRIOR TO INCIDENT?

(PLEASE ATTACH COPIES OF ANY MINUTES TAKEN) _____ YES _____ NO

21. ANY ADDITIONAL INFORMATION?

COMPLETED BY:

_____

CAPACITY:

_____

DATE

_____

SIGNATURE

_____

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CONSTRUCTION INSPECTION CHECKLIST

Contractor: _____ Date of Inspection: _____

Area of Inspection: _____ Inspected By: (print) _____

Yes	No	N/A	Particulars
			Job Site
❑	❑	❑	Free of obstructions
❑	❑	❑	Wide enough for normal movement
❑	❑	❑	In good repair
❑	❑	❑	Ramps or steps provided
❑	❑	❑	Free of slipping and tripping hazards
❑	❑	❑	Stair treads blocked
❑	❑	❑	Free of protrusion – nails, rebar, etc.
❑	❑	❑	Openings covered or barricaded
❑	❑	❑	Guards provided
❑	❑	❑	Proper site drainage
❑	❑	❑	Access graveled and compacted
			Scaffolds
❑	❑	❑	Footing stable, level
❑	❑	❑	Plumb and well braced
❑	❑	❑	Inspected periodically
			Anchored
❑	❑	❑	• Vertically (4.5 m.)
❑	❑	❑	• Horizontally (6 m)
			Planks minimum
❑	❑	❑	• 2" X 10" fir construction
❑	❑	❑	• 2" X 12" spruce construction
❑	❑	❑	Span no more than 3 meters
❑	❑	❑	Guard rail tips – 0.9 m to 1.1 high
❑	❑	❑	No cable or rope rails
❑	❑	❑	Ladders provided
❑	❑	❑	Ladders extend 3 ft. above platform
❑	❑	❑	Toe boards provided
❑	❑	❑	Work platform min. 2 planks wide
❑	❑	❑	Planks secured
❑	❑	❑	Planks extended minimum 15 cm.
❑	❑	❑	Fireproof or metal plank used as required.
❑	❑	❑	Kept clean and uncluttered
❑	❑	❑	Tagged
❑	❑	❑	Height/base ratio less than 3:1
❑	❑	❑	Surface smooth/firm
❑	❑	❑	Wheels blocked or locked
❑	❑	❑	All members firmly fastened
			Ladders
❑	❑	❑	Properly constructed (wooden)
❑	❑	❑	Certified
❑	❑	❑	4:1 ratio
❑	❑	❑	Properly secured
❑	❑	❑	Tie-off at top
❑	❑	❑	Properly chocked
❑	❑	❑	Anti-slip feet
❑	❑	❑	Damaged removed from service

Yes	No	N/A	Particulars
			Compressed Cylinders
❑	❑	❑	Stored upright and secured
❑	❑	❑	Caps in place
❑	❑	❑	Segregated and market
❑	❑	❑	Removed from work area when empty
❑	❑	❑	Shut off at bottle when not used
❑	❑	❑	Equipment and hoses in good repair
❑	❑	❑	Stored away from electrical contact
❑	❑	❑	Not stored in stairways and egress routes
❑	❑	❑	Flash-back arrestors in place
			Tools
❑	❑	❑	Inspected and/or repaired
❑	❑	❑	General condition
❑	❑	❑	Guards in place and serviceable
❑	❑	❑	Electrical tools grounded & double insulated
❑	❑	❑	Power-activated tools used properly
			Electrical
❑	❑	❑	Properly protected
❑	❑	❑	System and cords grounded
❑	❑	❑	Cords and cables in good condition
❑	❑	❑	Extension cords color coded quarterly (industrial)
❑	❑	❑	Distribution boxes closed and secured
❑	❑	❑	Explosion-proof fixture where required
❑	❑	❑	Lock out system in place
			Rigging
❑	❑	❑	Area cleared for overhead hoisting
❑	❑	❑	Slings and ropes in good condition
❑	❑	❑	Tag lines in use
❑	❑	❑	Signal men designated and identified
❑	❑	❑	Safe distance from power lines
❑	❑	❑	Proper radius for loads
❑	❑	❑	Area roped off as required
			Vehicles and Mobile Equipment
❑	❑	❑	Authorized personnel operating
❑	❑	❑	Warning devices operative
❑	❑	❑	Speed limit observed
❑	❑	❑	In good mechanical condition
❑	❑	❑	Used in proper manner
❑	❑	❑	Extinguishers installed/inspected
❑	❑	❑	Equipment certified/inspected

CONSTRUCTION INSPECTION CHECKLIST

Yes	No	N/A	Particulars
			Excavation
❑	❑	❑	Permit Obtained
❑	❑	❑	Flagged and/or barricaded
❑	❑	❑	Properly sloped 45 deg. minimum
❑	❑	❑	Egress ladders provided/installed/used
❑	❑	❑	Shored as required
❑	❑	❑	Spoil pile back 60 cm back from top of excavation
			Fire Prevention
❑	❑	❑	Hydrants accessible
❑	❑	❑	Extinguishers available/adequate and identified
❑	❑	❑	Checked on routine basis
❑	❑	❑	"No Smoking" posted as required
❑	❑	❑	Combustibles properly stored
❑	❑	❑	Fire blankets used when required
❑	❑	❑	Welding areas kept free of combustible material
❑	❑	❑	Sewers covered for hot work
❑	❑	❑	Record of being serviced
			Personal Protection
❑	❑	❑	Hard hats
❑	❑	❑	Eye protection
❑	❑	❑	Hearing protection
❑	❑	❑	Face shield
❑	❑	❑	Respirators and masks
❑	❑	❑	Safety harness/lanyards
❑	❑	❑	Footwear
❑	❑	❑	Clothing
			Permits
❑	❑	❑	Obtained as required
❑	❑	❑	Conditions followed
❑	❑	❑	Safe work plans available
❑	❑	❑	Permit in work area returned at end of day

Yes	No	N/A	Particulars
			Material Storage
❑	❑	❑	Racks and shelves provided
❑	❑	❑	Storage area orderly
❑	❑	❑	Stacked material secured
❑	❑	❑	Pallets stacked securely
❑	❑	❑	Chemicals properly labeled & properly secured
			General
❑	❑	❑	Poster, safety grams displayed
❑	❑	❑	Tool box meeting held
❑	❑	❑	Heavy duty skips, bins provided for clean-up
❑	❑	❑	Emergency procedure posted
❑	❑	❑	Hazardous material data available
❑	❑	❑	Eye wash and showers available if needed
❑	❑	❑	Appearance of area
❑	❑	❑	Lunchrooms
❑	❑	❑	Adequate waste containers used.
❑	❑	❑	Sanitary facilities
❑	❑	❑	Tag lines in use
❑	❑	❑	Designated smoking area
❑	❑	❑	Adequate First Aid supplied
❑	❑	❑	Proper First Aid station
			Unsafe Acts
❑	❑	❑	Failing to use adequate personal protection equipment
❑	❑	❑	Not following instructions on safety permit
❑	❑	❑	No safety permit for the job
❑	❑	❑	Working unsafely
❑	❑	❑	Unsafe use of tools or equipment
❑	❑	❑	Using unsafe ladders or scaffolds
❑	❑	❑	No safety belt when required
❑	❑	❑	Not following job procedures

COMMENTS

JOINT WORK SITE INSPECTION CHECKLIST

Date of Inspection: _____
Area of Inspection: _____
Inspected By: (print) 1. _____ 2. _____
3. _____ 4. _____

Yes	No	N/A	Particulars
			Job Site
❑	❑	❑	Free of obstructions
❑	❑	❑	Ramps or steps provided
❑	❑	❑	Free of slipping and tripping hazards
❑	❑	❑	Stair treads blocked
❑	❑	❑	Free of protrusion – nails, rebar, etc.
❑	❑	❑	Openings covered or barricaded
❑	❑	❑	Barricades/guards provided
❑	❑	❑	Proper site drainage
❑	❑	❑	Access graveled and compacted

Comments

			Scaffolds
❑	❑	❑	Footing stable, level
❑	❑	❑	Plumb and well braced
❑	❑	❑	Inspected periodically (weekly)
			Anchored
❑	❑	❑	> Vertically (15 ft.)
❑	❑	❑	> Horizontally (20 ft.)
			Planks minimum
❑	❑	❑	> 2" X 10" fir construction
❑	❑	❑	> 2" X 12" spruce construction
❑	❑	❑	Span no more than 10 feet
❑	❑	❑	Handrail top 34-40 inches
❑	❑	❑	Midrail
❑	❑	❑	Ladders provided
❑	❑	❑	Ladders extend 3 ft. above platform
❑	❑	❑	Toe boards provided
❑	❑	❑	Work platform min. 2 planks wide
❑	❑	❑	Planks secured
❑	❑	❑	Kept clean and uncluttered
❑	❑	❑	Tagged
❑	❑	❑	Height/base ratio less than 3:1
❑	❑	❑	Surface smooth/firm
❑	❑	❑	Wheels blocked or locked
❑	❑	❑	All members firmly fastened

Comments

Yes	No	N/A	Particulars
			Compressed Cylinders
❑	❑	❑	Stored upright and secured
❑	❑	❑	Caps in place when not in use
❑	❑	❑	Removed from work area when empty
❑	❑	❑	Shut off at bottle when not used
❑	❑	❑	Equipment and hoses in good repair
❑	❑	❑	Stored away from electrical contact
❑	❑	❑	Not stored in stairways and egress routes
❑	❑	❑	Flash-back arrestors in place
❑	❑	❑	No smoking signed posted and/or properly identified

Comments

			Tools
❑	❑	❑	Inspected and/or repaired
❑	❑	❑	General condition
❑	❑	❑	Guards in place and serviceable
❑	❑	❑	Electrical tools grounded & double insulated
❑	❑	❑	Being used properly
❑	❑	❑	Power-activated tools used properly

Comments

			Electrical
❑	❑	❑	Properly protected
❑	❑	❑	System and cords grounded
❑	❑	❑	Cords and cables in good condition
❑	❑	❑	Extension cords color coded quarterly (industrial)
❑	❑	❑	Distribution boxes closed and secured
❑	❑	❑	Explosion-proof fixture where required
❑	❑	❑	Lock out system in place

Comments

JOINT WORK SITE INSPECTION CHECKLIST

Ladders

❑	❑	❑	Properly constructed (wooden)
❑	❑	❑	Certified
❑	❑	❑	4:1 ratio
❑	❑	❑	Properly secured
❑	❑	❑	Tie-off at top
❑	❑	❑	Properly chocked
❑	❑	❑	Anti-slip feet
❑	❑	❑	Damaged removed from service

Comments

Rigging

❑	❑	❑	Area cleared for overhead hoisting
❑	❑	❑	Slings and ropes in good condition
❑	❑	❑	Communication system in place
❑	❑	❑	Tag lines in use
❑	❑	❑	Signal men designated and identified
❑	❑	❑	Safe distance from power lines
❑	❑	❑	Proper radius for loads
❑	❑	❑	Area roped off as required

Comments

Excavation

❑	❑	❑	Permit Obtained
❑	❑	❑	Flagged and/or barricaded
❑	❑	❑	Properly sloped
❑	❑	❑	Egress ladders provided/installed/used
❑	❑	❑	Shored as required
❑	❑	❑	Spoil pile back 2 ft. back from top of excavation

Comments

Vehicles and Mobile Equipment

❑	❑	❑	Authorized personnel operating
❑	❑	❑	Warning devices operative
❑	❑	❑	Speed limit observed
❑	❑	❑	In good mechanical condition
❑	❑	❑	Wheel chocks in place when parked
❑	❑	❑	Used in proper manner
❑	❑	❑	Extinguishers installed/inspected
❑	❑	❑	Equipment certified/inspected

Comments

Fire Prevention

❑	❑	❑	Hydrants accessible
❑	❑	❑	Extinguishers available/adequate and identified
❑	❑	❑	Checked on routine basis
❑	❑	❑	"No Smoking" posted as required
❑	❑	❑	Combustibles properly stored
❑	❑	❑	Fire blankets used when required
❑	❑	❑	Welding areas kept free of combustible material
❑	❑	❑	Sewers covered for hot work
❑	❑	❑	Record of being serviced (extinguishers)
❑	❑	❑	Protection from welding flash

Comments

Material Storage

❑	❑	❑	Racks and shelves provided
❑	❑	❑	Storage area orderly
❑	❑	❑	Stacked material secured
❑	❑	❑	Pallets stacked securely
❑	❑	❑	Chemicals properly labeled & properly secured

Comments

JOINT WORK SITE INSPECTION CHECKLIST

Personal Protection

- ❑ ❑ ❑ Hard hats
- ❑ ❑ ❑ Eye protection
- ❑ ❑ ❑ Hearing protection
- ❑ ❑ ❑ Face shield
- ❑ ❑ ❑ Respirators and masks
- ❑ ❑ ❑ Safety harness/lanyards
- ❑ ❑ ❑ Footwear
- ❑ ❑ ❑ Clothing

Comments

Unsafe Acts

- ❑ ❑ ❑ Failing to use adequate personal protection equipment
- ❑ ❑ ❑ Not following instructions on safety permit
- ❑ ❑ ❑ No safety permit for the job
- ❑ ❑ ❑ Working unsafely
- ❑ ❑ ❑ Unsafe use of tools or equipment
- ❑ ❑ ❑ Using unsafe ladders or scaffolds
- ❑ ❑ ❑ No safety harness when required

Comments

Permits

- ❑ ❑ ❑ Obtained as required
- ❑ ❑ ❑ Conditions followed
- ❑ ❑ ❑ Work properly defined
- ❑ ❑ ❑ Permit in work area returned at end of day

Comments

General

- ❑ ❑ ❑ Tool box meeting held
- ❑ ❑ ❑ Heavy duty skips, bins provided for clean-up
- ❑ ❑ ❑ Emergency procedure posted
- ❑ ❑ ❑ Hazardous material data available
- ❑ ❑ ❑ Eye wash and showers available if needed
- ❑ ❑ ❑ Appearance of area
- ❑ ❑ ❑ Lunchrooms
- ❑ ❑ ❑ Sanitary facilities
- ❑ ❑ ❑ Designated smoking area
- ❑ ❑ ❑ Adequate First Aid supplied
- ❑ ❑ ❑ Proper First Aid station
- ❑ ❑ ❑ Pre-shift equipment inspections completed

Comments

GENERAL COMMENTS

SCAFFOLD INSPECTION

COMPANY: _____ DATE: _____

		YES	NO
1. Is the Scaffold:	Level?	☐	☐
	Base solid?	☐	☐
2. Is there adequate bracing?		❑	❑
3. Are ties provided every	15 feet vertically?	❑	❑
	20 feet horizontally?	❑	❑
4. Are proper ladders provided for access to top platforms?		❑	❑
5. Does the ladder(s) extend	3 feet above work platform?	❑	❑
6. Are platforms?	Completely covered (No openings)?	❑	❑
	Cleated or tied down	❑	❑
	Of span less than 10 feet?	❑	❑
	Clear and uncluttered?	❑	❑
7. Are guard rails provided:	Minimum 1" X 4" lumber?	❑	❑
	34 inches to 42 inches high?	❑	❑
	Standards minimum 10 feet apart?	❑	❑
	Provided with mid-rail?	❑	❑
	Provided with toe boards	❑	❑
	Drop bar or swing gate built in	❑	❑

Comments: _____

_____

_____

_____

_____

Inspected By (Print Name): _____

Signature: Date: _____

Note: Only those scaffolds meeting all of the above requirements may be tagged as being safe to use. The scaffold tagging system used must bear the name of the worker responsible for inspection and date the scaffold was last inspected.

SECURITY SHIFT REPORT

PLEASE PRINT ALL INFORMATION

DATE:	**SHIFT TIME:** **FROM** **TO**	**CLIENT:**
LOCATION:	**REPORTED BY:**	**OPERATION INSPECTED BY:**

TIME:	**DETAILS &ACTION**	**INCLUDE ALL RELEVANT INFORMATION - I.E., DOORS OR WINDOWS OPEN OR DAMAGED, PROPERTY DAMAGE, ACCIDENTS, SAFETY OR FIRE HAZARDS, VISITORS OR OTHER INFORMATION THAT MAY BE OF INTEREST TO CLIENTS. ENSURE ALL AREAS COVERED AS TO WHO, WHEN, WHERE, WHY, HOW, SUPPLY DESCRIPTION IF NAMES NOT AVAILABLE**

RELIEVED BY **SIGNED**

Noble
Engineers & Constructors

SECURITY DAILY OCCURRENCE LOG

PLEASE PRINT ALL INFORMATION

DATE: **CLIENT:** **LOCATION:**

SUPERVISOR: **INITIALS:**

DATE	TIME	REPORTED BY	DETAILS OF OCCURRENCE	SIGNED

Site Specific Safety Orientation

Contractor/Subcontractor: _____ Project No. _____

The success of the construction safety program depends on its implementation at all levels beginning with senior top management. The safety performance of each of our subcontractors is equally important as that of our own.

Print Name: _____ Trade: _____
Address: _____ Tel. No. _____
_____ NIS No.: _____
Name of contact person: _____
Tel. No.: _____

Medical Questions

1. Do you have any known allergies? No ☐ Yes ☐ Describe_____
2. Are you on any medication? No ☐ Yes ☐ Describe_____
3. Do you have first aid training? No ☐ Yes ☐ Describe_____

Safety Rules and Regulations

1. ☐ Special State/OSHA Requirements
2. ☐ Emergency Response
3. ☐ First Aid Station
4. ☐ Reporting ACC/Hazards
5. ☐ Worker Responsibilities
6. ☐ Foreman Responsibilities
7. ☐ Management Responsibilities
8. ☐ Worker Right to Know
9. ☐ Site Hazards
10. ☐ HMIS/MSDS – Training/Locations
11. ☐ Communication System
12. ☐ Traffic Patterns/Parking/Security
13. ☐ Safety Meetings – Daily/Weekly
14. ☐ Smoking/Alcohol/Drugs
15. ☐ Good Housekeeping/Sanitation
16. ☐ Equipment Inspection/Certification
17. ☐ Equipment Backup Alarms
18. ☐ Types of H20/Potable
19. ☐ P.P.E. Eyes/Ears/Head/Hands/Feet
20. ☐ Safety Harness/Lanyards
21. ☐ Confined Space/Training
22. ☐ Work Permit
23. ☐ Scaffolding/Tag System
24. ☐ Ladders
25. ☐ Riggers – Responsibilities/Identification
26. ☐ Slings – Certified/Good Repair
27. ☐ Excavations
28. ☐ Barricades
29. ☐ Signage/Flagging
30. ☐ Welders Respon./Work Protection etc.
31. ☐ Fire Extinguishers/Locations/Inspected
32. ☐ Torch/Cut Equip/Safegrds/Flash Arrestors
33. ☐ Proper Storage/Transporting Cylinders
34. ☐ Inspection of Hoses/Coupling/etc.
35. ☐ Equipment Safeguards
36. ☐ Grinders/Disc Rated
37. ☐ Electrical Cords/Connectors/Overhead Lines
38. ☐ Hand Tools/Power Tools
39. ☐ Rowdiness/Horseplay
40. ☐ Others: _____
_____
_____

Signed: _____ Date: _____

Instructor: _____ Date: _____

SECURITY INCIDENCE REPORT

DATE:	TIME:	**CUENT:**
LOCATION:	**REPORTED BY:**	**REPORTED TO:**

NATURE OF INCIDENT	**DETAILS AND ACTION** (INCLUDE ALL RELEVANT INFORMATION. ENSURE ALL AREAS COVERED AS TO WHO, WHEN, WHERE, WHY, HOW, SUPPLY DESCRIPTION IF NAMES NOT AVAILABLE)
1. THEFTS: COMMITTED, ATTEMPTED?	
2. TRESPASSERS, SUSPICIOUS ACTIVITIES?	
3. PROPERTY DAMAGED	
4. DOORS OR WINDOWS OPEN? BROKEN?	
5. VAULTS OR SAFE DOORS OPEN?	
6. VISITORS: NAME, TIME?	
7. ACCIDENTS?	
8. SECURITY LIGHTS OFF?	
9. PARKING VIOLATIONS? LICENSE NUMBERS	
10. SAFETY HAZARDS?	
11. FIRE HAZARDS: SMOKING VIOLATIONS	
12. FIRE	
13. WATER LEFT RUNNING	
14. PIPES BROKEN	
15. INSIDE TEMP. TOO HIGH/LOW	
16. COMPLAINTS?	
17. OTHER?	

CALLED	**ARRIVED**	**OFFICER ATTENDING**	**(OFFICE USE ONLY)**
POLICE			DATE, STAMP, INITIAL
FIRE DEPARTMENT			
AMBULANCE			
EMERGENCY REFERENCE			
BUILDING MAINTENANCE			
HEAD QUARTERS NOTIFIED			

INCIDENT / ACCIDENT INVESTIGATION REPORT

PROJECT NAME:	**PROJECT NO.:**	**REPORT NO.:**
COMPANY/SUBCONTRACTOR:	**SUPERVISOR/FOREMAN:**	
LOCATION OF ACCIDENT/INCIDENT:		
DATE OF OCCURRENCE:	**TIME:**	
DATE REPORTED:	**TIME:**	
REPORTED BY:	**REPORTED TO:**	

Type of Accident or Incident			
	❑ Personal Injury	❑ Near Miss	❑ Inhalation Exposure
	❑ Equipment Damage	❑ Security Theft	❑ Chemical Exposure
	❑ Equipment Failure	❑ Spill Release	❑ Occupation Illness
	❑ Property Damage	❑ Material Loss	❑ Contamination
	❑ Fire/Explosion	❑ Environmental	❑ Other (Explain)

PERSONAL INJURY	**EQUIPMENT/PROPERTY**
RECORDED AS First Aid ❑ Medical ❑ Lost Time ❑	**PROPERTY/EQUIPMENT DAMAGED**
INJURED PERSON'S NAME AND ADDRESS	
OCCUPATION	**ESTIMATED COSTS** **ACTUAL COST** $
INJURED BODY PART	**NATURE OF DAMAGE**
NATURE OF INJURY	**OBJECT/EQUIPMENT/SUBSTANCE INFLICTING DAMAGE**
OBJECT/EQUIPMENT/SUBSTANCE INFLICTING INJURY	**PERSON WITH MOST CONTROL OF OBJECT/EQUIPMENT/SUBSTANCE**
PERSON WITH MOST CONTROL OF OBJECT/EOUIPMENT/SUBSTANCE	**IDENTIFY OTHER WORKERS INVOLVED**

VEHICLE(S) or EQUIPMENT INVOLVED

VEHICLE #1	**VEHICLE #2**
Make of Vehicle _____	Make of Vehicle _____
License No. _____	License No. _____
Serial # _____	Serial # _____
Company _____	Company _____
Company Address _____	Company Address _____
Owned/Rented/Leased From _____	Owned/Rented/Leased From _____
Insurance Co. _____	Insurance Co. _____
Operator's Name _____	Operator's Name _____
Operator's Address _____	Operator's Address _____
_____	_____
Driver's License No. _____	Driver's License No. _____
Phone No. _____	Phone No. _____

NAME/ADDRESS OF WITNESS:	**NAME/ADDRESS OF WITNESS:**
_____	_____
_____	_____
_____	_____

PROPER AUTHORITIES NOTIFIED **YES** **NO**

WHO?

DESCRIPTION

INCIDENT / ACCIDENT INVESTIGATION REPORT

DESCRIBE CLEARLY HOW THE INCIDENT/ACCIDENT OCCURRED. INCLUDE A DIAGRAM (SEE LAST PAGE)
REMEMBER: WHAT, WHEN, WHERE AND WHY?

ANALYSIS

DIRECT CAUSES: WHAT ACTS, FAILURES TO ACT AND WHAT CONDITIONS MAY HAVE CONTRIBUTED MOST DIRECTLY TO THIS INCIDENT/ACCIDENT?

ANALYSIS

INDIRECT CAUSES: WHAT ARE THE OTHER CONTRIBUTING FACTORS TO THE DIRECT CAUSES?

PREVENTION

WHAT ACTION OR RECOMMENDATIONS ARE MADE TO PREVENT RECURRENCE? PLACE AN "X" NEXT TO ITEMS COMPLETED.

DIAGRAM

MAKE A DIAGRAM OF THE ACCIDENT SCENE, INCLUDING MEASUREMENTS TO FIXED OBJECTS. SHOW SKID MARKS WHERE APPLICABLE.

INCIDENT / ACCIDENT INVESTIGATION REPORT

ATTACH ALL SIGNED WITNESS STATEMENTS

ACCIDENTS	❑ PREVENTABLE	❑	NON PREVENTABLE		
SEVERITY	❑ MAJOR	❑	SERIOUS	❑	MINOR
FREQUENCY	❑ FREQUENT	❑	OCCASIONAL	❑	RARE

Investigated By	Date	Reviewed By	Date
Noble	Date	Clients' Site Manager (if req'd)	Date

CRANE ACCIDENT INVESTIGATION REPORT

CONTRACTOR:	**DATE AND TIME OF ACCIDENT:**	
CRANE MAKE:	**SERIAL NO.:**	**JOB NO.:**
MODEL:	**CAPACITY:**	**AGE OF CRANE:**
NAME OF OPERATOR:	**OE No:**	**YEARS IN PROFESSION:**
❑ **RENTED (Name of Owner):**	**JOB LOCATION:**	

Description:

❑ Continued on attached page.

Sketch (Plan and elevation showing positions of the crane and involved items or persons immediately before and after the accident:

❑Continued on attached page.

CRANE ACCIDENT INVESTIGATION REPORT

C. Injuries

Name	Injury	Employer

❑ Continued on attached page.

D. Property Damage (other than damage to crane)

❑ Continued on attached page.

E. Crane Damage and Repair (Initial assessment of damage and repair required: do not wait for final estimates.)

❑ Continued on attached page.

F. Basic Data

1. Weather and wind conditions:

2. Crane support

a. Outriggers: ❑ out and locked ❑ partially out and locked ❑ out, but not locked

Comments:

b. Crane mats used ❑ not used ❑ Comments:

3. Boom: Model No.: Length Radius Angle

Jib: Model No.: Length Offset degrees

Change of radius from pickup to point of extension when accident occurred:

Comments:

Degrees of swing from angle of pickup to angle where accident occurred:

Comments:

Boom angle indicator: Type , operable at time of ?

CRANE ACCIDENT INVESTIGATION REPORT

G. Rigging

1. Describe and sketch

❑ Continued on attached page.

2. Was the crane equipped with a weight indicator? ❑ Yes ❑ No
   Was it functional? ❑ Yes ❑ No
3. Attach copy of capacity chart.
   Was the capacity chart data visible to the operator at time of accident? ❑ Yes ❑ No
   Was it legible? ❑ Yes ❑ No

H. Load

1. Was load involved in the accident? _____ If involved, and weights, size or configuration was crucial or contributory to the accident, have weight, size and configuration certified. State results of certification and attach copy:
2. What item or material comprised the load?

3. Show computations to determine load percentage or rated capacity:

Crane Mechanical Functions

1. Identify crane mechanical function that failed, and was it contributory to the accident?

2. When was the involved crane function last inspected? Date: _____
   - ❑ Attached copy of Last Certification
   - ❑ Attached copy of Daily Inspection Report

CRANE ACCIDENT INVESTIGATION REPORT

J. Cause

1. Preliminary determination:

2. Preliminary indicated corrective action:

3. Final determination of cause: ❑ Preliminary determination affirmed Not affirmed. If not affirmed, state final determination

4. Final corrective action: ❑ Preliminary indicated corrective action affirmed ❑ Not affirmed, state final corrective action

❑ Recommended and/or ❑ Taken

Investigator or Investigation Team

Signature(s) Name(s) Title(s)

DISTRIBUTION: Original to Resident Construction Manager

ENVIRONMENTAL / SPILL REPORT

CONTRACTOR: _____ DATE: _____

TIME: _____

1. Who first noticed the spill or release? _____
2. Who was notified? _____
3. What is the chemical name of the substance or process solution which was released? (If a cyanide solution was released what was the pH and CN concentration

   _____

   _____
4. When did the spill or release start (date, time)?

   _____
5. When did the spill or release end (date, time)?

   _____
6. Where was the substance released from (attach sketch or marked-up map)?

   _____
7. Where did the substance travel (attach sketch or marked-up map)?

   _____
8. How much of the substance was spilled or released? (How did you determine the amount?)

   _____

   _____
9. What was the concentration of the substance (assays, log sheets, etc.). Please attach source of data.

   _____
10. What caused the spill or release? _____

    _____

    _____
11. What actions were taken to respond to and contain the spill or release? _____

    _____

    _____
12. What actions were taken to clean-up the spill or release? _____

    _____

    _____
13. How much material was removed or excavated? _____

    _____

    _____
14. Where was the clean-up material placed? _____

    _____

    _____
15. What mitigation measures were taken to ensure this type of release will not occur again?

    _____

    _____

ENVIRONMENTAL / SPILL REPORT

16. Were there any injuries or property damage? _____

17. Sketches for No. 6 and 7

Signature	Print Name (Contractor)	Date
Signature	Print Name (Noble)	Date

MAJOR / SERIOUS ACCIDENT - ROOT CAUSE INVESTIGATION

1. General Information

REPORT NO.	DATE	TIME OF INCIDENT	SHIFT
NO. OF DAYS WORKED IN SHIFT	NO. OF HOURS WORKED IN SHIFT	DATE OF REPORT	WORK AREA
SITE/LOCATION	PLANT/BUILDING	FUNCTION	PLACE
SYSTEM STATUS (I.e., Start-up)	CONTRACTOR FIRM	TYPE OF CONTRACTOR	TYPE OF INCIDENT
❑ Client ❑ Contractor ❑ Subcontractor		❑ Construction ❑ Operations ❑ Service ❑ Maintenance	❑ Personal Injury ❑ Spill Release ❑ Equipment Damage ❑ Environment ❑ Equipment Failure ❑ Chemical Exposure ❑ Property Damage ❑ Contamination ❑ Fire Explosion ❑ Other

For: Personnel Injury Name: Age: Department: Function (Trade): Function Years: I.D. No.:	DESCRIPTION OF INCIDENT

NO. OF DAYS AWAY FROM WORK	TEAM MEMBERS	
NO. OF DAYS RESTRICTED WORK		
CHAIRPERSON		

2. Incident Information - Only to be completed for injury/illness incidents

TYPE OF CONTACT

❑ struck against ❑ struck by
❑ caught in/on/between
❑ fall on same level specify
❑ fall to lower level specify
❑ contact with or exposure to
❑ electricity
❑ arc flash ❑ current
❑ welding light ❑ explosion
❑ surface area ❑ steam
❑ hot condensate
❑ radiation
❑ extreme noise
❑ overexertion
❑ particle or sliver
❑ chemicals
❑ flammable
❑ poisonous
❑ corrosive
❑ bodily reaction
❑ reflex ❑ fear

NATURE OF INJURY/ILLNESS INJURY

❑ death ❑ amputation
❑ thermal bums 1 2 3
❑ chemical burns
❑ crushed body part
❑ fracture
❑ torn ligaments/sprain/strain
❑ bruise ❑ concussion
❑ cut/abrasion/puncture
❑ inhalation (one time)
❑ dislocation of joint
❑ hernia
❑ poisoning (one exposure)

ILLNESS

❑ repeated trauma disorder due to repeated exposure to physical agents
❑ skin diseases or disorders
❑ dust disease
❑ respiratory disease
❑ poisoning due to repeated exposure
❑ irritation
❑ poisoning due to repeated exposure
❑ irritation

AFFECTED BODY PART

❑ head
❑ scalp
❑ face
❑ eyes ❑ nose
❑ ears ❑ mouth
❑ neck
❑ chest/ribs
❑ back
❑ internal organs
❑ lungs ❑ kidney
❑ heart ❑ liver
❑ other
❑ arm
❑ shoulder ❑ elbow
❑ wrist ❑ hand
❑ finger ❑ other
❑ legs
❑ hip ❑ knee
❑ foot ❑ ankle
❑ toe ❑ other
❑ upper leg ❑ lower leg

MAJOR / SERIOUS ACCIDENT - ROOT CAUSE INVESTIGATION

3. Immediate Causes

Substandard Acts

Failure to Use Protective Defenses

- ❑ improper use of proper personal protective equipment
- ❑ failure to warn
- ❑ disabling guards or warning systems
- ❑ servicing, operating on non-isolated or energized equipment
- ❑ not using personal protective equipment
- ❑ failure to secure

Not Following Correct Procedures

General:

- ❑ not following proper Start-up/Commissioning Procedures
- ❑ not following Safety Standards or Guidelines
- ❑ not following proper Operating Procedures or Methods
- ❑ not following proper Maintenance Procedures or Methods

Specific:

- ❑ operating equipment without authority
- ❑ taking improper position or posture
- ❑ improper placement
- ❑ overexertion of physical capacity
- ❑ unsafe mixing of chemicals
- ❑ improper loading
- ❑ working at improper speed
- ❑ conscious risk taking (by group)
- ❑ conscious risk taking (by individual)
- ❑ horseplay

Improper Use of Tools or Equipment

- ❑ using equipment improperly
- ❑ using tools improperly
- ❑ using defective equipment (aware)
- ❑ using defective tools (aware)

Inattention/Lack of Awareness

- ❑ improper decision making or lack of judgment
- ❑ distracted
- ❑ inattention of footing or surrounding

Other Substandard Acts

Substandard Conditions

Hardware Defects

- ❑ defective equipment
- ❑ defective tools
- ❑ inadequate equipment
- ❑ improperly prepared tools
- ❑ improperly prepared equipment
- ❑ inadequate tools

From:

- ❑ wear/tear
- ❑ corrosion list equipment list tools
- ❑ other

Inadequate/Defective Defenses

- ❑ inadequate guards/protective devices
- ❑ inadequate personal protective equipment
- ❑ inadequate warning systems
- ❑ inadequate isolation of process or equipment
- ❑ defective guards/protective devices
- ❑ defective personal protective equipment
- ❑ defective warning systems

List PPE

Process Hazards

- ❑ fire and explosion hazards
- ❑ exposure to noise
- ❑ open systems
- ❑ exposure to radiation
- ❑ exposure to temperature extremes
- ❑ extremely hazardous chemicals
- ❑ energized electrical system

Workspace Hazards

- ❑ great heights
- ❑ inadequate layout, clearances, congestion or protrusions
- ❑ inadequate illumination
- ❑ inadequate housekeeping
- ❑ inadequate ventilation

MAJOR / SERIOUS ACCIDENT - ROOT CAUSE INVESTIGATION

4. Root Causes - Job Factors

Inadequate Engineering/Design

- ❑ poor technical design
- ❑ poor ergonomic design
- ❑ inadequate assessment of loss exposures
- ❑ inadequate standards, specifications and/or design criteria
- ❑ inadequate monitoring of construction
- ❑ inadequate assessment of operational readiness
- ❑ inadequate monitoring of initial operation
- ❑ inadequate evaluation and/or documentation of change
- ❑ other (please specify)

Can be applied to structures, equipment, tools, etc.)

Poor Maintenance Procedures

- ❑ inadequate preventative maintenance
- ❑ inadequate reparative maintenance
- ❑ excessive wear and tear
- ❑ improper extension of service life
- ❑ inadequate inspection/monitoring
- ❑ inadequate assessment of needs
- ❑ other (please specify)

Encompass underlying conditions that impact on the maintenance system.

Poor Job Procedures

- ❑ inadequate/absent safety regulations and/or procedures
- ❑ inadequate reference documents, directives, or guidance manuals
- ❑ lack of initial orientation
- ❑ inadequate work standards
- ❑ lack of or inadequate job safety analysis regarding hazardous activities
- ❑ inadequate shift hand over procedures
- ❑ inadequate identification and evaluation of loss exposures
- ❑ negative reporting (meaning: if not told otherwise, assume all is well)
- ❑ poor regulation for PPE use
- ❑ other (please specify)

Factors affecting the structure of a job.

Error Inducing Conditions

- ❑ environmental stress
  - ❑ noise
  - ❑ atmospheric conditions
  - ❑ oxygen deficiency
  - ❑ exposure to health hazards
- ❑ task related stress
  - ❑ repetitive/monotonous job tasks
  - ❑ confusing demands
  - ❑ extreme concentration or perception demands
  - ❑ extreme physical/physiological demands
  - ❑ fatigue due to mental task load or duration
  - ❑ fatigue due to sensory overload
  - ❑ other (please specify)

Conditions existing in the work environment conducive to committing errors or violations

Incompatible Goals

- ❑ system goals vs. safety goals (i.e., cost savings vs. safety)
- ❑ personal goals vs. safety goals (i.e., perceived inappropriate reward system)
- ❑ system vs. system goals (i.e., cost cutting by means of reduction in manpower

Chosen when the conflicting goals originate from different management systems. A change in these conditions generally impact on the management philosophy.

Inadequate Training

- ❑ inadequate training provided by company
- ❑ lack of training by company
- ❑ training requirements not identified as part of job description
- ❑ training is ineffective (boring, lack of incentive to learn)
- ❑ job requirements and training do not match
- ❑ Other (please specify)

This section pertains to company provided training.

Communication Failures

- ❑ giving unclear or incomplete instructions
- ❑ poor communications of safety and health data, regulations or guidelines
- ❑ inadequate communication tools
- ❑ inadequate horizontal communication (i.e., between peers)
- ❑ inadequate vertical communication (i.e., between supervisor to peer)
- ❑ inadequate communication between different organizations
- ❑ absence or misuse of standard terminologies and phraseologies
- ❑ other

Includes both the tools for communication and the process of communication.

Organizational Failures

- ❑ inadequate work planning
- ❑ unclear or conflicting reporting relationships
- ❑ unclear or conflicting assignment of responsibility
- ❑ improper/insufficient delegation
- ❑ inadequate audit/inspection program
- ❑ inadequate accident reporting/ investigation system
- ❑ inadequate purchasing
- ❑ Other (please specify)
- ❑ inadequate job placement (wrong person on the job)
- ❑ inadequate performance measurement, evaluation and feedback
- ❑ lack of supervisory/management job knowledge
- ❑ inadequate or lack of safety meetings
- ❑ inadequate safety promotion (visibility, acceptance)
- ❑ inadequate control of change system

Refers to systems or programs within the organization.

MAJOR / SERIOUS ACCIDENT – ROOT CAUSE INVESTIGATION

Personal Factors

Physical Capabilities

- ❑ substance sensitivities or allergies
- ❑ vision deficiency
- ❑ hearing deficiency
- ❑ other sensory deficiency
- ❑ respiratory incapacity
- ❑ other permanent physical disabilities
- ❑ temporary disabilities
- ❑ limited ability to sustain body positions
- ❑ restricted range of body movement
- ❑ other (please specify)
- ❑

Mental Capabilities

- ❑ fears and phobias
- ❑ emotional disturbance
- ❑ mental illness
- ❑ intelligence level
- ❑ inability to comprehend
- ❑ learning disability
- ❑ poor judgment
- ❑ memory failure
- ❑ poor coordination or reaction time
- ❑ other (please specify)

Physical Stress

- ❑ injury or illness
- ❑ fatigue due to lack of rest
- ❑ blood sugar insufficiency
- ❑ drugs or alcohol
- ❑ other (please specify)

Physical conditions specific to the individual that are: 1. Conducive to committing errors or 2. render the individual more susceptible to injury or illness.

Mental Stress

- ❑ frustration
- ❑ conflicting demands
- ❑ preoccupation with problems
- ❑ confusing directions
- ❑ "meaningless" or "degrading" activities
- ❑ other (please specify)

Mental conditions specific to the individual that are 1. conducive to committing errors or 2. render the individual more susceptible to injury or illness.

Improper Risk Taking

- ❑ improper performance is rewarding
- ❑ proper performance is punishing
- ❑ lack of incentives
- ❑ improper supervisory example
- ❑ inadequate identification of critical safe behavior
- ❑ inadequate reinforcement of critical safe behavior
- ❑ inappropriate aggression
- ❑ other (please specify)

Chosen when the conditions are specific to or impact directly on the individual. Recommendations generally fall under the control of the supervisor and employee.

Lack of Knowledge or Skill

- ❑ lack of experience
- ❑ inadequate initial instruction
- ❑ infrequent performance
- ❑ lack of coaching
- ❑ inadequate practice
- ❑ misunderstood directions
- ❑ other (please specify)

Conditions usually specific to an individual but may be common to a peer group.

5. Recommendations

List all recommendations along with the person responsible for the follow-up actions and the completion dates. Every immediate and/or root cause requires an action.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

CRANE SAFETY INSPECTION RECORD

CONTRACTOR:	**LOCATION:**	
CRANE MAKE:	**MODEL:**	**DATE:**
EQUIPMENT NO.:	**RENTED (NAME OF OWNER):** ❑	**SERIAL NO.:**

TYPE OF INSPECTION

❑ REGULAR MONTHLY
❑ MONTHLY FOR CRANE IDLED FOR 1 MONTH, SCHEDULED FOR SERVICE
❑ ANNUAL FOR CRANE IDLED FOR 6 MONTHS
❑ REGULAR ANNUAL
❑ MAJOR REPAIR INSPECTION
❑ PRE-CONSTRUCTION CHECK

PRE.	MO.	ANN.	ITEM	INSPECT FOR	OK	REPAIR REQUIRED
			CONTROLS	MALFUNCTION, EXCESSIVE WEAR AND CONTAMINATION		
			SAFETY DEVICES AND INDICATORS	MALADJUSTMENT, MALFUNCTION AND INACCURACIES		
			HOOKS AND BLOCKS	CRACK, SPREAD OR TWIST		
			AIR AND HYDRAULIC SYSTEMS	LEAKAGE, DETERIORATION OR DAMAGE		
			WIRE ROPE	EXCESSIVE WEAR, EVIDENCE OF TWIST, BREAK, BURN OR STRETCH		
			WIRE ROPE REEVING	PER CRANE MANUFACTURER RECOMMENDATIONS		
			ELECTRIC SYSTEM	MALFUNCTION, DETERIORATION, DIRT AND MOISTURE		
			SHEAVES AND DRUMS	EXCESSIVE WEAR AND CRACKS		
			STRUCTURE AND BOOMS	DEFORMATION CRACKS, CORROSION, OR LOOSE PARTS		
			BRAKES AND CLUTCHES	EXCESSIVE WEAR OR MALADJUSTMENT		
			TIRES AND TRACKS	EXCESSIVE WEAR, DAMAGE OR LOW PRESSURE		
			PINS, BEARINGS, ROLLERS, SHAFTS, GEARS AND LOCKS	EXCESSIVE WEAR, CRACKS, DISTORTION		
			ENGINE AND HOISTS	IMPROPER OR INADEQUATE PERFORMANCE		
			CHAIN DRIVES	WORN SPROCKETS OR STRETCHED CHAINS		
			TRAVEL STEERING	MALADJUSTMENT, MALFUNCTIONS, WORN OR BROKEN PARTS		

COMMENTS RE: ITEM NO. ON BACK OF REPORT

INSPECTION TIME (EXCLUDE NORMAL REPAIRS AND ADJUSTMENTS) HOURS	MINUTES
INSPECTED BY	**SIGNATURE**
POSITION OR TITLE	**DATE**

HEALTH & SAFETY INSPECTOR'S/REPRESENTATIVE'S APPOINTMENT LETTER

PROJECT: PROJECT No.:

HEALTH & SAFETY INSPECTOR/REPRESENTATIVE DESIGNATION

I, _____ REPRESENTING THE COMPANY DO HEREBY

DESIGNATE _____ AS A HEALTH & SAFETY

REPRESENTATIVE & COMMITTEE MEMBER AS FROM _____ TO_____

FOR THE _____ WORKPLACE OR SECTION OF WORKPLACE

AND TO SERVE ON THE _____ SAFETY COMMITTEE.

FUNCTIONS OF A HEALTH & SAFETY INSPECTOR/REPRESENTATIVE

MONTHLY INSPECTIONS WILL BE CARRIED OUT BY YOU ON DATES TO BE AGREED UPON, BETWEEN

THE HOURS OF _____ AND _____

HEALTH AND SAFETY INSPECTORS/REPRESENTATIVES WILL SERVE ON AT LEAST ONE SAFETY

COMMITTEE.

DATE: _____ SIGNATURE: _____

DESIGNATION: _____

ACCEPTANCE OF DESIGNATION

I, _____ DO HEREBY ACCEPT THIS DESIGNATION AND

ACKNOWLEDGE THAT I UNDERSTAND THE REQUIREMENTS OF THIS APPOINTMENT.

DATE: _____ SIGNATURE: _____

DESIGNATION: _____

MOBILE CRANES AND HOISTS - DAILY INSPECTION CHECKLIST

(P) Date _____ Passed (X) Month _____ Repair (N) Year _____ Not Applicable

Contractor																							
Equipment No.																							
Model																							
Operator																							
1.	Engine Performance																						
2.	Oil Pressure																						
3.	Housekeeping																						
4.	Fire Extinguisher and First Aid																						
5.	Audible Warning Device																						
6.	Mirrors and Lights																						
7.	Hydraulic Lines and Fluids																						
8.	Glass, Wipers and Locks																						
9.	Batteries and Charging System																						
10.	Hand Signal Chart																						
11.	Load and Radius Chart																						
12.	Guards																						
13.	Clutches																						
14.	Outriggers																						
15.	Brakes																						
16.	Boom Hoist Pawl																						
17.	Swing Dog and Brake																						
18.	Rollers (including Carrier)																						
19.	Drive Chains																						
20.	Sheaves and Drums																						
21.	All Cables																						
22.	Hoist Block and Hooks																						
23.	All Pins																						
24.	Boom																						
25.	Boom and Job Stops																						
26.	Boom Angle Indicator																						
27.	Boom Locking Device																						
28.	Transmissions																						
29.	Steering																						
30.	Gantry and Jon Gantry																						
31.	Wheels and Tires																						
32.	Carrier Assembly																						
33.	All Controls																						
34.	Load Limit and Safety Device																						
OPERATOR'S INITIAL																							

COMMENTS:

LIFT EVALUATION

CONTRACTOR:	**PROJECT NO.:**
LOCATION OF LIFT:	**DATE OF LIFT:**
DESCRIPTION OF LOAD:	

Load Weight		Load Weight:
Block Weight		
Spreader Weight		How determined:
Rigging Weight		By whom:
Jib Weight		
Jib Ball Weight		
Hoist Line Weight		
Total Load ( )		Maximum Load Radius:
		Boom Angle:
Crane Manufacturer:		Model No.:
Inspected/Certified:		
	On Outriggers	
	On Tires	
	On Crawlers - Extended	
	On Crawlers - Retracted	
Counter Weight:		
Boom Length:		Job Length:

Lift Will Be On:

Boom	Jib	Parts of Line
Over the Side	Over the Side	Over the End

Crane Rated Capacity:

Capacity Margin: = TOTAL LOAD X 100 = RATED CAP.

Shackle: Rated for Working Load	❑	Yes	❑	No
Slings: Certified	❑	Yes	❑	No
Diameter Safe Working Load	❑	Yes	❑	No
Tag Lines to be Used	❑	Yes	❑	No
Are there Underground Hazards?	❑	Yes	❑	No

Soil Condition

Will Blocking or Crane Mats be used?	❑	Yes	❑	No
Are there Fire or Explosive Hazards within reach?	❑	Yes	❑	No
Are there Electrical Hazards within reach?	❑	Yes	❑	No

Prepared By: Date:

Operator: Lift Supervisor:

Craft Supervisor: Proj. Engineer/Manager:

CRITICAL LIFT CHECKLIST

SAFE WORK PERMIT NO.: _____

JOB DESCRIPTION: _____

LOCATION _____

NOTES:
1. **!!! A SAFE WORK PERMIT IS REQUIRED FOR A CRITICAL LIFT !!!**
2. All items on this checklist form an integral part of this standard. Each item MUST be acknowledged by circling **Y** (yes), **N** (no) or **N/A** (not applicable). Items on the checklist with only a **Y** (yes) answer opposite them are mandatory.
3. A pre-job planning meeting is required to ensure complete job preparation and understanding.

1. General

Planning Information = _____
Total load weight below hook _____
Max. Boom length _____
Lowest Boom angle _____
Max. Operating radius _____
Allowable load at max. radius _____
% of allowable load

Method(s) used to determine load weight:

_____

_____

Name of person responsible for load weight determination:

_____

Site/unit safety standards and procedures specific to this job have been reviewed	Y	N/A
All workers clearly understand their role and responsibilities	Y	
Weather conditions are favorable for this lift	Y	
Wind speed judged acceptable for this lift	Y	
Emergency plan discussed for worst case scenario	Y	
Load's centre of gravity is prevented from shifting during lift	Y	
Any underground installations within lift area needing special treatment?	Y	N

(If yes, what?) _____

Best and most practical method of communication (between signal person and equipment operator to be used:

[ ] Radio [ ] Hand Signals Other _____

A designated channel/frequency is available for radio communication	Y	N/A

(CHANNEL # .....)

CRITICAL LIFT CHECKLIST

2. Workers Responsibilities

a) Signal Person

- Name _____
- Person is a competent worker in his role Y
- Understands lift procedure/plan Y
- Familiar with method of communication Y
- Will be wearing a signal vest Y
- Has plan for controlling lift zone Y
- Has experience with this type of lift Y
- Will ensure receiving area is properly prepared for load Y

b) Head Rigger

- Name _____
- Person is a competent worker in his role Y
- Has experience with this type of lift Y
- Familiar with method of communication Y
- Will ensure adequate condition and rating of rigging equipment before lift Y
- Will inspect for proper rigging before lift Y N/A
- Will inspect for proper rigging practices before lift Y
- Knows determined load weight Y

c) Hoisting Operator

- Name _____
- Certified to operate the equipment Y
- Has experience operating this type of equipment Y
- Has inspected the equipment and found it in acceptable condition for this lift Y
- Understands lift procedure/plan Y
- Has experience with this type of lift Y
- Familiar with method of communication Y
- Has verified allowable load calculations Y
- Max. Operating radius measured with proper/legal measuring device Y
- Has pre-lift check of crane been completed i.e. water/fuel/oil levels Y
- If communication fails the operator will cease lifting operation immediately Y

3. Hoisting Equipment:

Major hoisting equipment to be used: _____

_____

_____

CRITICAL LIFT CHECKLIST

	Soil bearing allowable load checked	Y	
	Outrigger beams will be fully extended	Y	N/A
	Outrigger float pads are being used and good condition	Y	N/A
	Proper mats are being used and in good condition	Y	N/A
	Machine will be level during lift operation	Y	
	Structural worthiness certificate up to date	Y	
	Load cable visually inspected	Y	
	Lift lugs are properly designed, used and inspected	Y	N/A

4. Conditions

a) Load exceeds 85% of max. Allowable load (If yes, complete this section) Y N

Weight of load (empty)	_____	lbs/kg
Weight of load internals	_____	lbs/kg
Weight of hooks	_____	lbs/kg
Weight of load block	_____	lbs/kg
Weight of headache ball	_____	lbs/kg
Weight of cable	_____	lbs/kg
Weight of spreader bar	_____	lbs/kg
Weight of rigging	_____	lbs/kg
- Total Weight	_____	lbs/kg
- Percentage total load weight of max. Allowable load	=	%

b) Load exceeds 50% of max. allowable load and failure would endanger existing facilities Y N/A
(If yes, complete this section and section 4a)

- Existing facilities =_____
- Facilities can be protected Y N
- Plan in place can be place for isolating facilities in case of failure Y N/A
- Occupied facilities beneath lift zone will be vacated Y N/A

c) Lift is within 4.5 meters of or above high voltage conductors Y N
or
Uninsulated high voltage lines within the 360 degree swing arc of the boom Y N
(If yes, complete this section)

- Lift has been approved Y N/A
  (If yes, approved by)_____
- Alternate lift/swing positions have been examined Y
- De-energizing lines/conductors is not considered feasible Y
- All workers are aware of electrical hazard Y
- There is a separate signal person designated to watch line/conductor clearance only Y
- Name _____
- Crane is properly grounded Y N/A

CRITICAL LIFT CHECKLIST

d) More than one crane required to make the lift and the verified lift exceed 50% of the max. allowable load for any of the cranes — Y N
(If yes, complete this section)

- A plan detailing the sequence of steps for the entire lift has been reviewed — Y
- All applicable conditions have been considered for each boom — Y
- Is the lift planned so that at no time any of the booms will have more than 80% of their load capacity — Y

A competent person has been selected to co-ordinate this lift — Y
Name _____

e) Lift will require use of man-basket — Y N
(If yes, complete this section)

- Alternate means of access have been considered — Y
- Man-basket has been inspected (and documented) in the last 12 months — Y
- Man-basket will be visually inspected before lift — Y
- Wind speed judged acceptable for this lift — Y
- At least one attended tag line to be used — Y
- Fall protection to be used — Y
- Weather changes during lift have been considered — Y
- Crane will not be used for any other purpose during lift
- Crane will not be traveled with personnel elevated — Y
- Operator will not leave with personnel elevated — Y
- Emergency rescue plan discussed and understood by all — Y
- Escape type breathing apparatus available in crane cab and in basket if in areas of potential hazardous gas release — Y
- Communication system for elevated personnel established — Y
- Only personnel and small tools will be carried in the man-basket — Y

f) Lift requires hydraulic crane with 2 lines reeved — Y N
(If yes, complete this section)

- Anti-two-blocking devices are operational — Y
- Additional weight of hooks and rigging have been considered — Y
- Is the whip line capable of handling the entire load? — Y N/A
- A plan detailing the sequence of steps for the entire lift has been reviewed — Y
- Is the lift planned so that at no time either of the lines will have more than 80% of their load capacity — Y
- A competent person has been selected to co-ordinate the lift — Y

Name _____

Additional Comments:

_____

_____

_____

_____

Noble
Engineers & Constructors

CRITICAL LIFT CHECKLIST

Safety plan/lift procedure reviewed by the following involved parties (Name in BLOCK letters, followed by signature):

Client Representative:

Noble:

Contractor:

All workers involved with lift:

CONTRACTOR MANHOUR SAFETY SUMMARY

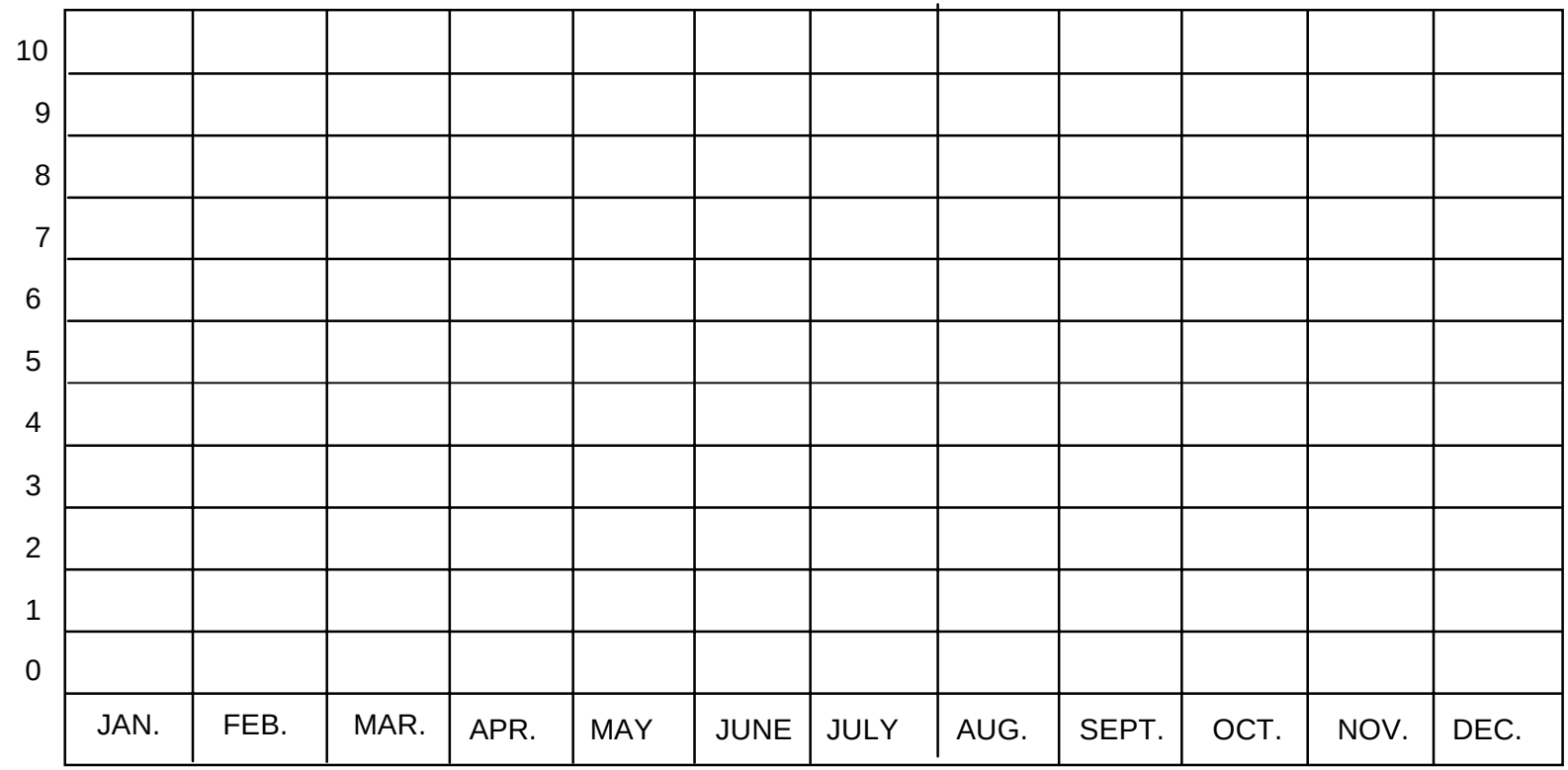
CONTRACT/CONTRACTOR	AVG. NO. EMPLOYEES	MAN HOURS MONTH	MAN HOURS Y.T.D	NO. LTA'S	TOTAL DAYS LOST	SEVERITY RATE	FREQUENCY RATE
AVERAGE PER MONTH							
PROJECT TOTAL							

FREQUENCY RATE = NUMBER LTA'S x 200,000
MANHOURS

SEVERITY RATE = NUMBER OF DAYS LOST x 200,000
MANHOURS

LOST TIME FREQUENCY RATE

PROJECT: | PROJECT *NO.:* | DATE:



Lost Time Frequency = $\frac{\text{No. of Accidents x 200,000}}{\text{No. of Man-hours Worked}}$

Monthly: _____

Accumulated: _____

Targeted: _____

Originator: _____

LOST TIME ACCIDENT REPORT SUMMARY

PROJECT NO.:	PROJECT:		CONTRACTOR:		
NAME	TYPE OF ACCIDENT	DATE	R.T.W.	W.S.I.B. FILE NO.	NO. DAYS

CONTRACTOR'S WEEKLY FIRST AID SUMMARY

SUBCONTRACTOR:	PROJECT NO.:	MONTH:

1. Head Injuries	
2. Minor Lacerations, Abrasions and Contusions	
3. Major Lacerations, Abrasions and Contusions	
4. Burns	
5. Muscle Sprains, Sprains or Extremities	
6. Neck and Back Injuries	
7. Fractures	
8. Eye Injuries	
9. Poisonings	
10. Other:	
TOTAL OCCUPATIONAL INJURIES	
11. Non-Occupational Visits	
Lost Time	
Medical Aid	

Notes:

CONTRACTOR'S MONTHLY SAFETY REPORT

CONTRACTOR:	PROJECT NO.:	MONTH:

	Monthly Total	Year to Date	Project Total
Lost Time Accidents			
Medical Aid			
Near Misses			
Lost Work Days (Actual or Estimate) Man-			
hours Worked (All Onsite Personnel)			
Automotive			

Description of Lost Time Injuries:
Including Date, Incident Resulting Injury and Recommendation for Future Prevention.

ATTACH MINUTES OF ALL SAFETY MEETINGS AND INSPECTIONS

Contractor Safety Representative: _____ (print) Date: _____

Report Developed By: _____ Date: _____

Contract Safety Representative: _____ Date: _____

WEEKLY SAFETY INSPECTION CHECKLIST — MOTOR VEHICLES

UNIT NUMBER:	MILEAGE:	DATE OF INSPECTION:
TYPE OF VEHICLE:		OPERATOR SIGNATURE:
INSPECTION BY (PRINT NAME):		APPROVED BY:

		Yes	No	N/A
1.	Does operator have a valid operator's license?			
2.	Has vehicle been inspected by a mechanic and found to be in safe operating condition?			
3.	Are the following parts, equipment and accessories in safe operating condition and free of apparent damage that could cause failure while in use? A. Service Brakes B. Parking Brake C. Tires D. Horns E. Steering Mechanism F. Seat Belts			
4.	Are lights in good working order? A. Headlights, Hi and Low Beam B. Parking Lights C. Directional Signal Lights, including Reverse D. Brake Lights			
5.	Are all gauges and speedometer operable?			
6.	Are windshield wipers and washer operable?			
7.	Is defroster/defogger in operating condition?			
8.	Is vehicle equipped with adequate rear view mirror?			
9.	Are windshields and windows in good condition?			
10.	Have the following fluid levels been checked? A. Fuel B. Engine Coolant C. Windshield Washing Fluid			
11.	Is the vehicle equipped with the following A. Fire Extinguisher B. Beacon Light C. First Aid Kit D. Buggy Whip			
12.	Remarks			

CONSTRUCTION EQUIPMENT SAFETY INSPECTION - ALL UNITS

CONTRACTOR:	**PROJECT:**	**DATE:**
UNIT:	**MAKE/MODEL:**	**MILEAGE:**
INSPECTED BY:		
REMARKS:		

CAB:	OK or Operates	Needs Repair	**ENGINE:**	OK or Operates	Needs Repair
Windows			Oil		
Mirrors			Belts		
Interior Lights			Hoses		
Windshield Wipers			Starter		
Horn			Alternator		
Backup Alarm			Batteries		
Parking Brake			Block Heaters		
Swing Brake			Muffler/Exhaust		
Defrost Fan/Heater			Clutch		
Gauges			Torque Compressor and Transmission		
Boom Angle Indicator					
4 Wheel Drive			Positive Shutoff		
OUTRIGGERS:	OK or Operates	Needs Repair	**HYDRAULICS:**	OK or Operates	Needs Repair
Extend Cylinders			Pumps		
Down Cylinders			Hoses		
No Cracks			Fluid		
CABLE AND BALLS:	Length or Unit #	Size / Condition	Winch		
Hoist Cable			Cable Followers		
Whip Cable			**JIB:**	OK or Operates	Needs Repair
Load Block			Sheaves		
Safety Latch OK?			Struts		
DRIVE:	OK or Operates	Needs Repair	Pendants		
Main Transmission			Unit Number		
U Joints			**BOOM:**	OK or Operates	Needs Repair
Differentials			Boom Extend Cylinder		
Axles			Boom Lift Cylinder		
Brakes			Boom Support		
Air System			Hinge Pin		
Suspension			Wear Plates		
Steering			Sheaves		
ATTACHMENTS:	Attached or Quantity	Missing/Not Sent	General Condition		
Log Book					
Operators Manual			**OTHER:**	OK or Operates	Needs Repair
Service Schedule			Fuel Gauge		
Fire Extinguisher			Lights		
Signal Vest			Headlights		
Swing Lock			4 Way Flash		
Hydraulic System - No Leaks			Backup Alarm		
TYRES:	% Wear Left	Describe Cuts	"Flashback" Arrestor		
Left Front					
Right Front			**BODYWORK:**	OK or Operates	Needs Repair
Left Rear			Paint Condition		
Right Rear			General Condition		
Spare			Door(s)		

SAFETY INSPECTION CHECKLIST — CRAWLER TRACTORS, DOZERS

PROJECT NAME:		**PROJECT No:**		
CONTRACTOR:		**DATE:**		
TYPE OF EQUIPMENT:		**IDENTIFICATION NO:**		
INSPECTION BY (PRINT):		**APPROVED BY:**		
		Yes	**No**	**N/A**
1.	Is protection (grills, canopies, screens) provided to shield operator from falling or flying objects?			
2.	Is adequate rollover protection provided?			
3.	Are seat belts provided?			
4.	Is the unit equipped with safety glass?			
5.	Does the unit have a suitable fire extinguisher?			
6.	Is there an effective, working, reverse alarm?			
7.	Are moving parts, shafts, sprockets, belts, etc., guarded?			
8.	Is protection against contact with hot surfaces, exhaust, etc., provided?			
9.	Are all screens, guards, shields in place and effective?			
10.	Is the unit shutdown for servicing, fuelling, etc.?			
11.	Is the dozer blade lowered when not in use?			
12.	Are sufficient lights provided for night operations?			
13.	Are there initial inspections and scheduled inspections of the equipment at regular intervals?			
14.	Are fuel tanks located in a manner to prevent spills or overflows from running onto the engine, exhaust or electrical equipment?			
15.	Are exhaust discharges from the equipment so directed that they do not endanger persons or obstruct the view of the operator?			
16.	Are inspection records kept available as a part of the official project file?			

REMARKS: _____

Inspected by (signature) _____

SAFETY INSPECTION CHECKLIST - SCRAPERS, MOTOR GRADERS, HEAVY HAULING UNITS

PROJECT NAME:	**PROJECT No:**
CONTRACTOR:	**DATE:**
TYPE OF EQUIPMENT:	**IDENTIFICATION NO:**
INSPECTION BY (PRINT):	**APPROVED BY:**

		Yes	No	N/A
1.	Is the unit equipped with a suitable fire extinguisher?			
2.	Is a safe means of access to the cab provided - steps, grab bars, non-slip surfaces?			
3.	Is the operator protected against weather, falling or flying objects			
4.	Are seat belts and adequate rollover protection provided? Used?			
5.	Are adequate head and tail lights provided? Used?			
6.	Have brakes been tested and found satisfactory?			
7.	Does the unit have an emergency brake system? A. Does the emergency work automatically when regular brakes fail? B. Can the emergency system be activated from cab?			
8.	Have air tanks been tested and certified?			
9.	Is an air pressure gauge in working condition installed on the unit?			
10.	Does the air tank have an accessible drain valve?			
11.	Are cabs equipped with unbroken safety glass?			
12.	Are the windshield wipers, defrosting and defogging equipment in good operating condition?			
13.	Is there an effective reverse signal?			
14.	Has the unit been inspected and certified mechanically safe by a qualified mechanic?			
15.	Is the test certificate available?			
16.	Is the unit shutdown for servicing, fuelling, etc.?			
17.	Are fuel tanks located in a manner to prevent spills or overflows from running onto engine, exhaust or electrical equipment?			
18.	Are exhaust discharges from equipment so directed that they do not endanger persons or obstruct the view of the operator?			

REMARKS:

Inspected by (signature)_____

SITE RADIOGRAPHY NOTICE

ALL CONTRACTORS AND THEIR PERSONNEL ARE ADVISED THAT RADIOGRAPHY EXAMINATION WILL BE CARRIED OUT ON THIS SITE AS FOLLOWS:

CONTRACTOR: _____

DATE: _____

TIME (START/END): _____

LOCATION: _____

PERSONNEL WHO ARE REQUIRED TO WORK AFTER CLOSE OF BUSINESS ARE ADVISED TO OBEY ALL RADIOGRAPHY AND WARNING SIGNS, AND MUST KEEP OUT OF DEMARCATED AREAS.

DATE OF ISSUE OF NOTIFICATION: _____

AUTHORIZED SIGNATURE: _____

PRINT: _____

FIRST AID KIT INSPECTION

KIT NUMBER	LOCATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE

FIRST AID KIT INSPECTION

KIT NUMBER	LOCATION	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

FIRE EXTINGUISHER INSPECTION

EXTINGUISHER IDENTIFICATION	LOCATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE

FIRE EXTINGUISHER INSPECTION

KIT NUMBER	LOCATION	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

SMOKE DETECTOR INSPECTION

DETECTOR NUMBER	LOCATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE

SMOKE DETECTOR INSPECTION

DETECTOR NUMBER	LOCATION	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

Noble
Engineers & Constructors

EMPLOYEE CERTIFICATE/LICENSE AND TRAINING RECORD

PLEASE PRINT when completing this form.

Name: _____ Trade: _____

Project: _____ Employer: _____

Have you received training or do you hold certificates or licenses in any of the following areas?

CERTIFICATE OR LICENSE	YES	NO	ISSUE DATE	EXPIRY DATE	CERTIFICATE OR LICENSE #	Supervisor's Initial*(see note below
Trade Qualification Certificate / License						
Employee Safety Orientation						
Owner's Site/Safety Orientation						
First Aid						
CPR						
Fork Lift Certificate						
Man Lift Certificate						
Hilti Certificate						
Hoisting Certificate Capacity: ton						
Personal Protective Equipment Type						
Propane Handling Certificate						
Rigging Certificate						
SCBA Self Contained Breathing Apparatus						
Valid Driver's License						
WHMIS Training All workers must be WHMIS trained, with yearly updates, prior to working on site.						
FALL PROTECTION Training						
Chain Saw Training						

Noble requires copies of all Licenses and/or Certificates named above. If a photocopier is not available, supervisor or subcontractor should initial right hand column to confirm visual verification.

Dated: _____ Signed: _____

TYPE OF ACCIDENT: ❑ Critical Injury ❑ Lost Time ❑ Fatality ❑ Environmental

Description of Incident: *(Who, what, how, when)*

Details of Injury/Damage/Impact: *(Nature and extent of injuries/damage/impact)*

Immediate Actions Taken:

Incident Date:		**Incident Time:**			
Business Unit:		**Project:**		**Country:**	
Employee or Contractor Incident?					
Does a site standard or procedure exist to control this risk? Yes/No					

Is this incident reportable to the authorities? **State name of government agency:** **Who from Noble made initial contact?**	**Will governmental agency be investigating accident?** **When?**

INVESTIGATION FINDINGS

Status of Investigation? Preliminary/Final			
Basic Causes: *(Why did the incident occur?)*		**Contributing Factors:** *(Additional causal factors)*	
Permanent Corrective Actions Taken: *(Actions taken to prevent a recurrence)*		**Key Learnings:** *(Summary of principal learning's from incident)*	
Contact Person:		**Telephone:**	

MONTHLY SAFETY STATISTICS SUMMARY

PROJECT:			
PROJECT No.		MONTH & YEAR:	
PROJECT MANHOURS			
AREA / CONTRACTOR	MONTH	YEAR TO DATE	PROJECT TO DATE
Noble			
TOTAL	0	0	0

INJURY CLASSIFICATION, FREQUENCY & SEVERITY

	MONTH			YEAR TO DATE			PROJECT TO DATE		
	SLEC	Contractor	Total	SLEC	Contractor	Total	SLEC	Contractor	Total
First Aid Cases			0			0			0
Medical Aid Cases			0			0			0
Lost Time Accidents			0			0			0
Lost Time Days			0			0			0
Medical Aid Frequency	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LTA Frequency	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Severity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Property Damage			0			0			0
Near Miss Incidents			0			0			0
Other Incidents			0			0			0

INCIDENT RATE FORMULAS

Medical Aid (MA) Frequency Rate = $\frac{\text{Number of Medical Aid Cases x 200,000}}{\text{Manhours Worked}}$

Lost Time Accident (LTA) Frequency Rate = $\frac{\text{Number of Lost Time Accidents x 200,000}}{\text{Manhours Worked}}$

Severity Rate = $\frac{\text{Number of Lost Time Days x 200,000}}{\text{Manhours Worked}}$

*Estimate only - Actual hours still pending from Contractor.

PREPARED BY: SIGNATURE: DATE:

Noble
ENVIRONMENTAL POWER

MONTHLY PROJECT SAFETY REPORT

Project:			Project Number:
Location:			Month Ending:
Recorded Accident/Incident			
	Noble	**Subcontractor**	**Total**
Equipment Damage			
Property Damage			
Worker Injury			
Safety Infraction/near Miss			
Enviromental Incident			
Fire/Explosion			
Security Incident			
Incident/ Accident			
Vehicle Accident			
Other - Fatality			
Medical Summary			
	Noble	**Subcontractor**	**Total**
First Aids			
First Aids Non Work			
Medical Aids			
Fatalities			
Lost Time Accident			
LTA's Days Lost			
LTA's Frequency			
LTA Severity			

SAFETY AUDIT SCORE	

Frequency Rate = $\frac{\text{Number LTA's x 200,000}}{\text{Manhours}}$

Severity Rate = $\frac{\text{Number of Lost Work Days x 200,000}}{\text{Manhours}}$

Prepared By _____ Date _____

Draft Emergency Response Plan

Emergency Response Plan
Noble Ball Hill Windpark

POLICY STATEMENT
Noble Power is committed to protecting personal property, the environment, and any impacts resulting from emergency situations. These situations will be handled through the implementation of an Emergency Response Plan (ERP) in adherence to all applicable emergency response laws and standards.

Plan Coverage
This Plan will cover all emergency situations and incidents that could occur during Project construction or operations, including worker accidents and spills:

- Accident: an unexpected event that can results in loss or injury to a person and/or damage to property or the environment;

- Spill: an unauthorized release or discharge of a dangerous material into the environment; and

- Emergency: an accidental situation that could result in serious adverse effects to the health and/or safety of persons or the environment. An emergency may be the result of man-caused or natural occurrences.

PRE-EMERGENCY PLANNING
Based on relevant experience and best professional judgment, Noble Power believes that the following types of hazards have the potential to occur at the project site:

- Fire;
- Worker accidents, including falls and electrocution;
- Medical conditions/emergencies;
- Lightning strikes;
- Ice throws from revolving blades;
- Excavation cave-ins;
- Spills of Hazardous Materials, including:
    1. Gasoline
    2. Diesel
    3. Propane
    4. Adhesives
    5. Hydraulic oil
    6. Lubricating oil and grease
    7. Cleaning solvents
    8. Paint and paint thinners
    9. Concrete form release agents.

ROLES AND RESPONSIBILITIES
- The Noble Power on-site Safety Coordinator or designee is the acting "Emergency Response Coordinator" during an emergency situation. He or she will be responsible

for ensuring that all subcontractors, staff, on-site visitors and others adhere to the appropriate emergency response procedures as stated in this Plan.

- The Emergency Response Coordinator must designate one person as a second-in-command Emergency Response Coordinator. The Second-in-Command Emergency Response Coordinator will provide any required assistance to the Emergency Response Coordinator and will assume the role of Emergency Response Coordinator if the Safety Coordinator is unable to perform this role.

Resources

- The Project will maintain and utilize on-site telephone and or radio communication at all times to support agencies as discussed below.

- If there is no cellular telephone reception on the Project site, a reliable method of communication will provide maximum safety to life and property through operational coordination during the construction of the project. Therefore, hard line telephone service and/or two-way radios would be used during construction.

RESPONSIBLE ORGANIZATIONS

- Noble Power personnel will be available to the Project and may be utilized to assist during emergency situations and/or provide first aid as needed.

Contact Info

Safety Coordinators:

John Jordan (Noble Power)	585-610-2137
Local Emergency Medical Services, Police Services, Fire Services:	9-1-1
New York State Police (Fredonia Station):	716-679-1521
Chautauqua County Sheriff (Non – Emergency):	716-753-2131
Local Fire Departments – Forestville, Kevin Peebles	716-965-4106
Hanover Center, Steven D'Angelo	716-934-7389
South Dayton, Benny Bottita, Jr.	716-988-5153
Cherry Creek, Bradly Rogers	716-296-5757

Nearest Hospitals:

Brooks Memorial Hospital: 716-366-1111
529 Central Avenue, Dunkirk, New York 14048

WCA Hospital: 716-487-0141
207 Foote Avenue, Jamestown, New York 14702-0840

Chautauqua County's Office of Emergency Services: 716-753-4341

Noble Power

V.P. of Construction: Jeff Taylor	860-395-7825
Director of Construction: Marc Reid	518-593-3215
Administrative Assistant: Cheryl Kirchmeyer	585-322–7671
Construction Manager: Kermit Graves	585-610-2254
Field Engineer: Marc Roche	716-560-9432

INTERNAL ALERTING

The following procedures will be adhered to for internal reporting of emergencies:

- The Emergency Response Coordinator will notify on-site personnel, including any visitors, of the nature of the emergency via an alarm system such as by telephone, two way radios or sirens.

- The Emergency Response Coordinator will specify the location for the first responders. (Have employee go to roadway to direct emergency services.)

- The Emergency Response Coordinator will notify Noble Power of the emergency using the contact information to be provided.

- The Emergency Response Coordinator will identify any need for security measures at the Project site during the emergency and will designate one person to implement.

- Any person, who identifies an emergency situation, or the potential for an Emergency situation, must immediately report it to the Emergency Response Coordinator or his designee. The Emergency Response Coordinator will then activate the Emergency Response Plan.

EXTERNAL ALERTING

The following procedures will be adhered to for external reporting of emergencies:

- If immediate emergency response assistance is required, the Emergency Response Coordinator or his designee will call 9-1-1.

- A member of management or the Emergency Response Coordinator or his designee are the only persons authorized to speak to outside agencies (e.g., police, fire department, medical services) during an emergency situation.

- In the event of a spill of a hazardous material in excess of reportable limits, the Spill must be reported to Noble Power.

- In the event of media coverage of an emergency event, members of management from Noble Power are the only persons authorized to speak to the media.

ACTIONS TO BE TAKEN DURING AN EMERGENCY

Medical Emergency or Injured Employee:

- Provide First Aid to all injured employees regardless of severity.
  Call 9-1-1 if the injury is serious and needs immediate medical treatment.

- If the medical emergency or injury occurs in the tower, then a Stokes basket attached to the crane will be used for extraction of the employee.

- Have employee go to road and access road to tower site, to meet emergency personnel and direct them to the injured employee.

- Employee should have a hand held orange safety flag to use to get the attention of the responding emergency services.

Fire

- If a fire exists at a project facility or within a wind turbine generator, personnel will:
  1. Shutdown the facility and/or wind turbine generator;
  2. Restrict the area;
  3. Request assistance of police/fire department, medical services if needed;
  4. Consult with on-site trained employees regarding required actions by Project personnel; and
  5. Request assistance from fire fighting personnel, if needed, in controlling the fire.

Gas Leak

- If a gas leak is reported, the area will be restricted and the presence or absence of gas will be confirmed. When necessary, gas detection instruments will be used to conduct a thorough inspection for the presence of gas, personnel will take the following action:
  1. Shut off the source of gas; notify the utility, if applicable;
  2. Continue to restrict the area until the origin of the gas is established and it is safe to lift the restriction;
  3. Initiate repairs to stop leakage; and
  4. Keep the utility notified of conditions and actions taken.

  The Project Site contains several public and private natural gas lines and wells. Prior to final design Noble will coordinate with *Dig Safely. New York* and the respective gas utility companies to determine the locations of all active gas lines and wells within the Project Site. Gas companies are being consulted to establish appropriate setbacks and crossing procedures to effectively minimize risks of interference. Where encroachments are necessary, Noble will follow the applicable company's encroachment policies. During construction, no gas line will be crossed without it first being exposed to confirm its depth. In addition to natural gas line and wells, propane and acetylene will be stored and used at the construction site. Safety and handling measures for cylinders and tanks used on site during construction are described in detail in Noble's Health, Safety, and Environmental Management Program and include appropriate tagging, placement

on a solid base eliminating direct contact with the ground, and minimum distances from any buildings and combustible materials (25 feet for 1,000-gallon tanks).

Chemical Spill/Release

- If storage tanks are required on site containment system will be used.
- Small spills should be cleaned up immediately by using absorbent materials such as hay, sand, socks or pads.
- If the spill is of such magnitude that it cannot be contained, the Emergency Response Coordinator will contact the appropriate authority for assistance.
- All spills regardless of severity will be reported to the Emergency Response Coordinator and Noble Environmental.
- There will be spill kits located through out the construction site.

EVACUATION

- If an evacuation is required to prevent potential injury to human life, the Site Supervisor/Project Manager or Emergency Response Coordinator or designee will evacuate the Project site. An evacuation point area will be pre-determined. The Site Supervisor will designate a person to conduct a "head-count" at this per-determined area to ensure that all persons have been safely evacuated.
- This could happen for fire, severe chemical release, wild land fires or inclement weather.

DISPOSAL OF CONTAMINANTS AND DEBRIS

- During construction, the project will be maintained in a sanitary condition at all times. Waste materials generated on the Project (e.g., trash, excess construction material, hazardous waste) will be stored in containers at all times and disposed of in an approved disposal site.
- All construction generated waste will be removed or disposed of in compliance with all federal, state and local requirements
- Portable toilets will be available for human waste and will be serviced on a regular basis.
- No open burning of waste materials will be allowed.
- Any materials used to clean up a chemical spill will be treated as hazardous waste and disposed of appropriately.
- Concrete trucks will wash out into waste management containers.

SITE RESTORATION/REMEDIATION

- If any accident or incident at the project site necessitates site restoration or remediation, the restoration/remediation will be conducted according to applicable Federal, State and local requirements.

POST-INCIDENT EVALUATION

- After every accident or incident, the Emergency Response Coordinator or designee will conduct a post incident evaluation to determine the following:
  1. Suitability of the organization's structure, equipment, communication plans/system, adequacy of training, alarm systems, security, spill containment and recovery procedures, monitoring, etc.
  2. If any of the above are found to be inadequate, then the Emergency Response Coordinator will make necessary changes.

TRAINING

- On site training will be given by the Emergency Response Coordinator or their designees regarding the content, requirements, and appropriate actions to comply with the provisions of the Emergency Response Plan. The training will occur:
  1. At orientation.
  2. Annually.
  3. When there are changes to the plan.
  4. When Emergency Response Coordinator determines.
  5. Site maps with all access roads and cross streets have been given to all local emergency services.

PRACTICE DRILLS

- Practice drills involving emergency response simulation exercises will be incorporated into the training program when determined to be necessary by the Site Construction Safety Manager.

EMPLOYEE SIGN-IN

1.	_____	8.	_____
2.	_____	9.	_____
3.	_____	10.	_____
4.	_____	11.	_____
5.	_____	12.	_____
6.	_____	13.	_____
7.	_____	14.	_____

Germanischer Lloyd Statement of Compliance with IEC Standards

Statement of Compliance

Germanischer Lloyd

GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

This Statement of Compliance for the A-Design Assessment of the Wind Turbine

GE 1.5sle 60 Hz CW

is issued to

GE Energy GmbH
Holsterfeld 16
48499 Salzbergen
Germany

This statement attests the compliance with normative references stated below concerning the design. The A-Design Assessment is based on the calculations and fabrication drawings listed in the relevant Certification Reports referenced below and the characteristic data given in the attached Annex.

Certification Report numbers and titles:

72183-1	dated 20.12.2005	Load Assumptions acc. to IEC 61400-1 Class S, Rotor Blade LM 37.3p2, Hub Heights 61.4m and 85.0m
72443-1, Rev. 1	dated 23.05.2006	Load Assumptions according to IEC 61400-1, Class IIB, LM37.3p2, Hub Heights 61.4 and 85.0 m (MTS)
72670-1, Rev. 6	dated 21.12.2006	Fatigue and Extreme Load Envelope for the Blades and the Machinery
72904-2, Rev. 2	dated 20.12.2006	Safety System and Manuals
72904-3, Rev. 1	dated 31.10.2006	Rotor Blade LM 37.3p2
73116-3	dated 20.12.2006	Rotor Blade GE 37c
72904-4, Rev. 5	dated 16.02.2007	Machinery Components
821420(e)	dated 05.05.2006	Tubular Steel Tower Hub Heights 61.4 m to 85.0 m (MTS)
782352(e)	dated 22.12.2006	Tubular Steel Tower Hub Heights 61.4 m to 85.0 m (MTS), Extension to Report No. 821420(e)
72904-6, Rev. 2	dated 20.12.2006	Electrical Equipment and Lightning Protection
72904-8	dated 30.06.2006	Commissioning
72904-12, Rev. 1	dated 21.07.2006	Nacelle Cover and Spinner

Normative references: International Standard IEC 61400-1 "Wind turbine generator systems – part 1: Safety requirements", second edition, dated February 1999.

Germanischer Lloyd WindEnergie GmbH "Guideline for the Certification of Wind Turbines", Edition 2003 with Supplement 2004.

GL Wind-Technical Note 067 "Certification of Wind Turbines for Extreme Temperatures (here: Cold Climate)", dated 23.08.2005

By DAP German Accreditation System for Testing
accredited Certification Body for products
The accreditation is valid for the fields of certification
listed in the certificate

Deutscher Akkreditierungs Rat
DAR
DAP-ZE-3443.00

Germanischer Lloyd Industrial Services GmbH
Business Segment Wind Energy
Steinhöft 9
20459 Hamburg
Germany

GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Changes in design are to be approved by Germanischer Lloyd (GL) otherwise this statement loses its validity.

Hamburg, 16th February 2007
HoBe/MRat

Germanischer Lloyd Industrial Services GmbH

Bodo Helm

i. V. Axel Andreä

Statement of Compliance

Germanischer Lloyd

Annex

16th February 2007
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GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Technical specifications for GE 1.5sle 60 Hz CW

Main data	Type	Horizontal axis wind turbine with variable rotor speed
	Rotor diameter	77 m
	Power regulation	Independent electromechanical pitch system for each blade
	Rated power	1500 kW
	Hub height	61.4m ... 85.0 m
	Rated rotational speed	18.3 rpm
	Operating range rotational speed	10.5 ... 20.3 rpm
	Cut-in wind speed	3 m/s
	Rated wind speed	10.2 ... 10.7 m/s
	Cut-out wind speed (10-min-mean)	25 m/s
	Extreme wind speed (50-year-gust)	52 m/s
	Annual average wind speed	8.5 m/s
	Design life time	20 years
	Operational temperature	- 30° C up to 40° C
	Survival temperature	- 40° C up to 50° C
	IEC 61400-1 ed. 2 – Type Class	**II_B, V_{e50} = 52 m/s**
Nacelle	Manufacturer	GE Energy
	Drawing No.	900619, Rev. 0
Nacelle cover	Documentation by	GE Energy AMADE, Universitat de Girona
	Drawing No.	900880, Rev. 1
Rotor	Cone angle	0°, pre deflected blades
	Tilt	4°
	Blade pitch-angle	Variable
	Orientation	Upwind

Annex

16th February 2007

GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Blade	Type	LM 37.3p2 (vg)
	Material	Glass fibre reinforced polyester
	Blade length	37.3 m
	Number of blades	3
	Manufacturer	LM Glasfiber
	Drawing No.	004537, Rev. 15572 "Main Drawing" DR-00021, Rev. 16090 "Lay up Drawing"
	alternative:	
	Type	GE 37c
	Material	Glass fibre reinforced epoxy
	Blade length	37.25 m
	Number of blades	3
	Manufacturer	GE Energy
	Drawing No.	905305, 905306
Pitch gear	Manufacturer	s.me.i srl
	Type	RES 1000 GR3
	alternative:	
	Manufacturer	Bosch-Rexroth
	Type	GFB 17
	alternative:	
	Manufacturer	Liebherr
	Type	DAT 250/480
	alternative:	
	Manufacturer	Liebherr
	Type	DAT 325/1408 (Spring activated pitch system)
	alternative:	
	Manufacturer	Zollern
	Type	ZHP 3.20

Annex

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GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Hub	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	900389, Rev. 4
Hub cover	Documentation by	GE Energy Jupiter Plast
	Drawing No.	903307, Rev. 1, 4 sheets
Main shaft	Type	Forged
	Material	34CrNiMo6
	Drawing No.	900664, Rev. 3
Main bearing	Design	Spherical roller bearing
	Type	240/600
	Manufacturer	F.A.G., SKF, Timken, Koyo, NTN
Main bearing housing	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	903374, Rev. 0
	<u>alternative:</u>	
	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	AHV-0055, issue 8
Gearbox	Manufacturer	Winergy
	Type	PEAB 4410.2
	Ratio	1:78.292
	<u>alternative:</u>	
	Manufacturer	Moventas (former Metso)
	Type	PLH 1100.1
	Ratio	1:78.0357
	<u>alternative:</u>	
	Manufacturer	Bosch Rexroth
	Type	GPV 453 S
	Ratio	1:78.03

Annex

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GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Mechanical brakes	No of callipers	1
	Position	High speed shaft of main gear
	Manufacturer	Svendborg Brakes
	Type	BSAK 3000-MS40S-103
Generator	Manufacturer	ABB
	Type	AMK500L6A BATYH
	Rated power	1545 kW
	Rated speed	1440 rpm
	Isolation class	F
	Degree of protection	IP54
	alternative:	
	Manufacturer	Hitachi
	Type	TFFOAN-DQ
	Rated power	1545 kW
	Rated speed	1440 rpm
	Isolation class	F
	Degree of protection	IP54
	alternative:	
	Manufacturer	Toshiba
	Type	IWFT-CHKM
	Rated power	1545 kW
	Rated speed	1440 rpm
	Isolation class	F
	Degree of protection	IP54
	alternative:	
	Manufacturer	VEM
	Type	DASAB 5025-6U
	Rated power	1545 kW
	Rated speed	1440 rpm
	Isolation class	F
	Degree of protection	IP54

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	alternative:	
	Manufacturer	Winergy
	Type	JFEA-500SS-06A
	Rated power	1545 kW
	Rated speed	1440 rpm
	Isolation class	F
	Degree of protection	IP54
Main frame	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	900245, Rev. 9
Yaw bearing	Type	Ball bearing
	Drawing No.	KUD 478 VA 804-000
	Manufacturer	Liebherr
	alternative:	
	Drawing No.	091.45.2334.004.61.1502
	Manufacturer	Rothe Erde
Yaw gear	Manufacturer	s.me.i srl
	Type	RES 3300 GR4-KT
	alternative:	
	Manufacturer	Bosch-Rexroth
	Type	GFB 60
	alternative:	
	Manufacturer	Liebherr
	Type	DAT 400/483
	alternative:	
	Manufacturer	Nabtesco
	Type	RGS 40

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	alternative:	
	Manufacturer	Zollern
	Type	ZHP 3.26
	alternative:	
	Manufacturer	Nanjing
	Type	FDP 1.5
Yaw brake	Manufacturer	GE Energy and manufacturer of yaw drives
	Type	Permanent brake on bearing and motor brakes
Tower	Type	61.4 m (MTS)
	Design	Tubular steel tower with 3 sections
	Length	58.8 m
	Drawing No.	114W1174
	alternative:	
	Type	64.7 m (MTS)
	Design	Tubular steel tower with 3 sections
	Length	62.0 m / 62.3 m
	Drawing No.	114W 1125 / 114W 1133
	alternative:	
	Type	80.0 m (MTS)
	Design	Tubular steel tower with 3 sections
	Length	75.9 m / 77.3 m / 77.6 m
	Drawing No.	903796(0) / 903793(0) / 903794(0)
	alternative:	
	Type	85.0 m (MTS)
	Design	Tubular steel tower with 4 sections
	Length	82.3 m
	Drawing No.	114W 1103

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16th February 2007

GL Wind Statement No. **DAA-GL-005-2006, Rev. 3**

Control and safety system Manufacturer

GE Energy
SSB Antriebstechnik

End of Annex

S Architectural Survey Report

Architectural Survey (Five-Mile APE) for the Proposed Noble Ball Hill Windpark

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ARCHITECTURAL SURVEY (FIVE-MILE APE)

FOR THE PROPOSED NOBLE

BALL HILL WINDPARK,

TOWNS OF VILLENOVA AND HANOVER,

CHAUTAUQUA COUNTY, NEW YORK

OPRHP #08PR01814

Prepared for:

NOBLE BALL HILL WINDPARK, LLC
8 Railroad Avenue, Suite 8
Essex, Connecticut 06426

Prepared by:

PANAMERICAN CONSULTANTS, INC.
Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227

July 2008

ARCHITECTURAL SURVEY (FIVE-MILE APE)

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OPRHP #08PR01814

Prepared for:

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July 2008

Management Summary

SHPO Project Review Number: #08PR01814

Involved State and Federal Agencies: U.S. Army Corps of Engineers, New York State Department of Environmental Conservation, Public Service Commission

Phase of Survey: Final architectural survey (5-mile APE; Intensive level)

Project Location Information

Location: see minor civil division below
Minor Civil Division: Towns of Villenova (MCD 01326) and Hanover (MCD 01314)
County: Chautauqua

Five-mile Ring Information

Minor Civil Division: Towns of Arkwright (MCD 01301), Charlotte (MCD 01304), Cherry Creek (MCD 01306), Hanover (MCD 01314), Sheridan (MCD 01323), and Villenova (MCD 01326), and the villages of Forestville (MCD 01352), Silver Creek (01346), Chautauqua County; and Towns of Dayton (MCD 00906), Leon (MCD 00917), and Perrysburg (MCD 00926), and the villages of Perrysburg (MCD 00951) and South Dayton (MCD 00954), Cattaraugus County
Counties: Chautauqua and Cattaraugus

Number of Proposed Turbines: 60 (49 in Villlenova and 11 in Hanover)

Survey Area (including zero visibility area [0 ZVI])

Total area surveyed: 169 square miles

USGS 7.5-Minute Quadrangle Maps (all New York):

Results of Archaeological Survey: (see separate report)

Hanley, Robert J., Mark A. Steinback, Michael A. Cinquino, Rebecca J. Emans, Edwin Button, Sharon Jenkins, Donald Smith

2008 *Phase I Cultural Resources Investigation for the Proposed Noble Ball Windpark, Towns of Villenova and Hanover, Chautauqua County, New York. OPRHP # 08PR01814*. Panamerican Consultants, Inc., Buffalo Branch, Buffalo. Prepared for Noble Ball Hill Windpark, LLC, Essex, CT.

Results of Architectural Survey

Number of previously determined NR-listed or –eligible buildings/structures/ cemeteries/districts in the positive Zone of Visual Influence (ZVI): 8 NRE (I)
Number of possibly eligible buildings/structures/cemeteries/districts in the positive ZVI: 138 individual structures, inclusive of one proposed 14-property historic district

Report Author(s): C. Longiaru, K. Mahar, F. Schieppati, M. Steinback, K. Nolte, D. Smith, M. Cinquino, and M. Wachadlo

Report Date: July 2008

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1.0 Introduction

1.1 PROJECT DESCRIPTION

Panamerican Consultants, Inc. (Panamerican) was contracted by Noble Environmental Power, LLC (Noble), Essex, Connecticut, to complete an architectural survey of the five-mile visual Area of Potential Effect (APE) around the outer most turbine locations and a three-mile radius around the proposed transmission line for the Noble Ball Hill Windpark, a wind-energy project proposed in the Towns of Hanover and Villenova, Chautauqua County, New York (Figures 1.1 and 1.2). The Project consists of two distinct portions: generation and transmission. The wind-energy generation component of the Project will be in the towns of Villenova and Hanover. The transmission component of the Project will be in the Town of Hanover.

The generation portion of the Project consists of the following:

- Installation and operation of 60 wind turbines with a capacity of approximately 9o megawatts (MW) within an approximately 5,500-acre area in the towns of Villenova and Hanover. Of the 60 wind turbines, 49 are proposed for location in Villenova and 11 in Hanover (see Figure 1.1).

- Construction and use of approximately 16 miles (25.7 kilometers) of access roads (a road measures 35 feet [10.6 meters] wide within a 60-ft [18.2-m] construction corridor) that will connect each wind turbine to a town or county roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities. After construction, the same access roads will be scaled back to 16 ft (4.9 m) allowing Noble to use the existing roadway for maintenance and operational purposes.

- Construction and use of an electrical collection system that will allow delivery of electricity to a new substation to be constructed in the Town of Hanover as part of the transmission portion of the Project.

The transmission portion of the Project consists of the following:

- Construction and use of a new substation in the Town of Hanover on a one-acre parcel east of Empire Road and north of Hurlburt Road, that will tie into a new 115-kilovolt (kV) transmission line. The substation footprint will be approximately 200 by 300 ft (60 by 90 m).

- Construction and use of an approximately six-mile (9.7-km) overhead 115-kV transmission line, sited in the Town of Hanover, to transfer the energy to a switchyard near Bennett State Road, which will provide access to the grid (e.g., National Grid's existing 230-kV Dunkirk-Gardenville transmission line north of Forestville). The new switchyard will be built on a footprint measuring 300-x-500 feet (3.4 acres). Electrical lines connecting the turbines to each other and the existing substation will be carried on poles ranging from 55.5 to 75 ft (16.9 to 20.4 m) tall, placed underground, or installed along existing power line rights-or-way where possible.

The wind turbines that will be installed for the Project will be General Electric (GE) 1.5-MW, Model sle, 80-meter, modular tower system (MTS), T-Flange wind turbine generators[1]. The turbine is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 253 ft (77 m). The nacelle is located at the top of each tower and contains the electrical generating equipment. The turbine rotor and nacelle are mounted on top of a tubular tower, giving a rotor hub height of 263 ft (80 m). The maximum height for the turbine is 389 ft (118.5 m) when a rotor blade is at the top of its rotation. Once installed, each turbine will occupy a round, slightly exposed base approximately 18 ft (5.5 m) in diameter.

The purpose of this architectural survey was to identify National Register eligible (NRE) properties in the five-mile visual APE of the proposed Noble Ball Hill Windpark as well as NRE properties within a three-mile visual APE of the proposed transmission line. The Noble Ball Hill Windpark NRE recommendations in this report are preliminary and ***not*** considered final determinations of National Register eligibility. Final determinations will be made by New York State Historic Preservation Office (NYSHPO). The historic building survey of the five-mile APE study area and the three-mile APE study area was conducted in compliance with NYSHPO Guidelines for Wind Farm Development Cultural Resources Survey Work (NYSHPO 2006), the National Historic Preservation Act, the New York State Historic Preservation Act, and all relevant state and federal legislation.

The historic building survey was conducted by Panamerican in April 2008. Ms. Christine M. Longiaru, M.A., served as Principal Investigator/Senior Architectural Historian, assisted by Architectural Historians Ms. Kelly M. Mahar, M.H.P., and Mr. Martin Wachadlo, M.A.; Senior Historian Mr. Mark A. Steinback, M.A.; Project Director/Senior Archaeologist Dr. Michael A. Cinquino, RPA; Senior Preservation Planner/Senior Archaeologist Dr. Frank J. Schieppati, RPA; Database/GIS Supervisor/Archaeologist Dr. Donald A. Smith; and Senior Architectural Historian Ms. Kelly Nolte, M.A.

[1] "1.5 MW" refers to the production capacity of the turbine, which is 1.5 megawatts. The nomenclature "sle" is used to designate that the diameter size of the turbine rotor is 253 feet. The "80-meter" refers to the height of the tower. MTS (Modular Tower System) designates the type of tower configuration, and T-Flange designates the type of flange used to connect the tower directly to the foundation.

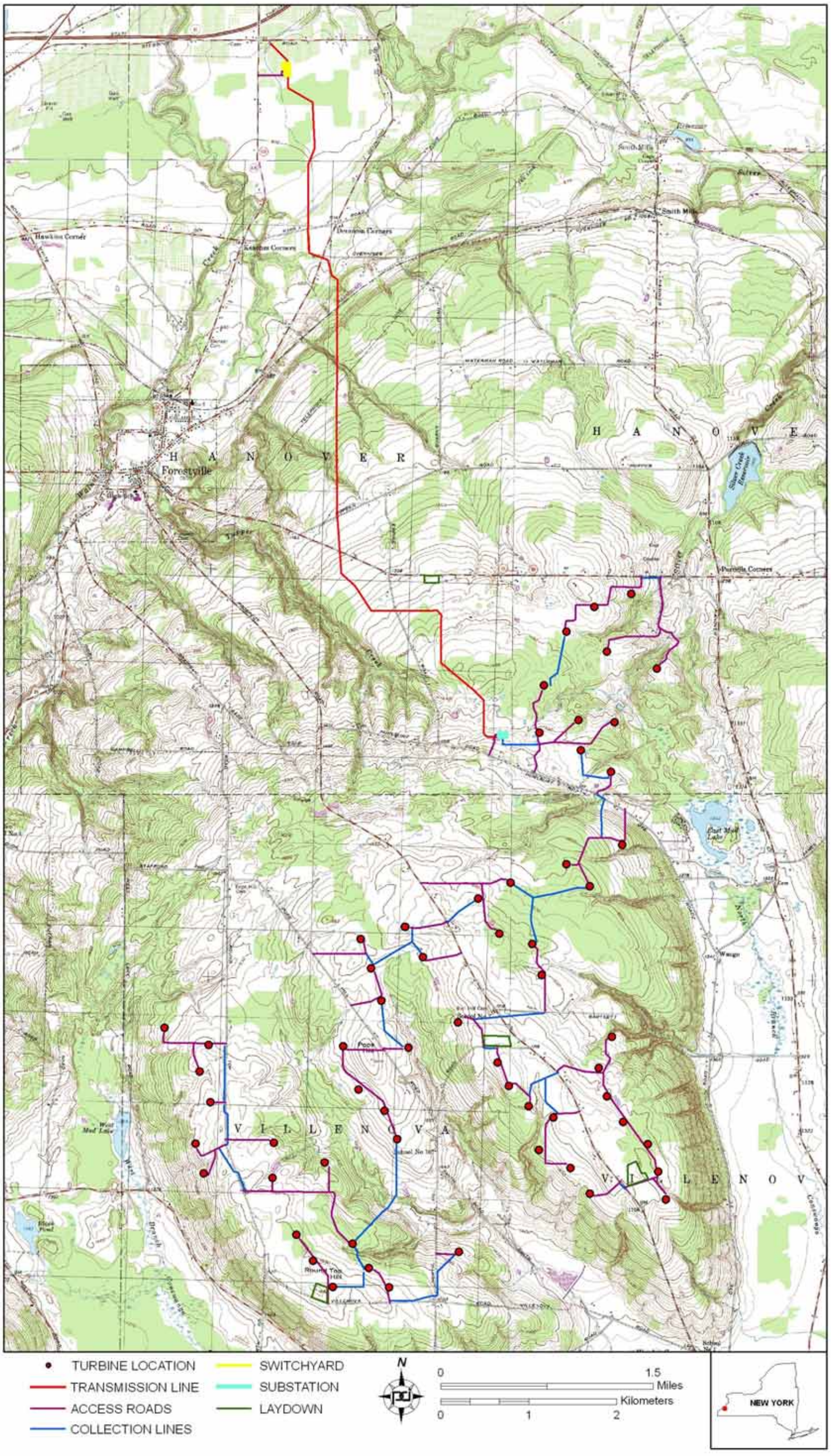

Figure 1.1. Approximate location of the proposed Noble Ball Hill Windpark, Towns of Hanover and Villenova, Chautauqua County, New York *(USGS 100k Series Topographic: Silver Creek, NY 1962, Farnham, NY 1963, Perrysburg, NY 1980, Forestville, NY 1980)*

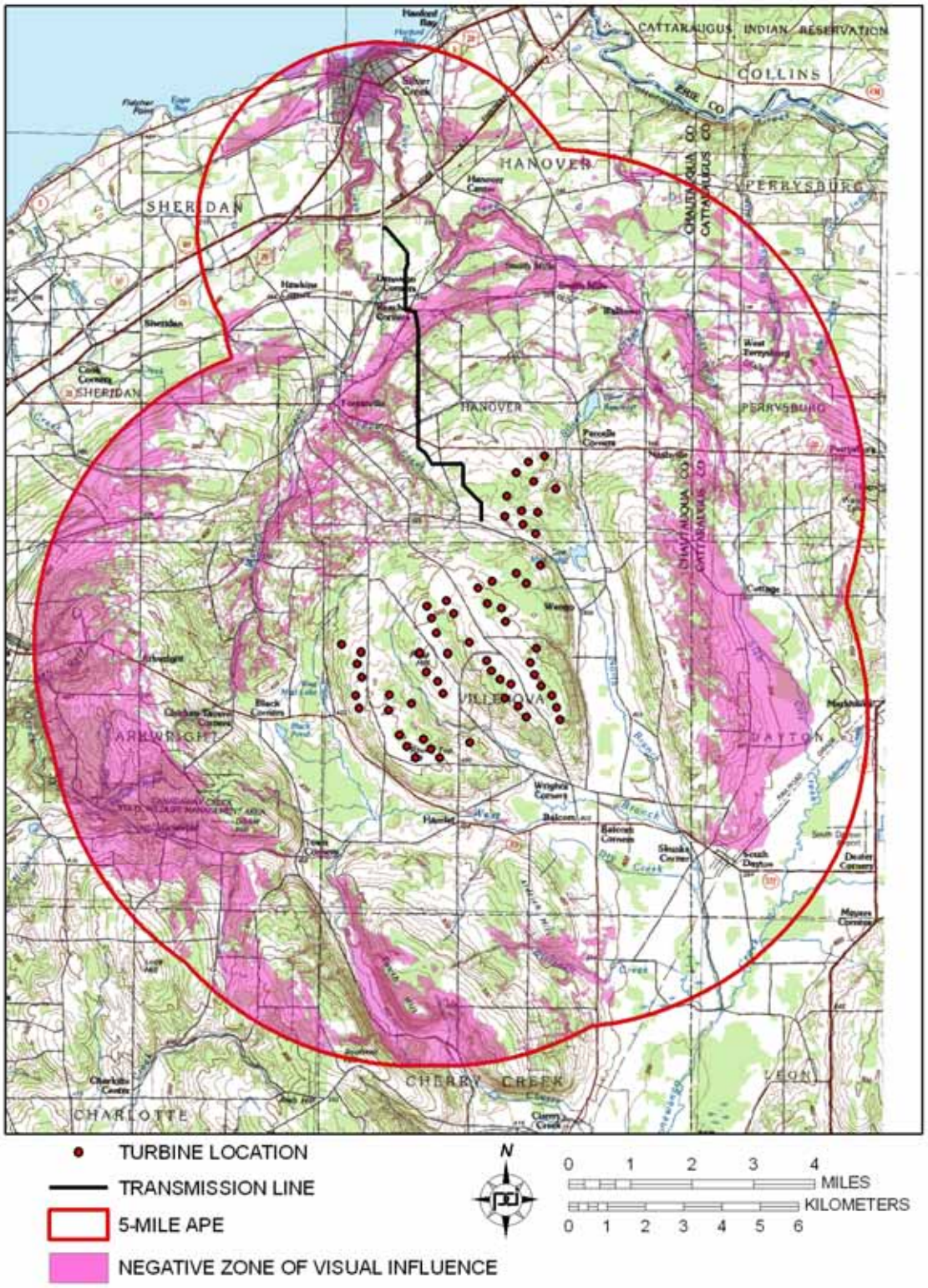

Figure 1.2. Noble Ball Hill five-mile visual APE map including turbine locations and six miles of new transmission right-of-way in Chautauqua County, New York *(USGS 100k Series Topographic: Jamestown NY 1986, Silver Creek, NY 1986)*

2.0 Historical Context

During the late Prehistoric and Contact periods, tribal clusters of Iroquoian-speaking peoples were distributed throughout New York State and lower Ontario. Comprising several thousand people in at least one, and usually several, villages in proximity to one another, each tribal cluster was separated from the others by extensive and widespread hunting and fishing areas (Trigger 1978:344; Engelbrecht 2003). Native American groups in western and central New York were profoundly affected by the introduction of the fur trade, long before the arrival of a permanent European-American population in the area. This period dates the beginning of the end of traditional Native American cultural patterns due to ever-increasing political, military, religious and economic interactions with Europeans.

Prior to the arrival of Europeans into the Niagara Frontier, three Iroquoian peoples primarily occupied the region: the Neutral, the Wenro and the Erie. A fourth Iroquoian group, the Seneca, inhabited areas well east of the Niagara River, but would assert their power in the region's affairs beginning in the seventeenth century (White 1978a; Abler and Tooker 1978).

Located in the Niagara peninsula of Ontario and in the western portion of what is now Niagara County, the Neutral earned their name from their location between the Huron to the north and the Iroquois to the east, and their efforts to remain non-aligned during the incessant warfare between those two groups. The Kahquahs (also known as the Neuter or Neutral nation) were reported to have a village at the mouth of Eighteenmile Creek during the middle of the seventeenth century. The Wenro occupied areas in Niagara and Orleans counties, east of the Neutral near Batavia. The Erie, or Nation of the Cat, were located south of the present city of Buffalo along Lake Erie (or *Lac du Chat*, to the French) and utilized areas southeast of the lake that bears their name to Sandusky, Ohio. The traditional homeland of the Seneca was the area between the Genesee River and Seneca Lake (Engelbrecht 2003; White 1978a:407-409; Turner 1974 [1850]:69; Parker 1922:493).

After 1600, the sources of animal skins within Seneca territory diminished. Because of this shift in resources, the Seneca expanded the range of their hunting and trading efforts into the traditional areas of other Iroquoian groups. Between 1638 and 1655, the Seneca warred against their rivals in western New York to secure the resources of the Niagara Frontier. The Seneca "dispersed" (e.g., annihilated and assimilated) the Wenro (by 1638), the Huron Confederacy (1649), the Petun (1650), the Neutral Confederacy (1651) and, finally, the Erie Confederacy (1655). By the mid-seventeenth century, the Haudenosaunee or Iroquois Confederacy of New York emerged as a politically, militarily, and economically united confederacy with sole access to both the land and resources surrounding the lower Great Lakes. As a result, the project area remained a sparsely settled hinterland of the Seneca, subject to hunting and resource procurement.

For almost all of the seventeenth and eighteenth centuries European activities in what is now western New York would consist of limited religious, commercial, and military endeavors. Jesuit missionaries and French traders were the first Europeans to penetrate the valleys of the region. For example, Joseph de la Roche Daillon, a Récollet (Franciscan) missionary, lived among the Neutrals for three months in 1626, and Jesuits St. Jean de Brébeuf and Pierre Joseph Marie Chaumonot visited the Neutrals in 1640. La Roche Daillon is reported to have noted a petroleum pool near what is now Cuba during his travels in July 1627. Although these visits to the region increased in frequency after the 1660s, French explorations did not generally penetrate the dense forests of what are now Chautauqua and Cattaraugus counties. The first

recorded visit to the Seneca by the Jesuits was in 1656 by Pierre Joseph Marie Chaumonot. In 1678-1679, as part of general reconnoitering and trade expeditions in western New York, men under the direction of René-Robert Cavelier, Sieur de La Salle constructed a ship called *Le Griffon* along the Niagara River which would be the first sail vessel to ply the waters of Lake Erie and prosecute the Great Lakes fur trade. During their explorations of the interior of what is now Chautauqua County, La Salle and his party were the first Europeans to see Chautauqua Lake. In general, European activities would be far removed from the area until the mid-eighteenth century (Trigger 1978:347-354; Abler and Tooker 1978:505-506; Edson 1894; Turner 1974 [1850]:116-119).

As the fur trade became an imperial concern for the European powers during the seventeenth and eighteenth centuries, competition among these powers resulted in the erection of fortified trading posts along the frontier, such as the French Fort Conti in 1679 (later, Fort Niagara), and the British fort near the future village of Geneva. Despite consistent failures in establishing permanent trading posts along the Niagara River, French strategists continued to accept the idea that asserting control over the Great Lakes offered strategic advantages for their imperial goals. As early as the 1669 (and perhaps earlier), the French were aware of a portage from Lake Erie to Chautauqua Lake and then via waterways to the Mississippi River. This route was traversed in 1739 by forces under the command of Charles Le Moyne de Longueuil, the second baron de Longueuil, as part of an indecisive effort to reinforce French forces in what is now northern Mississippi, who were engaged in battle with the Chickasaw. The contingent landed near what is now Barcelona, New York, and may have followed two separate paths to Chautauqua Lake, and then along the Chadakoin River to Conewango Creek to the Allegheny River. It was not noted how or when they returned to New France (Stevens and Kent 2000[1941]).

By the middle of the eighteenth century, the French had created a string of military and trading installations extending from Fort Niagara along Lake Ontario, south to Buffalo Creek, and along the southern shore of Lake Erie to Presque Isle (present-day Erie, Pennsylvania) into the Ohio valley. In the late 1740s, both French traders and British settlers had expanded their efforts west of the Appalachian Mountains to engage Native nations in the Ohio Country. As a result, each kingdom intensified their efforts to deny the other access to the area (Abler and Tooker 1978:506-507; Tooker 1978:431-432: Turner 1974 [1850]: 143-147, 184; Smith 2008).

In 1749, a French expedition under the direction of Captain Pierre-Joseph Céloron de Blainville marched through the Chautauqua County woods in an effort to drive out British-American interlopers during the run up to the French and Indian War and exert the French claim to the Ohio River valley. The detachment followed the Lake Erie shore and landed at the mouth of what is now Chautauqua Creek in present-day Westfield near where de Longueuil landed a decade earlier. Carrying their gear overland along an Indian trail to Chautauqua Lake, the expedition used the established water route to reach the Allegheny River on July 29, 1749. As they went, they buried engraved lead plates that proclaimed French sovereignty of the area, although no plates were buried in Chautauqua County (Sullivan 2004[1927]; Smith 2008). Four years later, in 1753, an expedition of 200 men under the command of Captain Michel-Jean-Hugues Péan expanded the nine-mile portage trail into the so-called French Portage Road by hacking out a path through the dense forest. The road, which connects present-day Westfield and Mayville, was still evident in 1802 when settlers first moved into the area. They called it the "Old French Road" (which approximated what is now State Road 394) (Preservation League of New York State 2001; Smith 2008).

The ancient rivalry between the British and the French intensified during the course of the eighteenth century, reaching a crescendo during the 1750s, when the two countries engaged in another round of warfare. Much of the action of the conflict occurred elsewhere, including the erection of several French fortifications in what is now northwestern Pennsylvania, including Fort Presque Isle (1753), Fort Le Boeuf (1753), and Fort Machault (1756). The British would construct Fort Venago (1760) approximately 200 feet from the site of Fort Machault, which the French burned when they left the area in 1759. After a 19-day siege, British troops captured Fort Niagara along Lake Ontario in July 1759. This crippled the French presence in the region, although skirmishing between Native Americans and the English continued until the closing days of the French and Indian War (Smith 2008; Turner 1974 [1850]:228-233).

During the Revolutionary War, both the British and Americans enlisted the aid of individual Haudenosaunee nations in their battles in the frontier, as several of the nations allied with Great Britain and several with the Americans. Warfare initially remained well east of the region, but Britain's efforts to cripple the frontier economy engendered raids by their Haudenosaunee allies against isolated farming communities, notably in the Mohawk and Delaware valleys. In response, Commander-in-Chief General George Washington ordered a punitive assault into the heart of Haudenosaunee country in 1779 to halt the attacks against American settlers. Under the command of Major General John Sullivan and Brigadier General James Clinton, the American forces destroyed more than 40 villages and hundreds of acres of crops in an area between the eastern Finger Lakes and the Genesee River. Many Haudenosaunee, burned out of their central New York villages, sought refuge at Fort Niagara where they suffered through a difficult winter of hardship and hunger (Spiegelman 2007; Abler and Tooker 1978:507-508; Ellis et al. 1967:116-117).

As part of that campaign, Colonel Daniel Broadhead led a complementary maneuver to drive Britain-allied nations from the Allegheny valley. The Americans destroyed ten native villages during their march up the Allegheny River between Fort Pitt (present-day Pittsburgh) and Olean Point. Provisioned and armed by the British, groups of Haudenosaunee periodically harassed colonial settlements until the end of the war, but were not a major military threat (Abler and Tooker 508).

The British and their Loyalist allies were expelled from the new United States after the Treaty of Paris (1783) ended the Revolutionary War, although the British did not vacate forts along Lake Ontario or farther west until 1796. The Haudenosaunee, abandoned in the United States by their British allies after the war, were forced to make peace as separate nations with the Americans (Abler and Tooker 1978:507-508; Ellis et al. 1967:115-117). As a result of the Second Fort Stanwix Treaty (1784), the Haudenosaunee relinquished all their land west of the Niagara River. This treaty was disputed by several groups of Haudenosaunee until 1794, when a treaty was signed at Canandaigua between the United States and the Six Nations that defined the boundaries of Seneca lands and the reservations to the other Haudenosaunee nations. Native American title to the land in western New York was largely extinguished with the Treaty of Big Tree (present-day Geneseo, New York) in 1797; although several areas were reserved for the Native Americans to use and live on, including reservations at Allegany, Buffalo Creek, Cattaraugus, and Tonawanda (Figure 2.1; Turner 1974 [1850]:403; Abler and Tooker 1978:509, 512; Higgins 2004; Goldman 1983:27-31).

European-American settlement of the Niagara Frontier dates from the end of the American Revolution in 1783, although border disputes between New York and Massachusetts, both of which claimed the new territory, frustrated the actual, legal sale of these lands. Under an

agreement signed in Hartford, Connecticut in 1786, the land once occupied by the Haudenosaunee came under the jurisdiction of New York State. Nonetheless, the Commonwealth of Massachusetts maintained the right to sell the land west of Seneca Lake once the Native title to it had been extinguished. During the next decade large grants of land in western New York were sold to private investors who attempted to open the land to settlement, except for a one-mile wide strip of land along the eastern bank of the Niagara River, which New York State reserved for itself (see Figure 2.1; Ellis et al. 1967:152-156; Schein 1993:5-8; Abler and Tooker 1978:507-509; Turner 1974 [1850]:326).

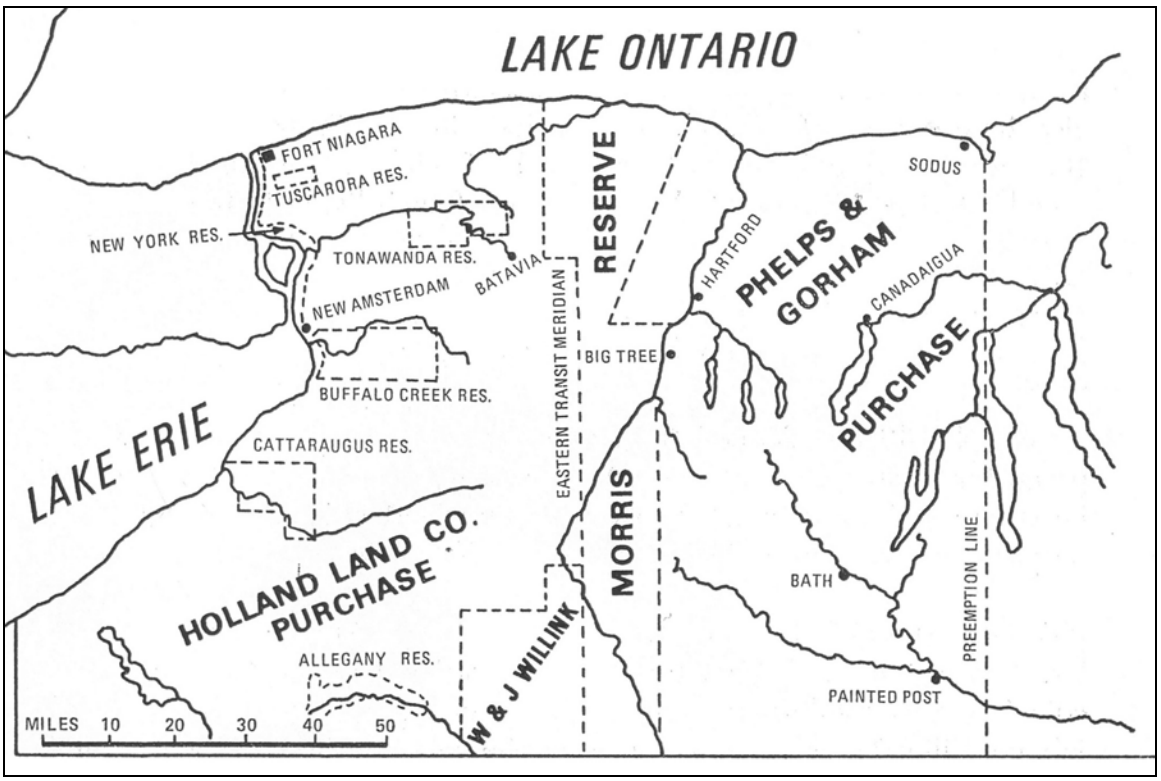

Figure 2.1. Landholdings in Western New York circa 1800 *(Chazanof 1970:23).*

The Commonwealth of Massachusetts sold the preemption rights to the entirety of western New York (more than 6 million acres) to a syndicate of land speculators headed by Oliver Phelps and Nathaniel Gorham. The eponymous Phelps & Gorham purchase became Ontario County in January 1789. Financial troubles soon undermined the syndicate's efforts to sell parcels within their purchase to settlers. These difficulties ultimately led to the group's forfeiture of the western two-thirds of the tract in 1790 in exchange for retention of title to the eastern third. Massachusetts then sold the remaining unsurveyed portion of the area to financier Robert Morris in 1791. Reserving a portion of the land for his own purposes (the so-called "Morris Reserve"), Morris sold the remainder, including all of the present Chautauqua and Cattaraugus counties, to a consortium of Dutch investors called the Holland Land Company in 1792-1793 (see Figure 2.1; Turner 1974 [1850]:396-403; Ellis et al. 1967:154-156).

To facilitate settlement of the area, Theophilus Cazenove, agent for the group, contracted Joseph Ellicott in the autumn of 1797 to survey the company's land in western New York and divide it into townships. All of western New York was at one time part of an über Genesee County, which included all the land west of the Genesee River and a line due south from the

junction of the Genesee and Canaseraga Creek (near Big Tree on Figure 2.1). The first Euro-American settler of Chautauqua County may have been Amos Sottle (or Sawtel) who reputedly erected a log house in 1796 or 1797 near what is now the Village of Irving along Cattaraugus Creek (Smith 1884:I:77; Young 1875:70-74). The first Euro-American settlement in what is now Cattaraugus County occurred in 1798 in the Town of South Valley by Joel Swane, Halliday Jackson and Henry Simmons, who were sent by the Society of Friends of Philadelphia (Quakers) to teach agricultural techniques to the Seneca. It was short-lived settlement (Adams 1893; Ellis 1879). The first permanent settlement in Cattaraugus County took place in 1804 when Robert Hoops erected a cabin at Olean Point (East Olean) along the Allegheny River. Hoops was an agent for his brother Major Adam Hoops and David Heuston. Major Hoops purchased 20,000 acres in what are now Cattaraugus and Allegany counties in January 1803 on advice from his son, Adam, Jr., who was a surveyor for the Holland Land Company. The settlement at Olean Point was chosen because it was at the head of steamboat navigation on the Allegheny River, which would become a major point of embarkation for pioneers heading to Pittsburgh, Cincinnati, and the Western Reserve in Ohio (Beers et al. 1869:97; Adams 1893:57, 854; Ellis 1879:153-154).

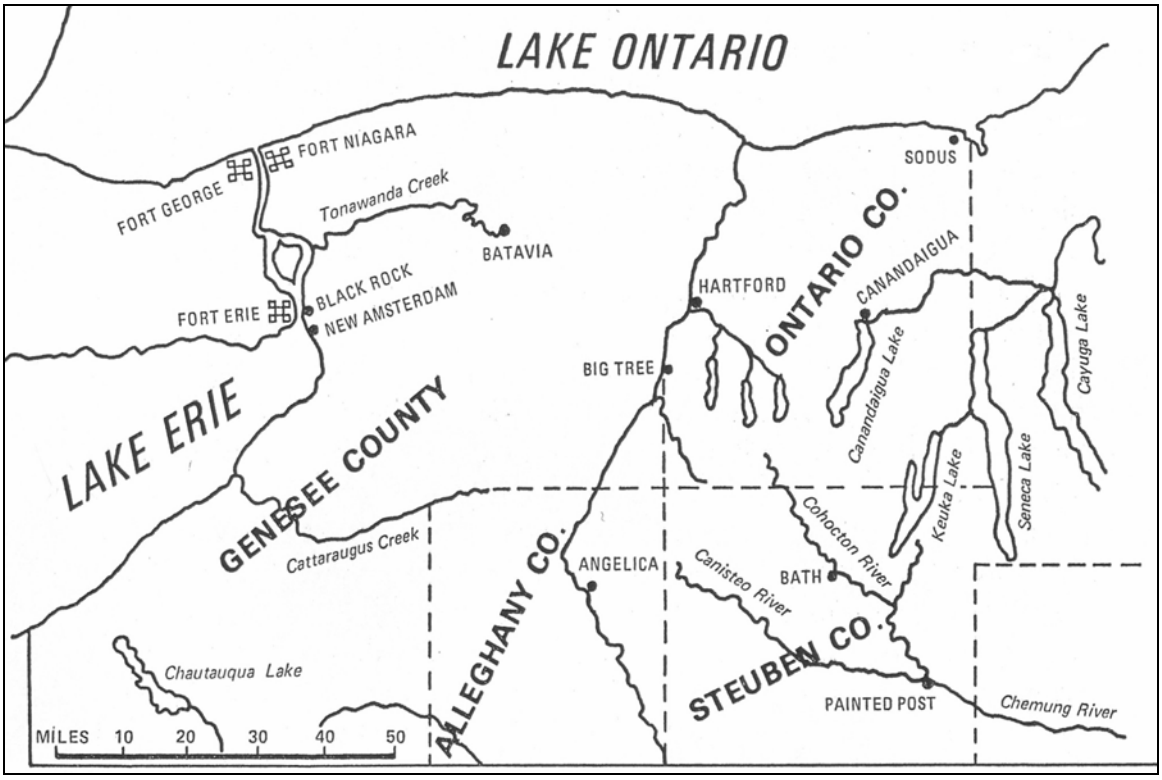

Figure 2.2. County organization of Western New York as of 1806 *(Chazanof 1970:55).*

The Town of Chautauqua was formed within Genesee County on April 11, 1804, and comprised all of the present county of Chautauqua except the townships in Range X, the easternmost strip (Doty et al. 1940; Young 1875; Beers 1881:18-19). In 1808, the counties of Chautauqua and Niagara (consisting of what are now Erie and Niagara counties) were created from Genesee County. At that time, Range X was included as part of Chautauqua County, which was divided into two townships—the Town of Pomfret in the east and the Town of Chautauqua in the west. Cattaraugus County was created in 1808 as well, although it was coterminous with the Town of Olean. It would remain so until the Town of "Ischua" (now

Franklinville) was created in 1812 (Beers 1881:18-19; Young 1875:109-110, 466; Hazeltine 1887:49, 52; Chautauqua History Co. 1904:517; Doty et al. 1940:590).

However, at the time of their formation in 1808 neither Chautauqua County nor Cattaraugus County had sufficient population to operate separately. Chautauqua County would act in conjunction with Niagara County until 500 taxable inhabitants (or voters) were living within it boundaries. The proto-county reached the magic number of 500 in 1810 and was fully organized on February 9, 1811. Mayville was selected as the county seat (Beers 1881; Young 1875:110-114; Turner 1974 [1850]:578, 576). Cattaraugus County also worked under the jurisdiction of Niagara County until it attained 500 voters. With its population hovering around 537 residents, Cattaraugus County was officially created on March 26, 1817, although the county courts did not open session in Olean until July 3. As a consequence of a number of factors—poor roads, nothing to sell, no market for goods or services, and general frontier poverty, settlement of Cattaraugus County lagged. Early population centers were at Olean and Ellicottville (Adams 1893:55-59, 857; Beers 1880:15; Adams 1893:55, 854; Doty et al. 1940:590).

Early settlers were from Pennsylvania, Rhode Island, and Vermont, who entered the region during the early 1800s via Lake Erie and the network of streams east of Chautauqua Lake, up from Pennsylvania, or along Cattaraugus Creek. While John and James McMahan and Edward McHenry (near what is now Westfield) are regarded as the first permanent settlers of Chautauqua County (in 1802), Amos Sottle (or Sawtel) had reputedly erected a log house in 1796 near what is now the Village of Irving along Cattaraugus Creek. An axeman with Ellicott's surveying party, Sottle resided there for a number of years, but left for several years to work with Ellicott surveying the Northwest Territory. Sottle returned by 1804 to live permanently in Chautauqua County. At this early date, settlement in northern Chautauqua County concentrated at what would become the Village of Silver Creek, approximately eight miles north of the project area. Other pioneers included Andrew Straub, David Kincaid, Arthur Bell, Christopher Dull, James Montgomery, Culbertson, George, and John Degeer, and Jeremiah George, all by 1804 (Beers 1881:18; Stewart 1867:7; Young 1875:70-73).

Settlement of what is now the Town of Pomfret began in 1804; the first settlers were Thomas McClintock, David Eason, and Low Miniger. These three eventually sold their land to Hezekial Barker, Zattu Cushing, and other people, and moved to Westfield. Cushing arrived in 1804 and purchased land in Lots 29 and 33 of Township 6, and Lot 16 of Township 5. Other early settlers include Epiphalet Burnham, Philo Orton, Samuel Davis and Samuel Berry (Beers 1881:20-21). Richard Williams and Zattu Cushing built a gristmill on Canadaway Creek in 1807. This mill attracted settlers, and as a result the concentration of settlement in the town was in this area, which was then called Canadaway (present-day Fredonia). A road through the village was laid out by 1809. The first bridge over Canadaway Creek was built by Elijah Risley, near Colburn's Mill; and his son Elijah Risley, Jr., opened the first grocery. Next door to the grocery, was the first shoe store, owned by Thomas Kapple, who also had the first tannery. The first school was taught by Samuel Berry in a log house; across the street was a bookstore. The first post office was in the home of Samuel Bellows, and the first tavern was in the home of Hezekiah Barker. Another tavern was established by Richard Williams (Beers 1881:21).

The earliest purchases of land in what is now the Town of Hanover occurred along Cattaraugus Creek in 1804 by Charles Avery and William G. Sydney in the area identified as "Cattaraugus Village." Other landowners included Amos Sottle, Sylvanus Maybee, Able Cleveland, David Dickenson, and John Howard. Cleveland and Dickinson operated the first

sawmill and gristmill in the town (at Silver Creek) prior to 1805. Additional settlers before the War of 1812 were Ezekial Lane (an early resident of Buffalo), Artemas Clothier, Norman Spink, Jehial Moore (who built a sawmill near Forestville and later a gristmill), Guy Webster, and Joseph Brownell (Young 1875:73-74; Downs and Hedley 1921a).

On June 12, 1812, the Town of Hanover was formed from the Town of Pomfret and included what is now the Town of Villenova, which was formed on January 24, 1823. The Town of Hanover attained its present size in 1827, with the creation of the Town of Sheridan (Beers 1881:18-19; Young 1875:466; Chautauqua History Company 1904:517; Doty et al. 1940:590). The commercial center of Hanover was initially located in the north part of the town near the junction of Cattaraugus Creek and Lake Erie where Cattaraugus Village (now Irving) developed and what is now Silver Creek (then Fayette). Away from the lake, settlement clustered at Forestville and Nashville (at that time Webster Settlement). Settlement of what is now Forestville commenced ca. 1805 with early settlers including Ezra Puffer, Samuel Johnson, John Mack, Rufus Washburn, Walter Lull and Martin B. Tubbs, Jehial Moore (who in 1809 erected the first sawmill below the falls, and in 1810 the first gristmill), and Daniel Holbrook (Downs and Hedley 1921a).

The initial, formal land purchases in what is now the Town of Villenova began in late 1809, when Ezra Puffer, John Kent, and Daniel Whipple purchased lots in Township 5, Range 10 of the Holland purchase. Other purchasers before the War of 1812 included John Kent, Jr., Reuben Wright, Jr., John Arnold, Benjamin Sweet, and Charles Mather. Initial settlers, beginning with John Kent in 1809, included Daniel Whipple, John and Eli Arnold, William and Benjamin Barrows, Roderick Wells, Charles Mather, Captain Sweet, Nathaniel Bowen (who was killed at the Battle of Buffalo in 1813), Ezra Puffer, Villeroy Balcom, Ezra and Eldad Corbett, and William Pierce, who all arrived before 1816 (Downs and Hedley 1921b).

Northeast of the project area, the first settler in what is now Gowanda was Turner Aldrich who acquired more than 700 acres on both sides of Cattaraugus Creek in 1810. Aldrich erected a sawmill near Cattaraugus Creek in 1810 and a gristmill nearby in 1815. Known at the time as “Aldrich’s Mills,” the future village of Gowanda took shape around the mills. Ahaz Allen purchased 300 acres north of Aldrich in 1812 and later erected a dam on the creek to create a sawmill. Other early pioneers included Stephen Lapham, Stephen Wilber, Joshua Palmerton, Stephen Peters, and Augustus Smith in 1810; and Luke Crandall, Allen King, Arnold and John King, John Wiliams, and Jehial Abbee in 1811. Stephen Lapham and John Lawton erected sawmills in 1811 (White 1898:I:525-526).

The hamlet of Villenova emerged at a crossroads and was originally referred to as Wright’s Corners. Grover & Norris kept the first store here in 1828 and Villeroy Balcom operated a tavern in 1829. Auren G. and Nathaniel Smith built a sawmill in 1819 at what is now the hamlet of Hamlet. Long the leading business center in the town during the nineteenth century, Hamlet was at one time known as Orton’s Mill and as Omar in the 1850s. George Wilson, a wagon maker, was an early resident of Hamlet and Benjamin Vincent was an early Villenova blacksmith. James Brown constructed the first carding and cloth-dressing mill at Hamlet, which later housed a gristmill (Downs and Hedley 1921b). Other industries included an early gristmill in the Town of Villenova constructed by Stephen Landers and Crowell & Shepard; Kent’s mill on the Conewango River; and Nathan Worden’s sawmill less than two miles from Hamlet. An iron foundry was constructed along the Conewango by Hickey & Howard ca. 1860 and remained in operation through a number of owners during the middle of the century. Martin Crowell ran a planing mill from the same source for a number of years (Downs and Hedley 1921b).

Growth in Chautauqua County, especially along the lakeshore, was stunted by the War of 1812. During the war, western New York was a primary theater of activity, ravaged by attacks and counterattacks between American and British forces. Most of the fighting was north and west of Chautauqua County, but along Lake Erie, the *Queen Charlotte*, a British vessel, prowled the waters, sending marauders ashore to forage food (Ellis et al. 1967:141; Goldman 1983:21-24; Turner 1974 [1850]:603; Beers 1881:15, 18-19). Settlement resumed after the cessation of hostilities, but the conflict delayed the development in the county.

In 1811, the road between Ellicottville and Mayville had been constructed through the central part of the county, and the Sinclairville and Cassadaga Creek Road was begun shortly thereafter and later extended along the Ellery-Gerry town line to Jamestown (Beers 1881:18; Edson 1894:860, 863, 881-883; Young 1875:396-397). Early roads (ca. 1812) also connected Kent's mill in Villenova through the Town of Cherry Creek to Kennedyville as well as from the mill to Sinclairville (Downs and Hedley 1921b). After the war ended, bridges and other improvements were completed. Ca. 1820, a stage road had been completed between Canadaway (Fredonia), Jamestown, and Warren, Pennsylvania (Chautauqua History Company 1904:518; Young 1974 [1875]:327). By 1815, Canadaway had grown to such an extent that the village included a meat market, tailor, distilleries, brewery, blacksmith, ashery, and many other stores. On May 2, 1829, Canadaway was incorporated as a village, and renamed Fredonia (Beers 1881:21). Early religious societies in the towns of Hanover and Villenova included the Methodists (initially itinerant), Methodist Episcopal began with circuit preachers and later had a church at Hamlet, Wesleyan, and Freewill Baptist (Downs and Hedley 1921b).

Before they could sow crops settlers first had to clear their lots of trees. As a result, lumbering and timber by-products—potash, pearl ash and charcoal—were an important early industry and a source of needed income for local pioneers. Once cut and dried, the timber was burned and processed by asheries into either a white powder called "pearl ash" or potash, sometimes called "black salts." The sale of wood ashes was the only cash-producing crop for many early settlers during their first years in western New York (Chautauqua History Company 1904:521; Young 1875:332). Pearl ash sold for between $200 and $300 in 1805, and some farmers derived enough income from these products to offset the cost of opening new areas to cultivation (Fletcher 1971:329). Resulting from the burning of wood, potash could be used to make soap or glass, scour wool, and bleach and dye cloth. Demand for potash and pearl ash subsided in the mid-1850s, when potassium deposits in Germany began to be exploited. In its highly concentrated form, pearl ash could be transported more readily to distant markets from isolated farmsteads.

The production of charcoal and tanbark were other profitable timber-related industries for the early settlers prior to the 1840s (Fletcher 1971: 329). Blacksmiths and metal workers used charcoal extensively as it was essential in smelting iron ore, one of the leading industries in Western New York in the nineteenth and twentieth centuries. Another by-product of clearing new ground, tanbark was created when bark from oak and hemlock trees was peeled off in the early summer and dried in four-foot long cylinders. The curled green bark was used by local tanneries in processing animal skins. The barkless trees were cut into boards and shingles (Fletcher 1971:329).

While the pioneers worked the land in preparation to sow their crops or graze their animals, an abundance of wild animals provided options as a source of food. Deer, bear, raccoon, rabbit, partridge and wild turkey populated the area's forests, as did dangerous

competition from wildcats and wolves. Substantial bounties were advertised for killed wolves, suggesting not only the economic importance the grazing of sheep and cattle held for settlers, but the degree of threat of depredation posed by wild animals (Beers 1881:15, 16; Adams 1893:59).

Ca.1830, commercial activity increased in the county as new entrepreneurs established stores and inns in the area's villages. In Silver Creek, Oliver Lee opened a store that attracted customers from throughout the county. Other storekeepers in Silver Creek included Stephen Clark, John E. Howard, Manning Case, C.C. Swift, John M. Cummings, Ammi Merchant, and Daniel Rumsey. At what would become the Village of Irving, the federal government erected piers and developed the harbor area where Cattaraugus Creek enters the lake. As a result, the developing freight-shipping business took root in this area, especially the shipping of lumber and timber products (Downs and Hedley 1921a). What is now the Village of Forestville became an economic center after the erection of a sawmill and a gristmill ca. 1810 and the emergence of a vigorous trade in potash and pearl ash. Further, after the Holland company sponsored the cutting of a road from Fredonia south through Forestville and Nashville, taverns developed in support of the cattle-driving trade. Leading citizens of Forestville prior to the Civil War included William Colville, Jr., John Hurlburt, Nathan Mixer, Daniel and Harvey Holbrook, Albert Camp, Dr. Amos Avery, Adolphus and Orrin Morrison, and L.J. Pierce, among others (Downs and Hedley 1921a).

In 1851, the Village of Dunkirk became a terminal on the New York & Erie Railroad. The Buffalo & Erie Railroad company established the Buffalo & State Line Railroad from Dunkirk to the New York-Pennsylvania state line in 1852. This company later purchased the Erie & North East Railroad. In 1869, it was consolidated with the Lake Shore & Michigan Southern Railroad. The lakeshore railroads drew commerce away from the interior of the towns, which resulted in the closing of numerous hotels and taverns. After construction of the railroad, Forestville and Silver Creek saw a rise in manufacturing operations, whose success resulted in increasing population. A major fire in Forestville in 1870 destroyed much of the village's businesses, retarding its growth for the rest of the century (Beers 1881; Doty et al. 1940; Downs and Hedley 1921a).

By the late nineteenth century in northern Cattaraugus County, the most valuable timber had been removed and farming and dairying replaced lumbering. Much of the remaining trees were removed and used for destructive-distillation wood products. The trees that remained were mostly secondary and tertiary growth trees (Ellis 1879:160-161). With the completion of the New York & Erie Railroad from Hornellsville to Dunkirk in 1851, agriculture became an important commodity. The first product of Cattaraugus fields was grain, especially wheat and spring grains, as well as sheep-grazing; later dairying and mixed farming became preeminent. By 1855 county farmers were growing wheat, corn, oats, hops, and potatoes, and successfully exported maple sugar, honey and beeswax, in addition to butter, milk and cheese (Ellis 1879:159, 377; Beers et al. 1869:97; Adams 1893:60, 81-83).

After 1852 the Buffalo & Erie Railroad (the Allegheny Branch of the Erie Railroad in 1900) ran through the southern part of the Town of Hanover with a station at Forestville, Sheridan (Town of Sheridan) and Perrysburg (Cattaraugus County). No railroad lines traversed Villenova, although the Buffalo & Southwestern (later a part of the Erie system) ran just southeast of the town, with stations at Cherry Creek and South Dayton (USGS 1900). In 1960, the Erie Railroad merged with the Delaware, Lackawanna & Western (DL&W) to form the Erie-Lackawanna. In 1972, the line was absorbed into Conrail in 1976 (University of Akron 1996).

The Buffalo & Jamestown Railroad was organized in March 1872, and completed to Jamestown three years later. Running generally south from Buffalo, this line passed through Erie County before crossing Cattaraugus Creek at Gowanda, then turning southwesterly through the village of Dayton, where the line tunnels under the line of the Erie Railroad. As a result of the economic dislocations caused by "the Panic of 1877," the Buffalo & Jamestown was reorganized as the Buffalo & Southwestern Railroad, and later leased to the New York, Lake Erie & Western (NYLE&W) Railroad (ca. 1880). In 1895 the route was consolidated into the Erie Railroad. In the twentieth century, the line was known as the Buffalo Southern and later as the Erie-Lackawanna (Smith 1884:I:318; White 1898:I:419; Western New York Railroad Archive nda, ndb). At present, a small freight line called the New York & Lake Erie Railroad (NY&LE) runs trains through the tunnel at Dayton between South Dayton and its headquarters in Gowanda (Western New York Railroad Archive ndc).

After the Civil War, agricultural activities in Chautauqua County consisted mainly of grain growing (primarily wheat and corn), raising potatoes, dairying, butter and cheese making, and haying. Fruit trees (especially apple) helped supplement incomes. Closer to the lake, grapes were successfully cultivated. Livestock included pigs, horses and cows. A Farmers' Club of Hanover was founded in March 1877. Industry included timbering operations and the manufacture of grape baskets (Stewart 1867:7; Downs and Hedley 1921a).

The towns of Hanover and Villenova had divergent population histories during the nineteenth century. The population of the Town of Hanover generally increased during the period from 3,520 in 1835 to 4,101 in 1855 to 4,279 in 1880 and to 4,778 in 1900 (Beers 1881; Sullivan 2004[1927b]). The population of the Town of Villenova vacillated during the nineteenth century, rising from 1,453 in 1835 to 1,531 in 1845 before declining to 1,413 in 1855. The number of residents increased to 1,505 in 1865 before falling to 1,446 in 1880 and 1,206 in 1900 (Beers 1881; Sullivan 2004[1927b]). By 1920, the population of the Town of Hanover had risen to 5,977, while that of the Town of Villenova had fallen to 961 (Sullivan 2004[1927b]).

Although tanning and lumbering remained the principal industries of Cattaraugus County throughout the nineteenth century, the discovery of oil in northern Pennsylvania in 1859, and later in southwestern New York state, spurred a dramatic building boom and the county's prosperity after the Civil War. The first oil well in the county was dug in 1864. By 1878, there were 250 wells producing a high-grade paraffin-based oil (Pearson et al. 1940:4-5). Additional industries include furniture manufacture, tanning, glue making, cutlery manufacture, weaving, canning, and milk processing.

After years of effort, the Buffalo & Lake Erie Traction Company became the largest inter-urban trolley line in the Lake Erie Shore Region between Erie, Pennsylvania and Buffalo, New York on January 1, 1909 (Springfirth 1970:2, 40-53; B&LE nd). The line connected Buffalo to the summer resort coast of Lake Erie between the Lackawanna Steel Plant and Dunkirk, passing through the grape belt of Chautauqua County. With the emergence of the automobile in the 1920s, trolley service declined and in 1932 service was discontinued between Buffalo and Angola and between Erie and the state line. All service on the Erie to Buffalo line ceased on January 28, 1933 (Springfirth 1970:71).

By the 1920s, the town of Villenova contained four villages or hamlets: Balcom, Hamlet, Villenova (Wrights Corners), and Wango. The leading economic endeavor was agricultural, predominantly dairying. In the Town of Hanover, the largest village after Silver Creek is

Forestville, which was incorporated in 1848, and had an early start as a lumber town. However, a disastrous fire in 1870 destroyed much of the business district and the village did not recoup its early commercial success (Downs and Hedley 1921b). Businesses in the Town of Hanover in the early 1920s included Hasesot Canneries Co and W.F. Miller fruit basket factory (both in Forestville). Silver Creek supported "The Columbia Postal Supply Company (who made postal canceling machines); Fredonia Preserving Co.; The S. Howes Company; Huntley Manufacturing Company (manufacturers of canning-factory machinery); Invincible Grain Cleaner Co.; H.J. Montgomery Manufacturing Co.; Silver Creek Parlor Frame Co.; Silver Creek Upholstery Co.; and the Stewart Underwear Co. (Downs and Hedley 1921a).

In the twentieth century, urban and industrial growth in Chautauqua County centered on the villages of Dunkirk, and Fredonia, and the City of Jamestown, while the remainder of Chautauqua County supported predominantly rural farming communities. Primary crops on the county's farms remained corn and wheat, supplemented by dairying (Edson 1894:881; Beauchamp 1900:46-47). Grape growing and wine production became important commodities, as agriculture has remained a prominent industry for the county. In 1982, Chautauqua County had the most farms of any county in New York State (2,134) (Puglia 1994:1). In this century, the region has experienced limited growth as improvements in transportation have provided increased access to jobs and resources for the general population.

Contributing to this growth in the county was the development of Chautauqua Lake and the Chautauqua Institution as part of a resort/tourism industry beginning in the 1880s (Munger 1941:36). The State University College at Fredonia serves as an important educational and cultural resource for the community, dating to 1821 when it was founded as the Fredonia Academy. The Chautauqua County Airport, constructed in the mid-twentieth century, supports commercial airline service. Providing an important economic corridor in the northern part of the county, the completion of Route 5 and the New York State Thruway in the late-1950s linked the area to Buffalo as well as to points east and west (Leet 1980:216-218). The region's rolling hills provide opportune getaways for tourists attracted by fall foliage, the area's wineries, golfing, skiing, and the enticements of Chautauqua Lake and the Southern Tier. In 2000, the populations of the towns of Hanover and Villenova was 7,638 and 1,121, respectively.

In the twentieth century, the extension of Route 17 (the Southern Tier Expressway) through Cattaraugus County and the improvement of state and county highways has facilitated access to the county as well as its economic development. By 1980, the population of Cattaraugus County was 85,697; and it was 85,978 in 2000.

Village of Silver Creek. Pioneers of what is now Silver Creek were Abel Cleveland, David Dickinson, and John E. Howard ca. 1805. Cleveland and Dickinson erected the first sawmill in the Town of Hanover along Silver Creek, which they sold to Howard ca. 1805. Jesse and John Skinner settled in what is now Silver Creek in 1805. Nehemiah Heaton and Thomas Kidder erected a saw and grist mill in the south part of the village, and Mr. Hollam and John Vail build a sawmill. Some time later, Hollam operated a gristmill and wool-carding and cloth-dressing businesses. Other early industries included tanning, distilling grain, and brewing. Several asheries and a cotton factory as well as numerous mills (grist and saw) also were in operation (Sackett 1904:609-612; Beers 1881:18).

Stephen Clark, John E. Howard, Manning Chase all operated early stores in the Village of Silver Creek. Howard is regarded as keeping the first tavern ca. 1806. Jacob Morrison erected the first tannery in Silver Creek after the war. Luther Briggs opened a second one in the 1820s.

N. Wattles established a distillery ca. 1823. Edmund Clark was a carriage maker. Oliver Lee, after purchasing the Howard property, opened a store in Silver Creek in 1828 to trade with the Indians at the nearby Cattaraugus Reservation. The Village of Silver Creek was incorporated on June 5, 1848, and had a population of 661 in 1867 (Sackett 1904:611-612, 116; Beers 1881:18; Stewart 1867:7; Downs and Hedley 1921a).

In 1852, the village was a stop on the Buffalo & State Line Railroad, later the Buffalo & Erie and, later still, it was part of the Michigan Southern line. Other routes through Silver Creek included the New York, Chicago & St. Louis (completed in 1882, and sometimes referred to as the "Nickel Plate") which had links to the Buffalo, Pittsburgh & Western near Brocton in Chautauqua County (Smith 1884:I:318). These two lines were operated by Conrail and Norfolk & Western in 1995. The creation of the railroad changed the character of the village as more hotels and manufacturing interests were established, such as the Eureka smut and separating machine works, the Monitor Works (grain mill machinery), and the Excelsior Works (a variety wood products). Other industries during the second half of the nineteenth century included an upholstery works, a basket factory, a cannery, and two flouring mills (Sackett 1904:617-618). By 1865 the population of the Village of Silver Creek was 661 (Beers 1881:19).

Initiated in the Town of Portland in 1818, grape production expanded greatly after the Civil War, especially along the lake shore. In 1867, the village supported two hotels, several millers, a furniture dealer, a carriage maker, a cooper several grocers, a milliner, a marble dealer, a harness maker, and several blacksmiths (Stewart 1867:7). During the last third of the nineteenth century, the Village of Silver Creek experienced a period of growth as numerous new streets and lots were configured and additional residences and factories were constructed (Stewart 1867; Beers 1881). Agriculture has remained a prominent industry well into the twentieth century (Chautauqua History Company 1904:521; Puglia 1994:1). In the twentieth century, the area has experienced growth as developments in transportation have improved access to jobs and resources for the general population. In 2000, the population of the village was 2,896.

Other Chautauqua County Towns.

Town of Arkwright. The Town of Arkwright was formed from the towns of Pomfret and Villenova in April 1829. Dairying and grazing rather than cultivation of crops have been the predominant agricultural endeavor. Original land purchasers prior to 1815 included Zattu Cushing (articled to Uriah L. Johnson), Benjamin Sprague, Augustus Burnham, Edward McGregor, Oliver Taylor, Aaron Wilcox, Nathan Eaton, Benjamin Perry, Horace Clough, Robert Cowden, Moses Tucker and Daniel Harris. The initial settlers of the town prior to the War of 1812 were Byron T. Orton, Benjamin Perry, Augustus Burnham, Aaron Wilcox, Nathan Eaton, Uriah Johnson, John Sprague, A.Z. Wilson and Robert Cowden. Isaiah Martin erected the first frame house in 1814 and kept the first tavern; Lucy Dewey was the first school teacher in 1813; and Benjamin Orton operated the first sawmill in 1818 (Downs and Hedley 1921c).

In 1861, Asahel Burnham organized the earliest cheese-manufacturing cooperative in Chautauqua County. He erected a cheese factory at Burnham's Hollow, which he called the Canadaway Cheese Factory. He built another one at Sinclairville in 1865. In that year his factories processed 4,349,364 pounds of milk into 7,200 cheeses, each weighing 60 pounds. Three cheese factories were in operation in Arkwright in 1902, while the county supported 35 cheese factories (Downs and Hedley 1921c).

In 1900, the town's population had increased to 918 from its 1890 enumeration of 886. However, by 1920 it had fallen dramatically to just 757 residents (Sullivan 2004 [1927b]). In 2000, the Town of Arkwright had a population of 1,126.

Town of Charlotte. In 1808, the area was surveyed, and lots were drawn by John Lamberton for the Holland Land Company. The first Euro-American settlers were John Picket, Daniel Picket and his family, and Arva O. Austin and his wife, all of whom spent the winter of 1809 to 1810 in the town. John Picket erected the first house in the town, on Picket Brook. Other early settlers were John Cleland, Sr., and three of his sons (Nathan, Oliver, and Samuel) on Lots 53 and 54, William H. Gleason, Joel Burnell, Caleb Clark, David Ames, James Cross, Jacob Hall, Eliakim Barnum, Edward Dalrymple and Freeman Ellis. Major Samuel Sinclear constructed a sawmill in what would become Sinclairville in 1810, and a gristmill in 1811. Abraham Winser, Sinclear's brother-in-law, built an ashery in 1813, and a store in 1815 (Beers 1881:12).

The Town of Charlotte was formed from the Town of Gerry on April 29, 1829, and was named after the Town of Charlotte in Vermont. Other settlers in the town included Samuel Hurley in 1817, Abraham Reynolds and Robert Legrys in 1819, John Thorn in 1834, and John Reed in 1836. Hugh Harper, from County Donegal, Ireland, settled near Charlotte Center in 1828. Soon after, his brother, and others from northern Ireland, settled the area north of Charlotte Center. William and Ernest Heppenen came from Germany, in 1853 and 1854, respectively. Jacob Flanders settled the area near Lots 58 and 59 in 1816. The population of the Town of Charlotte rose from 1,428 in 1845 to 1,672 in 1855 and remained generally stable to 1880, when 1,702 people were listed as residents (Beers 1881:10, 12, 18; Edson 1894:892).

By 1867, agricultural activities in the Town of Charlotte consisted mainly of grain-growing (primarily wheat and corn), raising potatoes, dairying, butter-and-cheese making, and haying. The town's farmers also raised pigs, horses and cows (Stewart 1867:7). The industrial operations included timbering and the manufacture of grape baskets.

The villages of Gerry and Sinclairville were stations on the Dunkirk, Allegheny Valley & Pittsburgh Railroad, which was constructed in 1870 and 1871 (Beers 1881:10). The section from Dunkirk and Laona was completed in 1870, and from Laona to Sinclairville in June 1871. Soon after that, the section to Warren, Pennsylvania, was constructed. This part of the Town of Charlotte has been largely rural. Despite its proximity to the railroad station, historic occupations have focused on agricultural practices. Urban and industrial growth has centered on Sinclairville, west of the project area. After 1880, population of the town declined into the early twentieth century, falling to 1,441 in 1890, and to 1,173 in 1920 (Sullivan 2004[1927b]).

The town has been generally a farming area throughout the nineteenth and twentieth centuries. Primary crops on the town's farms remained corn and wheat with increasing amounts of dairying (Edson 1894:881; Beauchamp 1900:46-47; Parker 1922:533). Grape growing has become an important crop in the twentieth century. The population of the town rebounded to 1,406 in 2000.

Town of Cherry Creek. Land contracts for lots in what is now the Town of Cherry Creek were let beginning in 1815, with settlement commencing shortly thereafter. The town was created from the Town of Ellington in May 1829 and was known for its cherry trees. Original purchasers of lots included Joshua Bentley and Gardner (or Gardiner) Crandall in 1815 (one of Bentley's lots was settled by Joshua M. Kent); Barber Babcock, Ely D. Pendleton and Reuben Cheney in 1816; Elam Edson and Rufus Hitchcock in 1817; John Smith and Hiram Hill in 1818;

John P. Hadley, Henry Babcock, Alvah Hadley, Julius Gibbs, Robert James, Nathaniel Gibbs, Jr., Eliphalet Wilcox, Robert Page in 1821; James Carr and Enos Bronson in 1823 (Downs and Hedley 1921d).

Joseph Kent on lot 9 was the first settler in the town in 1815, arriving with his wife and seven children. They cleared a field and grew potatoes. In the spring of 1816, Kent fashioned a canoe from a pine tree and traveled down Conewango Creek to Pittsburgh with a load of maple sugar and some black salts. He exchanged these goods for flour, pork, and salt (Downs and Hedley 1921d). Joshua Bentley, Jr., was the second settler in 1815. In 1810, Kent erected a sawmill and gristmill on Conewango Creek. John Kent, brother of Joseph Kent, an early settler of the nearby Town of Villenova, with John Dighton cut Cherry Creek's first road in 1812 from Kent's mill in Villenova through Cherry Creek to Kennedyville (now, Kennedy). In 1815, they cut a road to Sinclairville, called at one time Kent Road/Street (Downs and Hedley 1921d).

Subsequent settlers included Gardner Crandall and Isaac Curtis in 1816; John or James Marks at what is now the Village of Cherry Creek in 1816 (Marks' log house later became a school in 1824). Other settlers in 1816 included Barber Babcock, Ely D. Pendleton, Reuben Cheney or Cheeney, who was the first teacher in the southern part of the town. In 1817, Elam Edson, William Weaver, Rufus Hitchcock, Hiram Hill, John Smith, Henry Babcock, Nathaniel Gibbs, Jr., Eliphalet Wilcox, Daniel Hadley, and Robert Page arrived. Settlers in the northwestern part of the town included John Bartlett, Ira B. Tanner, Alvah Bannister, Elkanah Steward, Oliver Carpenter, Anson Newton, Wilbur Burdick, John Essex, J. Richardson, Eben Abbey, Putnam Farrington, Ora Parks, Enos A. Bronson (Downs and Hedley 1921d).

Early entrepreneurs included Pliny Shattuck, who operated a blacksmith shop at Shattuck's Schoolhouse in 1831; George Frost, who arrived in 1823 and settled at what is now the village of Cherry Creek and operated a tavern and later kept a store; and Thomas Carter, who opened a tannery and shoe shop near the village (Downs and Hedley 1921d). Jared Ingalls erected a sawmill on lot 22 in 1825. Seth Grover was the town's first merchant, beginning in 1831. He operated an ashery and a pearling oven in connection with his store. Other merchants were Cyrus Thatcher and George Frost. Jonathan Greenman and Russell Bartlett were early tailors. William Kilburn erected the first sawmill, along Cherry Creek near the village. He kept a shop that made spinning wheels and chairs. Robert James and William Green built the second sawmill in 1833. Hull Nickerson operated the first gristmill in 1828 and only ground corn. Joseph Kent built a "modern" gristmill in 1848. It burned in 1869, and was rebuilt the following year by Silas Vinson (Downs and Hedley 1921d).

The first churches in the town were the Methodist Episcopal (since 1857), First Baptist (1832), Free Baptist (1826), and a short-lived Christian Church (1839-1861). The population of the town rose from 1,481 in 1890 to 1,745 in 1900. Incorporated on May 20, 1893, the Village of Cherry Creek was a station on the Buffalo & Southwestern Railroad (Sullivan 2004[1927b]; Downs and Hedley 1921d).

The town supported the Cherry Creek Canning Company and the W.F. Stetson Company (makers of butter firkins), as well as three smaller factories in the 1920s. In the twentieth century, the population of the town has generally declined: from 1,745 in 1900 to 1,204 in 1920 to 1,152 in 2000.

Town of Sheridan. The Town of Sheridan was formed from the towns of Pomfret and Hanover, April 16, 1827. Early settlers of the town included William Gould, Jonathan Webber,

Abner Holmes, and Joel Lee, a carpenter and miller, who built the first frame house in the town (Beers 1881:23). Early purchasers of lots in the town included Francis Webber, Hazadiah Stebbins, William Webber, Abner Holmes, and Alanson Holmes in 1804; Gerald Griswold, Orsamus Holmes, Joel Lee, John Walker, John Hollister, Thomas Stebbins, Simeon Austin in 1805 (Downs and Hedley 1921e).

Orsamus Holmes on Lot 60 was first tavern keeper; William Griswold kept a tavern at "the Center" from 1805 to 1837; and a person named Pryor also kept a tavern for several years prior to the War of 1812. Benjamin Roberts later took over the operation of Pryor's tavern in the area that became Roberts Corner, which remained in operation until the 1850s. Other taverns in Sheridan included the Taylor-Haskin inn (from ca. 1820 until 1850), the Kensington tavern (1812 to 1850), and Goodwin-Huyck's Tavern (before 1820 to 1851) (Downs and Hedley 1921e).

Earlier storekeepers included Elisha Grey (reputedly the first), Allen Denny, William Holbrook, Edmund Mead (the first store at the Center in the 1830s), and P.H. Shelley. Haven Brigham operated the first tannery in 1811 at Beaver Creek; the second was constructed in 1820 by Enoch Haskin and Nathaniel Grey, which was later operated by Perry Gifford in conjunction with a shoe shop. The first gristmill in the town was constructed on Beaver Creek by Haven Brigham, near the tannery and where he would later erect a sawmill (Downs and Hedley 1921e).

By 1811, the road between Ellicottville and Mayville had been constructed through the central part of the county, and the Sinclairville and Cassadaga Creek Road was begun shortly thereafter and later extended along the Ellery-Gerry town line to Jamestown (Beers 1881:18; Edson 1894:860, 863, 881-883; Young 1875:396-397). After the war ended, bridges and other improvements were completed. Early religious societies included Presbyterians and Methodist Episcopal prior to 1810, and Baptist and Wesleyan Methodist after the 1840s (Downs and Hedley 1921e).

A lime kiln was operated by George Robinson and Alanson Denny in 1845, which was later owned by Orlando Elmore. A sporadically operated brick kiln was owned by William Ensign and Jonathan S. Pattison during the early nineteenth century.

By 1867, agricultural activities in the town consisted mainly of grain-growing (primarily wheat and corn), raising potatoes, dairying, butter-and-cheese making, and haying. The town's farmers also raised pigs, horses and cows (Stewart 1867:7). The industrial operations included timbering operations. During the nineteenth century, the population of the Town of Sheridan steadily declined, although a slight increase occurred in the 1860s with the construction of the railroad. The population was 1,919 in 1835; 1,591 in 1855; 1,663 in 1875; and 1,565 in 1880 (Beers 1881:15).

The completion of the Buffalo & State Line Railroad in 1852 undermined road transportation along the main road along the lake and resulted in the closing of numerous taverns and hotels along the route. By the end of the nineteenth century, numerous railroads traversed the town, including the New York & Erie (later, just the Erie), the Dunkirk & Silver Creek (later incorporated into the Lake Shore & Michigan Southern), the Nickel Plate (the New York, Chicago & St. Louis Railroad), and the Western New York & Pennsylvania (the Pennsylvania, for short).

In the twentieth century, the population of the Town of Sheridan has increased steadily from 1,633 in 1900 to 1,887 in 1920 (Sullivan 2004[1927b]). In 2000, 2,838 residents were enumerated as living in the town. Much of the Town of Sheridan has remained rural farmland in the twentieth century. Primary crops on the county's farms remained corn and wheat, supplemented by dairying.

Towns in Cattaraugus County.

Town of Dayton. The first settlers in the area that would become the Town of Dayton were Silas Nash and his family and Simeon Bunce, his brother-in-law, all of whom settled in the southeastern part of the town in 1810. Nash built the first log house in Dayton in 1810 and the first sawmill in 1817 at what was West Dayton. Other early settlers include Joshua Webb, who settled on Lot 56, Ralph Johnson, pioneer tanner and currier, on Lot 30, and Anson and Heman Merrill on Lots 30 and 31, in 1815. The next year, Leman H. and James P. Pitcher settled at what is now South Dayton on Lot 58. Landowners in 1819 included Lyman Wood, Abraham Hale, Timothy and James Shaw, Hiram Howard, Peter Allen, Nathaniel and William Blasdell, Jedediah Lee, Jeremiah Pratt, Azariah and Chester Darbee, Stephan and John Parsall, Ezra T. Winship, Nathan and Lyman Bumpus, Ephaphras and Ephraim Smith, and Frederick A. and Belah Redfield (Ellis 2004[1879]).

The first inn in what is now the Town of Dayton was opened by Joshua and Caleb Webb in 1824 at what was West Dayton and the first store was operated by William H. Leland in 1833 at what was the hamlet of Sociality; he also operated a nearby tavern. The Town of Dayton was formed from the Town of Perrysburg on February 7, 1835. At the time of its establishment, the town contained four whole schools, and five fractional schools, with a total of 365 children enrolled. In addition, the town supported three sawmills and one tannery. As early as 1817, a road was located in the western part of the town and connected South Dayton with Perrysburg (Ellis 2004[1879]).

As noted, Silas Nash erected the first sawmill in 1817, which remained in operation through a handful of owners until 1856. In 1853, John Knowlton began operation of a steam sawmill in West Dayton, which was still in operation in 1879. Ralph Johnson was the town's first tanner, beginning work in 1815. The tannery expanded and remained in operation under a variety of owners until 1865. Johnson and Anson Merrill erected a sawmill near Johnson's tannery, which was still in operation in 1879 under the ownership of Henry Markham, who also operated a shingle mill (erected 1862) at the site. A practice emerged in Dayton where a sawmill would operate for a number of years in a locality until the local timber was exhausted, and then the mill would be relocated to a more forested area (Ellis 2004[1879]).

Beginning in the 1850s, the New York & Erie Railroad traversed the northeastern part of the town and had a station at the hamlet of Dayton. The Buffalo & Jamestown Railroad (later, the Buffalo & Southwestern) was completed through Dayton in 1874, with a station at Markhams (Ellis 2004[1879]). West Dayton oldest hamlet by 1879 it contained a sawmill, store, shops, Methodist and Union churches, and 25 dwellings.

Dairying was a major industry of the town by the 1870s. In 1879 the town supported seven creameries and cheese factories, including the East Leon Cheese Factory, the West Dayton Cheese Factory (1866-1877), the Dayton Creamery in Dayton, Bartlett's Cheese Factory at Markham's Station (1875), Jenks' and Ross' Factory (1877), the East Dayton Factory (1874), the Lang or South Dayton Factory along Jamestown Road (1872) (Ellis 2004[1879]).

The Hamlet of Dayton emerged after 1851 and especially after 1872, with the completion of the Erie and Buffalo & Southwestern railroads through the area. By 1879 it contained several hundred inhabitants, several factories and stores, two hotels and Catholic and Methodist churches. A.W.W. Chaffee kept the first store and post office in 1851. The store remained in operation under numerous owners until 1879. Numerous other stores (e.g., drug, hardware, mercantile, furniture, boot and shoe) were erected after 1865, especially after the completion of the Buffalo & Southwestern. Col. Ralph Johnson kept the first tavern/hotel in the hamlet of Dayton in 1852; George Volk operated it by 1879. Charles Sisson erected a hotel near the railroad station, which was still in business in 1879. At that time the hamlet also supported C.L. Watkin's steam planing mill and sash and door factory; and Fernando Smith's steam stave and heading factory (Ellis 2004[1879]).

South Dayton, known as Pine Valley for a time during the nineteenth century, was mostly farmland until 1875, when land developers surveyed the area into lots to establish a village after the Buffalo & Southwestern Railroad sited a station there. Early settlers of the locality were Lehman H. and James P. Pitcher (in 1816); M.C. Nickerson (no date); William Tweedy (1838); Christopher Smith (1841); Daniel Smith (1845); Homer and Joseph Wheelock (1849); Fredrick C. Phillips (1864); and John and Cynthia Wickham (1865). Wickham sold a portion of his land to Robert F. Ewing in 1875, after which the village of South Dayton was plotted. Baron Hubbard had named the growing hamlet Pine Valley in 1855. David Barrett opened the first grocery store in 1862. John Wickham kept the store in 1872. Wickham built a gristmill, hotel, and 30 other buildings. N.L. Rowe also operated a store in 1875. Jesse Pile operated a steam lumber mill at the depot beginning in 1878; C.J. Babcock & Co. operated a stave and heading factory along the tracks in 1878; also in 1878 Palmer & Hall operated a stave and heading factory. In the late 1890s, the village's name was changed to South Dayton. When the area was Pine Valley, Wallace and William Ranlett operated a short-lived shingle mill, which became a sawmill in 1856, later with steam powered lumber mill (Ellis 2004[1879]).

Joshua Markham who arrived in 1834 and established a tavern, which he ran for 30 years. Col. Ralph Johnson also operated a tavern in the vicinity after 1845, but became Leonard Metsker's store by 1879, which also contained a cheese factory, several sawmills and several houses (Ellis 2004[1879]). This area coalesced into the hamlet of Markham 's Corners with the establishment of the railroad during the last quarter of the nineteenth century. The area was utilized for farming well into the twentieth century, prior to the purchase of a portion of the area by the Peter Cooper Corporation in 1955.

During the nineteenth and twentieth centuries, the town was and is generally rural with a sparse population. By 1860 the population of the town was 1,294, rising to 1,402 by 1875. The increase in population continued into the twentieth century when 1,691 people were enumerated in the town in 1900 and 1,712 in 1920 (Ellis 2004[1879]; Sullivan 2004[1927c]). The population of the Town of Dayton was 1,945 in 2000.

Town of Leon. Created from the Town of Conewango in April 1832, the town was reputedly named for the former kingdom of Leon in Spain. Early land purchasers were Edmund Dudley, James Franklin and James Franklin, Jr., Nathan Skinner, Asher Glover, John Dye, Nathaniel Cooper, and Harlow Beach. James Franklin and his son, James, Jr., were the first permanent Euro-American settlers in the town, erecting a log house in September 1818. Other settlers, many of whom were short-lived residents, arrived in the early 1820s and included Captain Abner Wise and his wife, Thomas Cheney, Abner Wines, Edmund Dudley, Nathaniel

Cooper, Daniel Dye, Robert Durfee, Otis Durfee, Asa Franklin, who opened the first tavern, William Bartlett, Harlow Beach, Andrew Oathout, Ireneus Baldwin, William Morrison, and Luanan Coe, among others (Ellis 2002[1879]). Richard Oathout, an early teacher, erected the first frame house in the town.

Asa Franklin operated the first tavern in the town and Luman Coe operated one after 1826. Amasa Green kept a tavern at Leon Mills in 1830, which remained in operated until 1868 under several owners. Captain William Fenton operated a public house on the road between Jamestown and Buffalo in 1844. Thomas Noyes founded a tavern at Leon Center in 1834, which was still in operation in 1879. Numerous owners kept it in operation (Ellis 2002[1879]).

Johnson Noyes opened the first store in town in 1827 at Leon Mills. Jabez Thompson operated a small, short-lived store in 1830. The first store at Leon Center was kept by James Dunlap in 1833. Others shopkeepers included Amaziah Strong, Jenks & Cooper, Ezra Cooper, Spencer Horton, J.H. Chaffee, Ira Jones, W.O. Tyrer and Willam Babcock (Ellis 2002[1879]).

Nineteenth-century manufacturing interests included Ebenezer Collar's sawmill on Mud Creek in 1826. He sold the site to Johnson Noyes in 1828, who prepared the area for conversion to a gristmill; the site was a gristmill in 1879. In 1829, Noyes operated a short-lived distillery at the site, and erected a wool-carding and cloth-dressing operation that remained in business for about a decade. Jabez Thompson bought the sites and erected a gristmill in the early 1830s. The gristmill remained in operated through the 1870s under a variety of owners. The area became known as Leon Mills (Ellis 2002[1879]).

Other mills, some of which had ceased operation by 1879, included Abner Wise's, later Lyman Town's, sawmill on Mud Creek; Daniel Whiting's sawmill; Mathew Franklin's, later J.C. Green's, sawmill; Judd & Babcock's steam sawmill in East Leon (1861-1875; after the mill burned the machinery was sold to John Seekins, who relocated it to Leon Center); and Butcher & Keyser's steam sawmill in the northwestern part of town in 1875, which was still in operation four years later (Ellis 2002[1879]).

Dairying became the leading industry of the town after the conclusion of the Civil War. As a result, several creameries were established, notably after 1870. These included the East Leon Creamery, founded by Jenks and Ross in 1866; the Leon Center Factory, founded by Hunt and Cancen in 1866 (later purchased by Jenks and Ross); Wells and Thompson's North Leon Factory in 1869 near Wells Hill; the Ackley factory east of Leon Center in 1879; and the Keyser Hill factory, formed in 1875. Other factories included the Peace Vale factory, the South Leon factory, and the Leon Creamery (Ellis 2002[1879]).

Leon Mills was the initial commercial center of the town as a result of the numerous water-powered manufacturing operations present there, but these businesses later relocated to the hamlet of Leon or Leon Center. The location had a hotel, four stores, six shops, a school, and Baptist, Methodist, and Free Methodist churches. The town had a population of 1,399 in 1860, but declined precipitously for the remained of the century. In 1875, the town's population was 1,201, and by 1900, it was 1,003. The town had only 729 residents in 1920 (Ellis 2002[1879]; Sullivan 2004[1927c]. In 2000, the town's population had rebounded to 1,380.

Town of Perrysburg. The Town of Perrysburg was created as the Town of Perry from the towns of Olean and Ischua on April 13, 1814, after Commodore Oliver Hazard Perry. Its name was changed to Perrysburgh in April 1818. The town attained its present size in 1835, with the

creation of the towns of Dayton and Persia in 1835. The first settler in the town was John Clark, ca. 1815. By 1818, what is now the Town of Perrysburg contained 46 landowners, most of whom developed their holdings. The landowners at that time included Phineas Spencer, Hugh Campbell, William Cooper, Truman Edwards, Daniel Johnson, Simeon, Benjamin, Elijah and Heman Waterman, Ralph Griswold, Hiram Burden, Alanson Dewey, Preserved Wilber, Harvey and Harrison Elwell, Alpheus Colton, Royal Aldrich, Elder Moore, and Hosea Hogeboom, among others (Doty et al. 1940:598; Ellis 2001[1879]). Elisha Ward, Stephen Crocker, and Freeman Edwards located near Perrysburgh Village in 1817 (Ellis 2001[1879].

Early enterprises included taverns, sawmills and gristmills. John Clark kept a short-lived tavern in his log house ca 1816, and Benjamin Waterman kept a tavern near Gowanda about that time. Isaac Baloomb erected the first sawmill in the town, on Silver Creek, about 1820. He erected the first gristmill, at Versailles, about the same time. L.A. Foote erected one on Mill Brook in 1822. The latter mill was acquired by Rufus Ware, who added a run of stones to allow for the grinding of grain. Garrett Hurd operated a sawmill on the nearby Cattaraugus Indian Reservation (Ellis 2001[1879]). Stephen Whitcomb constructed the first frame dwelling in the town. Olive Barton, ca 1818, was the first school teacher. Cobb, Cook & Pelton kept the first store in the village of Perrysburg in 1827 (Ellis 2001[1879]).

Like much of the area, after an initial period of land clearing followed by years of grain cultivation, dairying became an essential component of the agricultural sector during the 1860s. A. Dewey operated a creamery about that time, which was still in operation in 1879 as Johnson & Bartlett's cheesefactory. Andrew Brainard founded the Scotch factory at Perrysburg in 1863, which was still in operation in 1879. Jenks & Ross erected Factory #9 in 1878, and E. Ticknor operated the Versailles Factory, beginning in 1867 (Ellis 2001[1879]).

What is now the Village of Perrysburg was first settled by William Cooper in 1816. Elisha Ward arrived in 1818 and established a public house by 1821. It remained a tavern/hotel under a variety of owners up to 1879. William Cooper operated a tavern for a number of years, and a third, short-lived tavern was operated by Mr. Palmer. Cook & Pelton kept the first store in 1827. Other merchants at one time included Hooker & Gardner, A. Clark, Nathan Blackney, R.L. Blackmer, F.S. Royce, Orrin Clark, and A.M. DeLong. By 1863, the village contained a church and 23 dwellings, and was a station on the New York & Erie Railroad, which was completed through the town in 1851 (Ellis 2001[1879]).

Industrial activities included the Perrysburg Agricultural Works and Wooden-ware Factory, established ca. 1859 by Russell Briggs. The factory made barrels, grain and corn cradles, stave baskets, cheese boxes, and butter firkins, as well as cider vinegar. The area also patronized Sprague and Ticknor's grist and lumber mills, which began in 1869 as a sawmill. A wood workshop and planing mill were subsequently added, which allowed for the manufacture of barrels, tubs, baskets, and scythesnaths. The gristmill was added in 1874. By 1879, the village supported a large cheese factory, six mechanic shops and contained approximately 400 residents (Ellis 2001[1879]).

Five miles north of Perrysburg and adjacent to the Cattaraugus Indian Reservation, the hamlet of Versailles, located along Cattaraugus Creek, was an early location for industrial activity. Lee & Barker built a dam and race as well as a gristmill here in 1830. About that time, General Barker erected a tannery, which was later replaced by R. Green with a steam-powered version, which burned in 1860. Benjamin Rathbone opened a store here in connection with his lumber business in the 1830s. Early shopkeepers included Hamilton and Darwin Barker, Norton

& Sellew, F.E. De Wolf, D.N. Parker, and H. Chapman. J Sherman kept the first tavern in Versailles, which remained in operation under other owners until at least 1879. By 1840, Versailles contained stores, and shops. In 1863, the hamlet housed a church, two flouring mills, and a tannery, with a population of 274 (Ellis 2001[1879]).

In 1861, L. Palmer & Son established the Versailles tannery, which was a steam-powered operation in the hamlet. A. Beale & Company established the Versailles Botanic Mills ca. 1860 to prepare roots, herbs and bark for medicinal purposes. About that time, H. Chapman, a pioneer market gardener, initiated his Vegetable and Small Fruit Gardens. By 1879, the hamlet of Versailles supported a church, a school, a tannery, two mills, three stores, a hotel, a post office. Numerous saw and gristmills were located along the creek here, but had burnt down and then been rebuilt over the course of the nineteenth century. (Ellis 2001[1879]).

In 1860, the population of the Town of Perrysburg was 1,439, but it declined to 1,336 in 1875 (Ellis 2001[1879]). The decline continued through the nineteenth century and was 1,067 in 1900. However, it had increased to 1,150 in 1920 (Ellis 2001[1879]; Sullivan 2004[1927c]). In 2000, the population of the Town of Perrysburg was 1,771.

3.0 Methodology

For this investigation, the visual Area of Potential Effect is defined as the area from which the proposed undertaking may be visible within a five-mile distance around the outer ring of proposed wind turbine locations (or outer project components) (see Figure 1.2). Within this area both direct and indirect visual effects are assessed that may cause changes in the character or use of cultural properties. Panamerican, under contract to Noble, generated the viewshed analysis map (or Zone of Visual Influence [ZVI]) of the five-mile visual APE, which is based solely on topography (see project map at end of report). As such, additional screening may be provided by structures and vegetation. The study area spans northeast Chautauqua County, and northwest Cattaraugus County. In addition, the visual APE also includes the area within a three-mile distance around the proposed transmission line that extends outside of the 5-mile APE (see project map at end of report). The transmission line connects the proposed Ball Hill substation to the main National Grid transmission line. The municipalities, including non-incorporated villages and hamlets, in Cattaraugus and Chautauqua counties that are partially or entirely within the five-mile visual APE are listed below.

Cattaraugus	Chautauqua
Dayton *Village of South Dayton* Leon Perrysburg	Arkwright Hanover *Village of Forestville* *Village of Silver Creek* Cherry Creek Sheridan Villenova

3.1 NATIONAL REGISTER CRITERIA

For a building or structure to be considered eligible for listing in the National Register of Historic Places, it must be evaluated within its historic context and shown to be significant for one or more of the four Criteria of Evaluation (36 CFR 60) as outlined in *How to Apply the National Register Criteria for Evaluation* (*Bulletin 15*, NPS 2002). All structures examined as part of this investigation were identified and evaluated in the field with reference to these criteria:

Criterion A: (Event) Properties that are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B: (Person) Properties that are associated with the lives of persons significant in our past; or

Criterion C: (Design/Construction) Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a

significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: (Information Potential) Properties that have yielded, or may be likely to yield, information important in prehistory or history (*NPS Bulletin 15*, referencing 36 CFR Part 60).

A property is not eligible if it cannot be related to a particular time period or cultural group and thereby lacks any historic context within which to evaluate the importance of the cultural resource. The cultural property (e.g., historic structure or landscape) must also retain the historic integrity of those features necessary to convey its significance. Seven aspects or qualities of integrity recognized by the National Register are location, design, setting, materials, workmanship, feeling, and association (NPS 2002). Actual determinations of eligibility are made by the Field Services Bureau of the NYSHPO.

3.2 PRESENT ARCHITECTURAL SURVEY OF THE FIVE-MILE VISUAL APE

The purpose of this architectural survey was to identify National Register-eligible (NRE) properties in the five-mile visual APE of the proposed Noble Ball Hill Windpark and the three-mile APE of the transmission line (hereafter referred to singularly as the "five-mile APE" (see Figure 1.2). This historic building survey was conducted in compliance with NYSHPO Guidelines for Windpark Development Cultural Resources Survey Work (NYSHPO 2006).

Prior to initiation of the survey, the State Preservation Historical Information Network Exchange or SPHINX (NYSHPO nd) was reviewed to identify previously recorded historic and architectural resources within the project area and five-mile APE ZVI. National Register Inventory Forms were accessed from the State and National Registers of Historic Places (S/NRHP) web pages. Locations of NRHP-listed (NRL) properties and their boundaries were retrieved from NYSHPO's Geographic Information System for Archaeology and the National Register. Further, previously surveyed properties listed in SPHINX without determinations of National Register eligibility on file, within the positive ZVI, were located and assessed for their potential for listing on the S/NRHP. Of these previously inventoried properties, only those properties recommended in this survey as possibly NRE are included in the report.

3.3 FIVE-MILE APE ARCHITECTURAL FIELD INVESTIGATION: SPRING 2008

Panamerican architectural historians field-inspected buildings and other historic resources greater than 50 years of age in the positive ZVI of the project's five-mile APE to identify possible NRE properties. The Noble Ball Hill Windpark's five-mile visual APE and the three-mile visual APE of the proposed transmission line is an area measuring approximately 169 square miles. The architectural survey also included the identification of any potential historic districts.

All properties previously listed in the S/NRHP, properties determined eligible prior to the survey, and those identified during the survey were marked using a single GPS point. The single point was taken at the edge of the property generally at the mid-point of the property's street frontage. The GPS data is linked to the street address or NYSHPO Unique Site Number (if one currently exists). This GIS data will be submitted with the final report per NYSHPO guidelines.

Local sources, references, and historic maps were consulted to formulate an historic context of the region in order to supplement NRE evaluations. In some cases, additional information about specific buildings or farm complexes was supplied by the owner of the property or other interested/informed residents of the community.

Historic resource data collected during the architectural field investigation is presented in this report in the *Annotated List of Properties* (Section 8.0), which catalogs recommended NRE properties. Digital photographs of surveyed properties will be submitted on a CD to NYSHPO to supplement project review. Farm complexes were documented as a group with multiple photographs to convey the setting/relationship of farmhouses, outbuildings and the other farm elements. Clusters of buildings (villages/hamlets) are presented together in the annotated list of properties (Section 8.0). Cemeteries and historic districts are presented in separate sections of the report (Sections 9.0 and 10.0).

3.4 ASSESSMENT OF ADVERSE EFFECTS TO HISTORIC PROPERTIES

In general, an undertaking has an effect on an historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. The assessment of adverse effects to historic properties is spelled out in Section 106 of the National Historic Preservation Act as well as in 36 CFR 800.5.

> (1) *Criteria of adverse effect*. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.
>
> (2) *Examples of adverse effects*. Adverse effects on historic properties include, but are not limited to:
>
> (i) Physical destruction of or damage to all or part of the property;
> (ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;
> (iii) Removal of the property from its historic location;
> (iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
> (v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
> (vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
> (vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term reservation of the property's historic significance [36 CFR 800.5].

Visual Effects. By definition, a visual effect occurs whenever a proposed undertaking will be visible from an historic property. The mere existence of a visual effect does not automatically imply that the effect is adverse. An *adverse* visual effect occurs only when the addition of a new element to a landscape is found to diminish those aspects of a property's significance and integrity, such as its historic setting, which make it eligible for the National Register.

Adverse visual effects are generally of two types, aesthetic and obstructive. An adverse aesthetic effect transpires when an undertaking's visual effect has a negative impact upon the perceived beauty or artistic values of an historic structure or landscape, thereby diminishing the appreciation or understanding of the resource. Common examples of adverse aesthetic impacts include the diminution or elimination of open space, or the introduction of a visual element that is incompatible, out of scale, in great contrast, or out of character with the historic resource or its associated setting. An adverse obstructive effect occurs when the proposed undertaking blocks any part of an historic property, or eliminates scenic views historically visible from the property.

4.0 Architectural Summary

4.1 INTRODUCTION

This section provides a brief overview of each municipality within the study area and also includes a summary of existing NRHP and State Preservation Historical Information Network Exchange (SPHINX) data. It is organized by Minor Civil Division code. This summary only includes buildings/structures on file and not archaeological sites.

The project and its five-mile visual APE are located in agricultural communities in Chautauqua and Cattaraugus counties with farms and vineyards averaging 148 to 175 acres. The study area is representative of the region known as Western New York, which is typically sparsely populated outside village centers. The project is proposed on rolling, largely agrarian land in the towns of Hanover and Villenova in Chautauqua County. The proposed project is sited in the southeast portion of Hanover and the northeastern section of the Villenova (Figure 1.1). The elevation of the project area ranges from approximately 600 feet along Erie-Ontario Lake Plain to 1,800 feet in the rugged uplands of Arkwright. The largest community in the positive Zone of Influence (ZVI) in proximity to the project is the Village of Silver Creek in Chautauqua County. In low areas of the surrounding valleys, sightlines are limited by sizeable variations in elevation within a relatively small area. Further, the lee sides of hills along the perimeter of the study area are in the negative ZVI.

Primary creeks and tributaries in the study area that course through the fertile valleys of the low Allegany Hills and rural villages include Silver Creek, Walnut Creek, the West branch of the Conewango Creek, Tupper Creek, Slab City Creek, and Canadaway Creek. To the north of the study area is Lake Erie, which is one of the most important natural landmarks of the region. The lake and its tributaries are significant for their association with the historical development of the region. Earliest settlers constructed mills and factories to harness waterpower from the local creeks and the lake. The Village of Silver Creek was a major port along Lake Erie until railroads reduced lake bound shipping.

Chautauqua County is in two contrasting physiographic provinces, the Erie-Ontario Plain province and the Allegheny Plateau province, and supports two different kinds of farming, vineyards in the Erie-Ontario Plain and dairying in the Allegheny Plateau (Chautauqua County Soil & Water Conservation District 2008).

A moderate temperature, a long frost-free period, and good soils help to make the lake plain province an outstanding agricultural area. The main agricultural enterprise in this region is grape cultivation; however, substantial areas are used for vegetables, orchard crops or small fruit. Chautauqua County is the leading grape-producing county in New York, with 19,166 acres of vineyards (Chautauqua County Soil & Water Conservation District 2008). At the end of the twentieth century, winemaking was fast becoming a major industry in Chautauqua County with over two million gallons of wine produced annually. A narrow escarpment along Lake Erie uniquely suited to growing grapes sustained the industry with its gravel loam soil and moderating effects from the lake. This region has grown to become the world's largest and oldest Concord grape-growing region, and has been designated a New York State Heritage Area (Concord Grape Belt Heritage Association nd).

Within the Allegany Plateau the principal agricultural enterprise is dairy farming. Corn and hay are the main crops, but small amounts of other grain are also grown. This portion of the

study area contains largely non-architect-designed domestic buildings, which typify regional vernacular interpretations of popular historic architectural styles. In crossroads communities and villages, vestiges of nineteenth-century lifeways are revealed by the layout of these communities with their clustered arrangement centered on primary roadways. Lasting, character-defining elements of a representative rural settlement such as Forestville include residential buildings of mid-to-late nineteenth-century architectural styles set on narrow deep lots, prominently sited religious buildings, former commercial buildings, cemeteries, and, in some instances, transportation infrastructure such as railroads or bridges. Many farmsteads in this region retain their related agricultural and domestic outbuildings, which range in integrity and condition, as well as large tracts of agricultural land. These character-defining features of this rural landscape embody the long established farming traditions of the region, which for the most part has been abandoned. From Chautauqua County, the study area extends into neighboring towns in Cattaraugus County which also contain rural towns characterized by large tracts of undulating farm land located on some of the area's principal roadways.

4.1.1 Concord Grape Belt Heritage Area. Sections of the eastern portion of the Lake Erie Concord Grape Belt State Heritage Area are located in the survey area. The entire region is 50 miles long, extending from Silver Creek (Town of Hanover), New York, on the east to Erie, Pennsylvania, on the west. Some portions of the grape belt are up to six miles wide, making it one of the largest concord grape-growing and juice-processing areas in the nation (Figure 4.1).

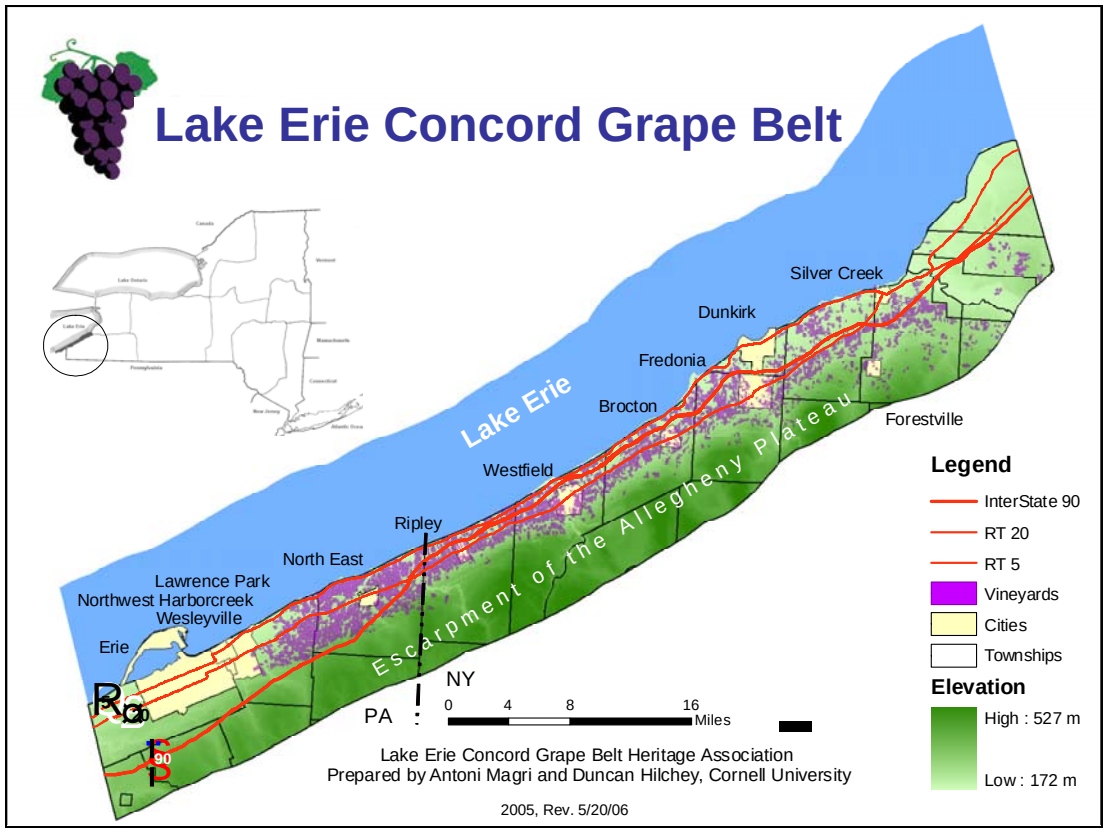

Figure 4.1. Map of the Lake Erie Concord Grape Belt *(Hilchey 2007)*. **Note: the study area is located near Silver Creek and Forestville at the top right.**

Chautauqua County's grape industry began in the Town of Portland. Deacon Elijah Fay introduced the grape and fruit-growing industry in 1818. By 1830, he was the first in the county to produce wine from cultivated grapes, all of it used for sacramental purposes, of course. Each year saw an increase in the amount of wine made, and in 1859 the wine house of Fay, Ryckman & Haywood was created. The company produced 2,000 gallons the first season. From a small beginning, grape culture has spread all over the region, and became a great source of wealth (Cutter 1912; Figure 4.2). At present, nearly 20,000 vineyard acres (30,000 including vineyards in Erie County, Pennsylvania) yield almost 65 percent of New York's annual grape tonnage and have a $50 million annual economic impact (Photograph 4.1). The grapes are used to produce juice, jellies and syrups in addition to wine. It is the first agricultural region in New York State to be designated a heritage area *(*Hilchey 2007*)*.

Figure 4.2. Historic postcard of harvest in the Lake Erie Concord Grape Belt, date unknown *(Hilchey 2007).*

4.2 ARCHITECTURAL STYLES IN THE STUDY AREA

The following is a discussion of architectural styles represented in the study area.

4.2.1 Federal. The Federal style is fairly well represented in the study area (Photograph 4.1), although numerous examples of the style are currently heavily modified. The Federal style is spread throughout the study area, with the best examples in the towns of Hanover and Sheridan (Photographs 4.2 to 4.4).

Photograph 4.1. Vineyard located along Old Forestville Road, north of Interstate-90 in the Town of Hanover *(Panamerican 2008).*

Photograph 4.2. A largely intact example of a Federal-style house, ca. 1820, located at 1890 King Road in the Town of Sheridan *(Panamerican 2008).*

Photograph 4.3. A largely intact example of a Federal-style house, ca. 1812, at 43 Main Street in the Village of Forestville *(Panamerican 2008).*

Photograph 4.4. The Clark C. Swift House is a highly intact example of a Federal/Greek Revival-style house, ca. 1846. It is currently part of the Mount Carmel Catholic Church complex at 165 Central Avenue in Silver Creek *(Panamerican 2008).*

4.2.2 Greek Revival. The study area has a wide range of surviving examples of Greek Revival farmhouses executed in frame. The highest concentration of Greek Revival buildings are located in the more populated village centers. Many subtypes are represented, including a regional side gable, main bay flanked by wings (Photographs 4.5 to 4.6).

4.2.3 Gothic Cottage/Gothic Revival. The Gothic Cottage is largely under represented in the study area. The best example of a Gothic Revival structure is the St. Peter's Episcopal Church located on Park Street in the Village of Forestville (Photograph 4.7).

4.2.4 Italianate. The Italianate style is well represented in the study area. It is perhaps the most popular housing style in the area. Excellent examples are plentiful in both the rural areas and the village centers. Perhaps one of the best examples is at 1 Center Street in the Village of Forestville (Photograph 4.8 to 4.10).

4.2.5 Second Empire. Only one Second Empire structure is located in the project area. This excellent example is prominently sited at the intersection of Pearl and Center streets in the Village of Forestville (Photograph 4.11).

Photograph 4.5. A good example of a Greek Revival church building, ca. 1850, located in the study area. The former church is found on the south side of NY 39, west of Alleghany Road in the Hamlet of Nashville, Town of Hanover *(Panamerican 2008).*

Photograph 4.6. A moderately intact example of Greek Revival subtype, the side gable, main bay flanked by gabled wings was identified in the study area. The property is located on the north side of Versailles Road, west of Buffalo Road in the Town of Hanover *(Panamerican 2008).*

Photograph 4.7. A highly intact Gothic Revival Church, ca. 1850 located on Park Street in the Village of Forestville. This building is situated in the negative viewshed *(Panamerican 2008).*

Photograph 4.8. A largely intact example of an Italianate farmhouse, ca. 1860, located on the west side of Hanover Road, south of Hopper Road in the Town of Hanover. The farmhouse has outstanding architectural detailing, evident in the bracketing and scrollwork on the door enframement *(Panamerican 2008).*

Photograph 4.9. A highly intact example of an Italianate farmhouse, ca. 1830/1860, located at 10079 Hanover Road in the Town of Villenova. The farmhouse maintains its historic rounded arch, two-over-four and four-over-four windows, single bracketing on main bay and double bracketing on wing *(Panamerican 2008).*

Photograph 4.10. An excellent example of a high style Italianate dwelling, ca. 1870, located at 1 Center Street in the Village of Forestville. Found in the negative viewshed, the building features: double bracketing, dentil cornice, segmented arch four-over-four wooden sash windows and a hipped roof cupola *(Panamerican 2008).*

Photograph 4.11. An excellent example of a high style Second Empire-style residence, ca. 1880, located at the intersection of Pearl and Center streets in the Village of Forestville. Found in the negative viewshed, the building features: symmetrical massing, full width porch, center tower, rounded arched windows with hoods, bracketing under the mansard roof and mansard roof tower with oculus windows *(Panamerican 2008).*

4.2.6 Stick. The Stick style is not well represented in the survey area. Only one Stick-style residential building was identified in the study area, located at 2 Prospect Street in the Village of Forestville (Photograph 4.12).

4.2.7 Queen Anne. Residential buildings executed in the Queen Anne style are not well represented in the survey area. The best examples are found in the Village of Forestville (Photograph 4.13).

4.2.8 Shingle. The Shingle style is underrepresented in the study area. One good example of the style is NRE St. Alban's Episcopal Church in the Village of Silver Creek (Photograph 4.14).

Photograph 4.12. A rare example of a Stick-style building, ca. 1870, in the survey area. Located at 2 Prospect Street in the Village of Forestville, the building in the negative viewshed *(Panamerican 2008).*

Photograph 4.13. A largely intact example of a Queen Anne-style residence, ca. 1890. It is one of the most intact Queen Anne structures in the study area. Found at 4 Pearl Street in the Village of Forestville, the building is in the negative viewshed *(Panamerican 2008).*

Photograph 4.14. A rare example of a Shingle-style building in the survey area, the NRE St. Alban's Episcopal Church, ca. 1890, is located at 38 Lake Avenue in the Village of Silver Creek, Town of Hanover *(Panamerican 2008).*

4.2.9 Rusticated Concrete-Block Houses. The study area has a large number of Rusticated Concrete-Block houses. The largest number of residential buildings of this construction type is concentrated in the Village of Silver Creek, however, the best example is found outside the Village of South Dayton. Several examples of Rusticated Concrete-Block commercial buildings are in the Village of South Dayton (Photograph 4.15).

4.2.10 Colonial Revival/Dutch Colonial Revival. The Colonial Revival style is fairly well represented in the study area. Very few intact examples were identified. The most highly intact example is found in the in the Town of Perrysburg (Photograph 4.16 to 4.17).

4.2.11 Neo-Classical. The Neo-Classical style is found scattered throughout the large village centers of the study area. The best residential examples are found in the Town of Hanover and the best commercial example is found in the Village of South Dayton (Photograph 4.18).

Photograph 4.15. The best example of the Rusticated Concrete-Block house in the study area, this structure, ca. 1920, is located at 8143 Oaks Road, Town of Dayton, Cattaraugus County *(Panamerican 2008).*

Photograph 4.16. A good example of a Dutch Colonial farmhouse, 1939, is the dwelling at 10292 West Perrysburg Road, Hamlet of West Perrysburg, Town of Perrysburg *(Panamerican 2008).*

Photograph 4.17. An excellent example of a Colonial Revival/Neo-Classical structure, ca. 1905, this structure is located on Old Forestville Road, east side, north of Stebbins Road in the Town of Hanover *(Panamerican 2008).*

Photograph 4.18. An excellent example of a Neo-Classical residential dwelling, ca. 1920, is the building at 117 Old Main Street in the Village of Silver Creek. It features full height Doric columns, second story balustrade, side pilasters, and full pediment with fan light *(Panamerican 2008).*

4.2.12 Prairie. Only one Prairie-style structure was identified in the study area. The residential dwelling is an excellent example of the style, and is located in the Village of Silver Creek (Photograph 4.19).

4.2.13 Craftsman. The Craftsman style is very well represented in the study area. The most notable examples of the style were identified in the Village of Silver Creek (Photograph 4.20 to 4.21).

4.2.14 Tudor. The Tudor style is fairly well represented in the study area. The best example is found in the Hamlet of Hanover Center (Photograph 4.22).

Photograph 4.19. The property at 27 Parkway Avenue, ca. 1915, in the Village of Silver Creek, Town of Hanover, is a rare, excellent example of a Prairie-style residence in the study area. *(Panamerican 2008).*

Photograph 4.20. An excellent example of a Craftsman-style residence, the building, ca. 1915, is located at 338 Central Avenue in the Village of Silver Creek, Town of Hanover *(Panamerican 2008).*

Photograph 4.21. Another excellent example of a Craftsman style residence is the Swift House, ca. 1914, at 6 Parkway Avenue, Village of Silver Creek, Town of Hanover *(Panamerican 2008).*

Photograph 4.22. The structure at 11991 Hanover Street, ca. 1930, in Hanover Center, Town of Hanover, is a good example of a Tudor Revival residence. It retains most of its integrity with the exception of new windows *(Panamerican 2008).*

***4.2.15 Barns and Farm Buildings*.** Historic barns and farm buildings remain an integral part of the rural agricultural landscape of southern Chautauqua and Cattaraugus counties (Photographs 4.23. to 4.30). The earliest barns constructed in the region followed building methods and forms practiced in New England. These early barns were simple and constructed of rough-hewn timber. As early as the mid-seventeenth century, colonists in New England erected frame barns with a tripartite configuration. Generally called an English barn, the outbuilding has a central door that opens onto a threshing floor flanked by two mows (or stock aisles parallel to the gable ends). This type of three-bay barn was usually gable-ended and could accommodate a wagon loaded with loose hay or unthreshed grain sheaves into the center of the barn. The English barn remained popular with American farmers as late as the nineteenth century. German influences on American barn construction manifested in the form of gambrel roofs and cellars for livestock.

The Raised or Basement barn emerged from the need for larger structures to accommodate the growing dairy industry. This barn form is more or less an English bank barn raised up, with a basement at ground level inserted beneath. Entry to the basement is usually through doors on the gable ends, differing from the downslope side-entrance of the German bank barn. Access to the upper floor of the Raised barn is by means of a ramp or barn bridge, which allowed for the Raised barn to be built on level lands. Three-Bay Threshing barns and some Raised or Basement barns, which may indicate an English origin, have covered entry porches. This type of entry porch rarely occurs on other barn types. The combined barn bridge and entry porch is a regional form ranging from northeastern Vermont, scattered across New York, and into northwestern Pennsylvania (Fink 2005; Noble and Cleek 1995; Visser 1996, Vlach 2003).

Buildings associated with dairying continued to expand and the form of the buildings accommodated the changes. The end of the nineteenth century marked the appearance of the tower silo, which enabled green fodder to be stored and fed out during the winter months. This innovation was instrumental for dairying, as previously cows were fed on dry grain and hay, which inhibited milk output. Feeding green fodder to cows during the winter permitted milking all year long, which satisfied the demands of expanding urban centers. Another innovative dairying addition was the milk house, a small sanitary building to store freshly produced milk in a cool environment with running water to clean empty containers. Initially, milk storage facilities were inside barns. By the 1840s, storage facilities operated in a separate structure. Milk houses became small rectangular barn appendages that are standard features of all dairy barn types. Today, pole barns and other modern structures increasingly make up the agricultural scene in dairying regions. With at least one open side, these low, factory-like sheds offer a milking parlor and windbreak in inclement weather.

Within the Allegheny Plateau, in rural the areas of Cattaraugus and Chautauqua counties, dairy farm complexes with outbuildings and silos dating from the turn of the nineteenth century through the present dominate the agricultural landscape. One regional architectural form is the square silo, identified in Villenova and Dayton (see Photograph 4.29). There are numerous inactive dairy complexes with older farm outbuildings, the ubiquitous gambrel roof barn and the less common side gambrel roof barn with gabled wall dormer (see Photograph 4.27). To ascertain specific functions of barns and farm buildings, access to the interiors of buildings is generally recommended for closer inspection (a task beyond the scope of the current study). Often there are wear patterns on floor boards or “ghost lines” on walls that may reveal missing interior features. The reuse of materials in barns is widespread. Examination of historical maps along with comparative field inspection of historic farm buildings will help to decipher and identify surviving architectural evidence of the region’s dairy history. Most of these farmsteads are no longer in use, forcing the barns into a state of decay.

Photograph 4.23. Greek Revival commercial/religious structure used as a barn, located behind 10300 Alleghany Road in the Hamlet of Nashville, Town of Hanover. It is not known where the structure was originally located, but it is striking similar to the former church building (see Photograph 4.5) found on NY 39 in the Hamlet of Nashville *(Panamerican 2008).*

Photograph 4.24. Side gable long barn, ca. 1870, at 2083 NY 83, Hamlet of Blacks Corners, Town of Arkwright *(Panamerican 2008).*

Photograph 4.25. Side gable long barn, ca. 1890, at 7814 NY 83 in the Town of Cherry Creek. The barn maintains its historic wood shingle exterior and clapboard milk house *(Panamerican 2008).*

Photograph 4.26. An excellent barn complex at 8911-8903 Farrington Hollow Road in Blacks Corners. It is the original farmstead in the hamlet. The complex consists of several barns, the earliest of which is a Greek Revival, ca. 1850. The long gambrel roof barn, ca. 1900, has three tile silos attached under one roof. It was completed in 1936 and, according to the owner, was the first one of its kind in Chautauqua County *(Panamerican 2008).*

Photograph 4.27. A good example of a gambrel roof bank barn with gabled dormer is located at 8562 NY 83, ca. 1900, in Town of Villenova *(Panamerican 2008).*

Photograph 4.28. The only gambrel roof bank barn executed in rusticated concrete-block, ca. 1915, in the study area is one that is part of the Dye Homestead at 558 South Dayton-Hamlet Road, Hamlet of Balcom Corners, Town of Villenova *(Panamerican 2008).*

Photograph 4.29. A side gable long barn with modern concrete silo and frame square silo, is located at 8052 NY 83 in the Town of Villenova *(Panamerican 2008).*

Photograph 4.30. An excellent example of a high style barn, ca. 1870, is located at 10523 Creek Road in the Village of Forestville, Town of Hanover *(Panamerican 2008).*

4.3 ARCHITECTURAL SUMMARY BY MUNICIPALITY

4.3.1 Cattaraugus Indian Reservation. An extremely narrow swath of land on the Cattaraugus Indian Reservation is located in the northeastern corner of the estimated five-mile Visual APE. No properties are located in this area, and no wind turbines or project elements are proposed for location on the reservation as part of the currently proposed Noble Ball Hill Windpark project.

4.3.2 Town of Dayton (MCD 00906), Cattaraugus County. The extreme western portion of the Town of Dayton is within the southeast section of the five-mile visual APE. Approximately half of this area is in the positive ZVI. Inside the APE, the town contains the Hamlets of Cottage (mostly in the negative ZVI) and Skunks Corners (entirely in the positive ZVI). No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The Town of Dayton, outside of the Village of South Dayton, is largely rural and characterized by family farmsteads consisting of farmhouses, barns, silos, associated outbuildings, agricultural fields, and livestock. Similar to other surrounding towns, Dayton's topography consists of rolling hills that contribute to the town's pastoral setting. From higher elevations there are long, wide vistas of the town's rural landscape. At present, many Amish live and work in the town. The traditional farming practices of the Amish with their farm complexes, schools and lack of modern technological conveniences compliment the historical agricultural traditions of the region. The town's built environment ranges from mid-nineteenth-century to present-day housing stock.

The Hamlet of Cottage is situated on Cottage and Mosher roads along Slab Creek. This small hamlet contains a church, abandoned general store and cemetery. The housing stock consists of mid-to-late nineteenth-century to mid-twentieth-century buildings. Most have been compromised.

Skunks Corners is a small hamlet west of the Village of South Dayton. It is sited on the banks of the West Branch of the Conewango Creek. The housing stock consists of a handful of highly modified mid-to-late nineteenth-century buildings and inactive farmsteads.

There are no NRL properties and 83 previously inventoried properties in the Town of Dayton. Of these properties four are NRE (I), one is located in the study area, and 74 were determined not eligible. The remaining five have no determination of eligibility. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.3 Town of Leon (MCD 00917), Cattaraugus County. The extreme northwest corner of the Town of Leon is in the southwest section of the project area. The town contains the hamlets of East Leon, Leon and Rays Corners, all of which are outside the five-mile APE. No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The small portion of the Town of Leon located in the five-mile APE is largely rural and characterized by family farmsteads consisting of farmhouses, barns, silos, associated

outbuildings, agricultural fields, and livestock. The town's built environment spans the mid-nineteenth-century to present-day housing stock.

There is one NRL—the Leon United Methodist Church—and three NRE (I) properties in the Town of Leon, all of which are outside the APE. A total of 20 properties were previously inventoried, four had no determinations and 12 had determinations of not eligible by NYSHPO. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.4 Town of Perrysburg (MCD 00934), Cattaraugus County. The extreme western portion of the Town of Perrysburg is in the northeastern section of the project area. Much of the area is in the positive ZVI. Inside the five-mile APE, the town contains the Hamlet of West Perrysburg and a swath of land at the western limits of the Village of Perrysburg, completely in the negative ZVI. No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The Town of Perrysburg is largely rural and characterized by inactive family farmsteads consisting of farmhouses, barns, silos and associated outbuildings. Similar to other surrounding towns, Perrysburg's topography consists of rolling hills that contribute to the town's pastoral setting. From higher elevations there are long, wide vistas of the town's rural landscape. The town's built environment spans the mid-nineteenth-century to present-day housing stock.

The Hamlet of West Perrysburg is a rural community located along West Perrysburg Road. The hamlet consists of old family farmsteads and a cemetery, and contains a mix of mid-nineteenth century to early twentieth-century architecture. Many of these structures have been compromised.

There are 19 National Register Listed properties and one NRE (I) property in the Town of Perrysburg, all located outside the APE. A total of 34 properties were previously inventoried, one was determined not eligible by NYSHPO, and the remaining 13 had no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.5 Village of South Dayton (MCD 00954), Cattaraugus County. The entire Village of South Dayton is located in the southeastern part of the five-mile visual APE. Most of the area is within the positive ZVI, with the exception a swath at the extreme northern portion of the village. No wind turbines or project elements are proposed for location in the village as part of the currently proposed Noble Ball Hill Windpark project.

The Village of South Dayton is situated between the West Branch of the Conewango Creek to the west and the Buffalo & Southwestern/Erie Railroad line to the east. NY 322/Pine Street bisects the village, which was laid out by three men, John Wickham, Robert Ewing, and Julius Shults. A small commercial corridor, centered on a village square, grew up around the Erie Railroad tracks. In addition, a small industrial corridor lines the tracks beginning south of Pine Street and extending north to Maple Street. The housing stock ranges from mid-nineteenth century to late twentieth century, with the older structures concentrated in the southern portion of the village.

There are no NRL and 27 previously inventoried properties in the Village of South Dayton. Of the 27 properties, one has been determined NRE (I) (located in the proposed Ewing Park Historic District), 24 have determinations of not eligible, two have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.6 Town of Arkwright (MCD 01301), Chautauqua County. The eastern portion of the Town of Arkwright is in the western section of the project area. Much of the area is in the positive ZVI. Inside the APE, the town contains the hamlets of Arkwright (partially in the negative ZVI), Blacks Corners (in the positive ZVI), Chickens Tavern (in the positive ZVI), Griswold (in the negative ZVI), and Towns Corners (in the positive ZVI). No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The Town of Arkwright is largely rural and characterized by old, mostly inactive, family farmsteads consisting of farmhouses, barns, silos, associated outbuildings, and fallow fields. Similar to other surrounding towns, Arkwright's topography consists of rolling hills that contribute to the town's pastoral setting. From higher elevations there are long, wide vistas of the town's rural landscape. The town's built environment spans he mid-nineteenth-century to present-day housing stock.

Arkwright is a small hamlet at the crossroads of NY 83 and Center Road. Little remains of this rural farming hamlet. There are remnants of old family farmsteads dot the landscape (e.g., farmhouses, barns, silos, associated outbuildings). The farmhouses and outbuildings have been heavily modified and no longer maintain their historic integrity or setting.

Blacks Corners is a small hamlet at the intersection of NY 83 and Farrington Hollow Road. The area is marked by two large farms owned by the Black and Wooley families, each of which maintains its historic setting. A small cemetery is situated between the farmsteads that contains the remains of the town residents as well as ancestors of the Black and Wooley families.

Chickens Tavern is a small hamlet at the crossroads of NY 83 and Schooley Road. There are remnants of old family farmsteads consisting of farmhouses, barns, silos, associated outbuildings, and fallow fields. The farmhouses and outbuildings have been heavily modified and no longer maintain their historic integrity or setting.

Towns Corners is a small hamlet located at the intersection of Farrington Hollow and Burnham Road. It is a rural community with family farmsteads consisting of farmhouses, associated outbuildings, and both cultivated and fallow fields. The farmsteads have been compromised and retain little integrity.

There are no NRL or NRE (I) properties located in the study area. There are 10 previously inventoried properties in the Town of Arkwright, one has no determination and the remaining nine have determinations of not eligible. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.7 Town of Charlotte, (MCD 01304), Chautauqua County. The extreme northeast corner of the Town of Charlotte is in the southwest corner of the five-mile APE. Approximately

half of this area is within the positive ZVI. No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The landscape within the portion of the Town Charlotte located in the study area is largely rural and characterized by inactive family farmsteads that contain farmhouses, barns, silos, associated outbuildings, and fallow fields. The built environment includes mid-nineteenth-century to present-day housing stock. The State Reforestation Area and privately owned forested land contribute to the undeveloped rural landscape of the town.

There are no NRL and one NRE (I) property in the Town of Charlotte, located outside the five-mile APE. There are seven previously inventoried structures in the study area. Two of these properties have been determined not eligible. The remaining four have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.8 Town of Cherry Creek (MCD 01306), Chautauqua County. The extreme northwest corner of the Town of Cherry Creek is in the southeastern portion of the five-mile APE. Much of this area is within the positive ZVI. The town contains the Village of Cherry Creek and the Hamlet of Thornton; both are outside of the five-mile APE. No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The landscape of the Town of Cherry Creek within the study area is largely rural and characterized by inactive family farmsteads consisting of farmhouses, barns, silos, and associated outbuildings. The built environment includes mid-nineteenth-century to present-day housing stock. The main road through the study area portion of the town is NY 83, which leads to the Village of Cherry Creek.

There are no NRL properties and one NRE (I) property, located outside the study area. There are 46 previously inventoried structures in the Town of Cherry Creek. Forty-three (43) of these properties have been determined not eligible, and the remaining two have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.9 Town of Hanover (MCD 01314), Chautauqua County. Nearly the entire Town of Hanover is in the visual APE. It contains the villages of Forestville and Silver Creek, both in the study area. The hamlets located within the study area include: Ball Town (in the positive ZVI), Hanover Center (positive ZVI), Keaches Corners (positive ZVI), Nashville (positive ZVI), Parcells Corners (positive ZVI), Smith Mills (mostly negative ZVI), and Denison Corners (positive ZVI). Noble Wind LLC proposes to install 11 turbines in the Town of Hanover, along with associated electric lines (below grade and overhead) and related facilities, including interconnection facilities for the connection to the National Grid's existing 230-kilovolt transmission line, access roads, parking areas, and operations and maintenance facilities. The turbines will be located south of NY 39 between Hanover and Prospect roads.

Town of Hanover, outside the village centers, is largely rural and characterized vineyards. Large sections of the northern part of the town are included in the Lake Erie Concord Grape Belt Heritage Area. The southern portion of the town is similar to other surrounding towns. Hanover's

topography consists of rolling hills that contribute to the town's pastoral setting. From higher elevations there are long, wide vistas of the town's rural landscape and Lake Erie. The town's built environment spans the mid-nineteenth-century to present-day housing stock.

Balltown is a small rural hamlet located along Alleghany and Mackinaw roads. The rural landscape consists of mid-to-late nineteenth-century family farmsteads and a cemetery set on rolling hills.

Hanover Center is a hamlet located at the intersection of Hanover, Angell and Hanford roads. The construction of Interstate-90 cut off the northwestern portion of the village. The core of the hamlet, Hanford Road, is densely settled. The surrounding land use includes a large municipal cemetery, Evergreen Lawn, and old family farmsteads. The building stock consists of mid-nineteenth-century to mid-twentieth-century structures.

Keaches Corners is a small rural hamlet located at the intersection of NY 428 and King Road, north of the Village of Forestville. The built landscape of the hamlet consists of compromised mid-nineteenth-century to early twentieth-century family farmsteads, with associated outbuildings and cultivated fields.

Nashville is a small hamlet located at the intersection of NY 39 and Alleghany Road. It was named for Uriah Nash, one of the hamlet's earliest settlers. The community once consisted of a church, general store, cheese factory, school and cemetery (Downs & Hadley 1921). The structures are still standing; most have been heavily modified, with the exception of the church located along NY 39 and the cemetery on Alleghany Road. The building stock consists of mid-nineteenth-century to early twentieth-century structures.

Parcells Corners is a small hamlet located along NY 39 and Hanover Road. The built landscape of the hamlet consists of mid-nineteenth-century to early-twentieth-century family farmsteads, with associated outbuildings and cultivated fields. Many of these buildings maintain their historic setting and integrity. The hamlet also contains the Tri-County Country Club, founded in 1924. The club consists of an 18-hole golf course with manicured lawns and gently rolling hills. The date of the landscape could not be verified. The associate outbuildings are modern structures.

Denison Corners is a small rural hamlet located at the intersection of Denison and King roads. The built landscape of the hamlet consists of compromised mid-nineteenth-century to early twentieth century family farmsteads, with associated outbuildings and cultivated fields.

There are no NRL properties and 40 previously inventoried properties in the Town of Hanover. Of these properties, one is determined NRE (I)—this property is located in the study area. The remaining 38 have determinations of not eligible and one has no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.10 Town of Sheridan (MCD 01323), Chautauqua County. The eastern portion of the Town of Sheridan is located in the northwest area of the APE. Inside the project area the town contains the Hamlet of Hawkins Corners (positive ZVI). No wind turbines or project elements are proposed for location in the town as part of the currently proposed Noble Ball Hill Windpark project.

The Town of Sheridan is largely rural and characterized by old, mostly inactive, family farmsteads consisting of farmhouses, barns, silos, associated outbuildings. Sheridan's topography consists of flat lands to the north and rolling hills, to the south, which contribute to the town's pastoral setting. Sections of the town are included in the Lake Erie Concord Grape Belt Heritage Area. From higher elevations there are long, wide vistas of the town's rural landscape and Lake Erie. The town's built environment spans from the mid-nineteenth-century to present-day housing stock.

Hawkins Corners is a small rural hamlet located at the intersection King and Stebbins roads. The built landscape of the hamlet consists of mid-nineteenth-century to early twentieth-century family farmsteads with associated outbuildings and cultivated fields.

There are no NRL and six NRE (I) properties; all are located outside of the study area. There are 37 previously inventoried properties in the Town of Sheridan. Of these 37 properties, 16 have determinations of not eligible and 15 have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.11 Town of Villenova (MCD 01326), Chautauqua County. The entire Town of Villenova is located in the center of the APE. The town contains the hamlets of Balcom, Balcom Corners, Hamlet, Wango and Wrights Corners, all in the positive ZVI. Noble Wind LLC proposes to install 49 turbines in the Town of Villenova, along with associated electric lines (below grade and overhead) and related facilities, access roads, parking areas, and operations and maintenance facilities. The turbines will be located in the north center of the town between West Lake and Hanover roads.

The landscape in the Town Villenova is largely rural and characterized by inactive family farmsteads consisting of farmhouses, barns, silos, associated outbuildings, and fallow fields. The built environment includes mid-nineteenth-century to present-day housing stock. The western portions of the town are heavily forested as part of the State Reforestation Area and privately owned forested land contribute to the undeveloped rural landscape of the town.

Balcom is a hamlet located at the intersection of NY 83 and Prospect Road. The landscape is rural, consisting active family farmsteads. The building stock is dominated by mid-to-late nineteenth century dwellings and associated outbuildings.

Balcom Corners is a hamlet situated at the intersection of NY 322 and NY 83. The landscape is largely rural, consisting of active and inactive family farmsteads and a general store. Much of this small community's building stock has been compromised.

Hamlet is a small hamlet that formed at the intersection of NY 83, Butcher Road, South Hill Road and Hamlet Road. Hamlet is densely settled consisting of two commercial buildings, a church, old schoolhouse and abandoned Grange Hall. The housing stock is consistent with the surrounding hamlets, mid-nineteenth-century to early twentieth-century dwellings. Many retain their setting and integrity.

Wango is a hamlet along Dye Road. Its landscape is largely rural, consisting of compromised active and inactive family farmsteads.

Figure 4.3. Historic streetscape of the Main Street, Hamlet (NY 83/Hamlet-South Dayton Road), date unknown. At right is the Hamlet United Methodist Church, 1119 NY 83 and the vernacular structure at 1129 NY 83. The commercial building has been demolished *(Davidson 2008).*

Wrights Corners is a small hamlet located at the intersection of Prospect Road and Phillips Road. The small community contains heavily modified nineteenth-century structures, including a schoolhouse. The hamlet is surrounded by cultivated fields. The Villenova Cemetery, 1811, is the dominating feature of the hamlet. It is a large municipal cemetery.

There are no NRL properties and 53 previously inventoried properties in the Town of Villenova. Of these 53, 51 have determinations of not eligible and two have no eligibility determinations. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.4.12 Village of Silver Creek (MCD 01346), Chautauqua County. The entire Village of Silver Creek is in the APE. Approximately half of the village lies in the negative ZVI. No wind turbines or project elements are proposed for location in the town as part of the current proposed Noble Ball Hill Windpark project.

Located in the Town of Hanover, the village of Silver Creek was the town's industrial center. Poised on Lake Erie, it began as an important lake port. The early lakeshore was lined with warehouses and wharfs. One of the first commodities was lumber, which was harvested from vast, forested areas south of the village and transported by steamboat to national markets. Silver Creek quickly became one of the busiest ports on Lake Erie. The settlement expanded from the lake southward, incorporating a commercial corridor and residential dwellings. By 1848, the economic climate of Silver Creek changed from a point of heavy shipping to an important stop on the Buffalo & State Line (later, New York Central) Railroad, the Lake Shore & Michigan Southern Railroad, and in 1852 the New York & Pennsylvania (The Pennsylvania) Railroad. This vast expansion of the railroad networks altered the landscape. Expansive arches

and trestles were constructed parallel to the lake (Figure 4.4). The railroads facilitated further expansion of the village. Factories and machine shops increasingly became the bread and butter of the economy (Donohue 1984). In the 1950s and 1960s, Silver Creek was adversely affected by the decline of the railroad and the relocation of factories and machine shops to cheaper southern markets. The infrastructure and built landscape reflect Silver Creek's period of prominence, 1830-1950.

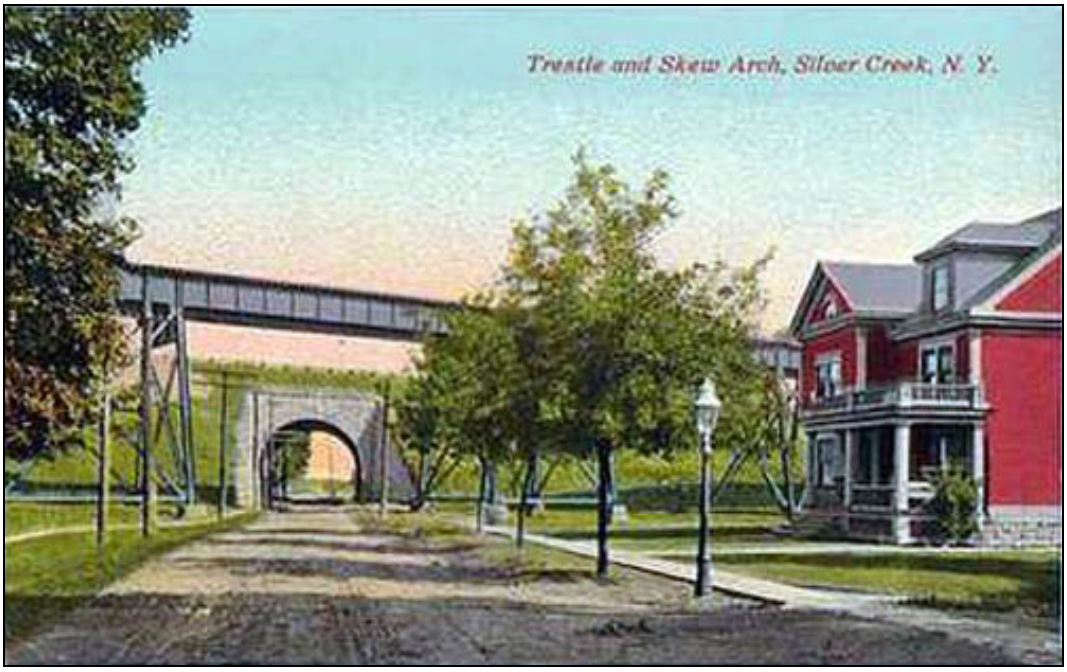

Figure 4.4. Vintage postcard of trestle and Skew Arch Bridge over Jackson Street, ca. 1910. The Skew Arch Bridge was erected in 1869, and was designed and erected for the Buffalo & Stateline Railroad. It is one of only two bridges in the world built on an angle *(Donohue 1984: Davidson 2008).*

There are is one NRL property, the U.S. Post Office, located in the negative ZVI and 10 NRE (I) properties, six of which are located in the positive ZVI. A total of 198 properties were previously inventoried. Of these 198, 110 have determinations of not eligible. The remaining 77 have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

4.3.13 Village of Forestville (MCD 01352), Chautauqua County. The entire Village of Forestville is in the five-mile APE. Nearly all of this area is within the positive ZVI. No wind turbines or project elements are proposed for location in the village as part of the currently proposed Noble Ball Hill Windpark project.

Located in the Town of Hanover, Forestville is a densely settled village nestled along Walnut Creek. Early industry centered on milling and forestry. Tracks for the Erie Railroad were laid in the extreme northeast corner of the village in 1851 (Forestville New York 2008). The main thoroughfare through the village is NY 39/Main Street (Figure 4.5). A one-block commercial district is located along Main Street. The commercial buildings range in age from mid-nineteenth century to late twentieth century. Many of these structures have been compromised and no longer retain their historic integrity. South of Main Street are many of the village's religious and

educational facilities, which are intermixed with residential dwellings. These structures range in age from mid-nineteenth century to early twentieth century. The area north of Main Street consists largely of mid-to-late nineteenth-century residential dwellings sited on narrow parcels with tree-lined streets and pedestrian rights-of-way (Figure 4.6).

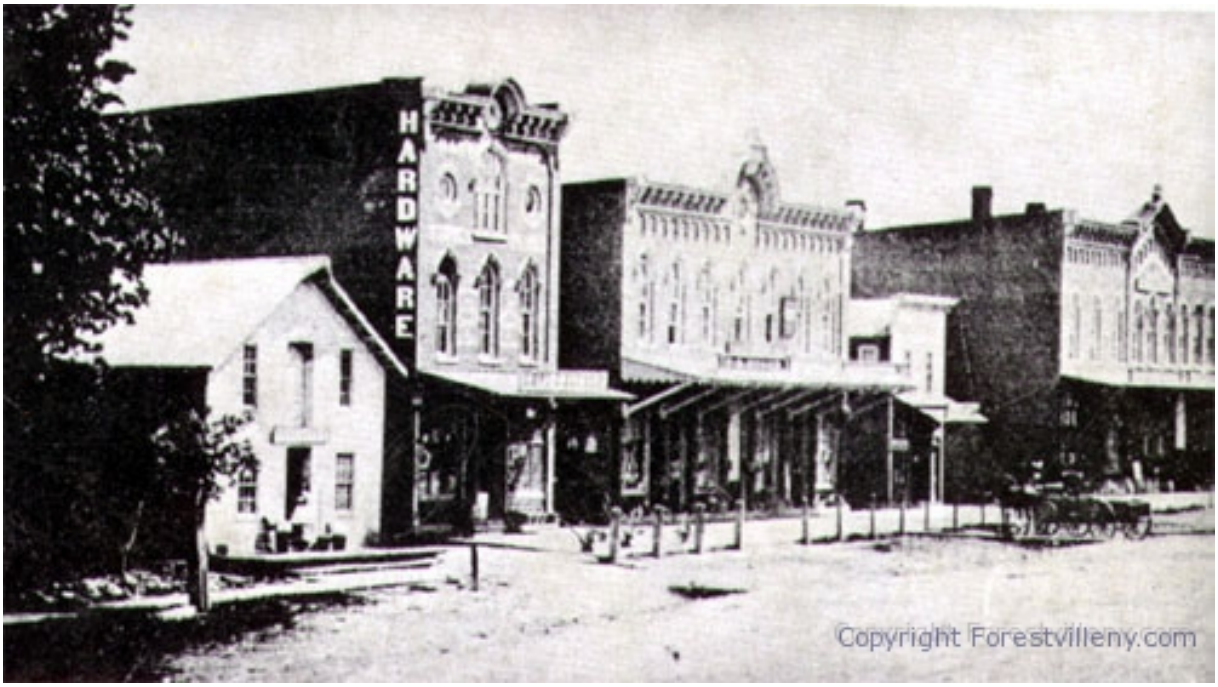

Figure 4.5. Historic photograph, date unknown, of the north side of Main Street in the Village of Forestville. The building at the far right is 11-15 Main Street. No other buildings survive *(Forestvilleny nd).*

Figure 4.6. Historic Streetscape of Pearl Street in the Village of Forestville, ca. 1908 *(Davidson 2008).*

There are no NRL or NRE (I) properties in the village. There are 93 previously inventoried structures, 15 of these properties have been determined not eligible. The remaining 78 have no determination. Properties listed in SPHINX without eligibility determinations were field inspected and only those that displayed sufficient architectural integrity or historical significance are recommended in this study as possibly NRE.

5.0 Architectural Survey Results

A total of 146 individual properties, including cemeteries and other structures, are documented in this report. Of these properties, eight have been determined NRE(I) by NYSHPO. There are no National Register Listed properties in the positive ZVI. The remaining 138 properties are recommended as possibly NRE for the first time. Farm complexes with numerous farm buildings or features are considered as one property. All of the towns documented are in Cattaraugus or Chautauqua counties (see Figures 1.1 and 1.2).

As part of the final architectural survey, these properties were examined along with other historic resources in the positive area of the ZVI. The breakdown of the results follows the order of the annotated list in Section 8.0, which catalogs the findings of this architectural survey.

5.1 TOWN OF DAYTON (MCD 00906), CATTARAUGUS COUNTY

1. NRE**:** 12182 Markhams Road
2. Erie Railroad Bridge, Oaks Road, over Conewango Creek

Hamlet of Cottage

3. Cottage Cemetery, Cottage Road, north side, west of Edwards Corners Road
4. 12654 Cottage Road

5.2 VILLAGE OF SOUTH DAYTON (MCD 00954), CATTARAUGUS COUNTY

1. 27 Cherry Street
2. Factory Building, East Railroad Street, east side, south of Pine Street
3. 73 East Railroad Street
4. 62 Main Street
5. 203 Maple Street
6. 212 or 214 Maple Street
7. Harry Austin Milling, Mill Street, east of the Erie Railroad tracks
8. 227 Oak Street
9. 8143 Oaks Road
10. 107 Pine Street
11. 309 Pine Street
12. 312 Pine Street
13. Wilson House, 319 Pine Street
14. 413 Pine Street

Proposed South Dayton Ewing Park Historic District

1. E.B. Crissey Building, 30 Maple Street
2. Wilson Hale & Co. Building, 1 Park Street
3. Wilson Hale & Co./ Post Office Building, 5 Park Street
4. NRE: Cattaraugus County Bank, 7 Park Street
5. Gypsy Tea Room, 9 Park Street

6. 11 Park Street
7. 13 Park Street
8. Rough Kutts,15 Park Street
9. Village Hall/Library, 17 Park Street
10. Ewing Park, Park, Maple, Railroad and Pine streets
11. The Valley House/South Dayton Hotel, 203 Pine Street
12. 205 Pine Street
13. 207 Pine Street
14. South Dayton Depot, Railroad Street, along the west side of the tracks

5.3 TOWN OF LEON (MCD 00917), CATTARAUGUS COUNTY

No properties in the Town of Leon are recommended as NRE.

5.4 TOWN OF PERRYSBURG (MCD 00926), CATTARAUGUS COUNTY

1. Perrysburg Cemetery, NY 39, south side, west of West Perrysburg Road
2. 12316 NY 39

West Perrysburg

3. Rugg-town (West Perrysburg Cemetery), West Perrysburg Road, west side, north of NY 39
4. 10929 West Perrysburg Road

5.5 TOWN OF ARKWRIGHT (MCD 01301), CHAUTAUQUA COUNTY

1. Weaver Cemetery, Center Road, west side, north of Weaver Road
2. 8129 Griswold Road
3. Rose Farm, 1936 Ruttenbur Road

Arkwright

4. 2667 NY 83

Blacks Corners

5. Wooley Farmstead, 8903-8911 Farrington Hollow Road
6. Arkwright Summit Cemetery, Farrington Hollow Road, east side, south of NY 83
7. Black Farmstead/Mapl-Camp Farm, 2083 NY 83

5.6 TOWN OF CHARLOTTE (MCD 01304), CHAUTAUQUA COUNTY

No properties in the Town of Charlotte are recommended as NRE.

5.7 TOWN OF CHERRY CREEK (MCD 01306), CHAUTAUQUA COUNTY

No properties in the Town of Cherry Creek are recommended as NRE.

5.8 TOWN OF HANOVER (MCD 01314), CHAUTAUQUA COUNTY

1. 10917 Alleghany Road
2. 12168 Alleghany Road
3. Evergreen Lawn Cemetery, Angel Road, south side, east of Denison Road
4. Forestville Depot, Center Street, northeast corner at Erie Street (outside Forestville village limits)
5. Christy Road Cemetery, Christy Road, north side, east of Alleghany Road
6. Hanover Road, west side, south of Hopper Road
7. Livemore Homestead, 10079 Hanover Road
8. Swift Cemetery/Hurlburt Road Cemetery, Hurlburt Road, north side, east of Prospect Road
9. Abandoned farmhouse, Hurlburt Road, south side, east of Prospect
10. 469 NY 39
11. 503 NY 39
12. 675 NY 39
13 1411 NY 39
14. NRE: 11776 Old Forestville Road
15. Pioneer Cemetery, south of 11051 Old Forestville Road
16. 11103 Forestville Road
17. Mt. Carmel Cemetery, Old Main Street, east side, south of NY 20
18. Glenwood Cemetery, Old Main Street, east side, south of NY 20
19. 11935 Old Main Street
20. Prospect Hill Cemetery, Prospect Road, east side, south of the Village of Forestville
21. Doty Cemetery, Stebbins Road, south side, west of Old Forestville Road

Balltown

22. Ball Valley Farms, 11037 Alleghany Road
23. Balltown Cemetery, Mackinaw Road, north side at Alleghany Road

Hanover Center

24. 12010 Angell Road
25. 12021 Angell Road
26. Golden Harvest, 967 Hanover Road
27. 11991 Hanover Road

Nashville

28. Nashville Cemetery, Alleghany Road, west side, south of NY 39
29. Church, NY 39, south side, west of Alleghany Road

Smith Mills

30. Smith's Mill Cemetery, Hanover Road, west side at York Road

5. 9 VILLAGE OF FORESTVILLE (MCD 01352), CHATAUQUA COUNTY

1. Bridge over Walnut Creek, Bradigan Road, over Walnut Creek
2. 13 Cedar Street
3. 18 Center Street
4. 28 Center Street
5. 11-15 Main Street
6. 26 Main Street
7. 27 Main Street
8. Forestville Free Methodist Church, 32 Main Street
9. 43 Main Street
10. 2 Pearl Street
11. 9 Water Street

5.10 VILLAGE OF SILVER CREEK (MCD 01346), CHAUTAUQUA COUNTY

1. Clark Mansion on Lighthouse Point, Beachview, north side, facing Lake Erie
2. 10 Beachview
3. NRE: 130 Central Avenue
4. 147 Central Avenue
5. NRE: 151 Central Avenue
6. NRE: Our Lady of Carmel, 165 Central Avenue. Including the NRE Clark C. Swift House
7. 338 Central Avenue
8. 350 Central Avenue
9. 5 Christy Street
10. 9 Christy Street
11. 4 Dana Drive
12. 12370 Hanover Road
13. 16 Hanover Street
14. Howard Street, southwest side of Buffalo Street
15. Skew Arch Bridge over Jackson Street
16. Nickel Plate Bridge over Jackson Street
17. Hanover Bridge over Silver Creek, between Lake and Jackson Streets
18. Stone Bridge over Lake Avenue
19. Nickel Plate Bridge over Lake Avenue
20. 6-8 Lake Avenue
21. NRE: St. Albans, 38 Lake Street
22. 18 Oak Street
23. 30 Oak Street
24. 117 Old Main Street
25. 151 Old Main Street
26. 155 Old Main Street
27. 1 Oliver Place

28. 5 Oliver Place
29. Swift House, 6 Parkway Avenue
30. 9 Parkway Avenue
31. 17 Parkway Avenue
32. NRE: Erbin House, 27 Parkway Avenue
33. Trinity Lutheran Church, Porter Avenue, northeast corner at Adams Street
34. 19 Porter Avenue
35. 21 Porter Avenue
36. 45 Robinson Street
37. 16 Rumsey Street
38. 28 Ward Place

5.11 TOWN OF SHERIDAN (MCD 01323), CHAUTAUQUA COUNTY

1. 1873 East Middle Road
2. 1980 King Road
3. 2023 Stebbins Road
4. 2248 Stebbins Road

5.12 TOWN OF VILLENOVA (MCD 01326), CHATAUQUA COUNTY

1. Wheeler Cemetery, Hanover Road, east side, south of James Road
2. School no. 10, 9129 North Hill Road
3. NY 83 south side, west of Hamlet
4. 8025 NY 83
5. 8052 NY 83
6. 8562 NY 83
7. 307 Philips Road
8. Pope Hill Cemetery, Pope Hill Road, south side, east of Round Top Road
9. Forestville Wesleyan Church/School/ Ball Hill Cemetery, 9495 Prospect Road

Balcom

1. 641(NY 83)South Dayton-Hamlet Road
2. 691(NY 83) South Dayton-Hamlet Road
3. Dye Homestead, 558 (NY 83) South Dayton-Hamlet Road
4. Hamlet Cemetery, NY 83, south side, west of Hamlet
5. 1141 NY 83
6. Villenova Grange Hall, 1150 NY 83
7. Hamlet School District no. 2, School Street, east side at bend
8. Hamlet United Methodist Church, (NY 83) 1119 South Dayton-Hamlet Road
9. 1129 (NY 83) South Dayton-Hamlet Road
10. IOOF, 1129 (NY 83) South Dayton-Hamlet Road
11. Villenova Cemetery, Cemetery Road, east side, south of Villenova

6.0 Impacts

The study area is a five-mile radius extending from the perimeter edge of the Noble Ball Hill project site. In addition, the visual APE also includes the area within a three-mile distance around the proposed transmission line that extends outside of the five-mile APE (see Figure 1.1). This area includes sections of two counties: Cattaraugus and Chautauqua. The towns included within the project's five-mile visual APE primarily include portions of Dayton, Perrysburg and a small section of Leon in Cattaraugus County and Arkwright, Charlotte, Cherry Creek, Hanover, Villenova and Sheridan in Chautauqua County.

No structures or buildings will be demolished or physically altered in connection with the construction of the project. Access to the surrounding historical, recreational, and commercial land uses will not be impeded by the project.

Nevertheless, using a topography-based visual impact analysis (i.e., Zone of Visual Influence [ZVI] analysis) of the five-mile APE, the number of turbines that can be seen from National Register-eligible (NRE) properties spans the full range of values. The average number of turbines that can be seen from an NRE property is 29.1 with an average distance of 2.7 miles. The modal distance is three to four miles (Figure 6.1). While some of these properties are grouped together within municipalities—specifically in the villages of Silver Creek, Forestville, and South Dayton—and along roads or in associated complexes such as farmsteads, on the whole, the properties are found across the study area which typifies dispersed rural settlement and reflects the historic rural development of the region (see Table 6.1 at end of section). Because the visual impact analysis is topography based and does not include vegetative cover, it likely overestimates the number of visible turbines and the number of properties from which they can be seen. Turbine locations are illustrated on the large, fold-out maps included at the end of this report (Appendix A).

Based on the provided information, it is apparent that the windpark will change the visible landscape of the region and create a distinct visual aspect. The turbines will be unique and prominent visible features on the landscape in many locations where there are not or ever have been other types of vertical, manmade features. The Federal Aviation Administration (FAA)-required lighting on some of the turbines will also be visible from many locations. While there may be some screening afforded by mature trees, shrubbery and other plantings during the growing season, the prominent features of the turbines will be visible during periods of dormancy.

Within or immediately adjacent to the proposed windpark area there are electrical distribution lines, telephone poles, water towers, and other vertical, modern visual intrusions. Most of these modern intrusions, to a certain extent, may have compromised some historical settings. Existing modern visual intrusions are relatively small compared to the 122-meter high wind turbines.

The proposed windpark will be prominently sited in the southern portion of Hanover and the northern half of Villenova. The most significant visual impacts will be on open farming land (rural agricultural landscapes), and any of the following that have open/clear views of the wind farm: historic properties on ridges, cemeteries, historic properties within Hanover and Villenova, historic properties along major thoroughfares in the area, and at historic crossroads communities. The impacts to these resources vary with the surrounding topography, distance from the turbines, existing landscaping and vegetation, and surrounding land uses.

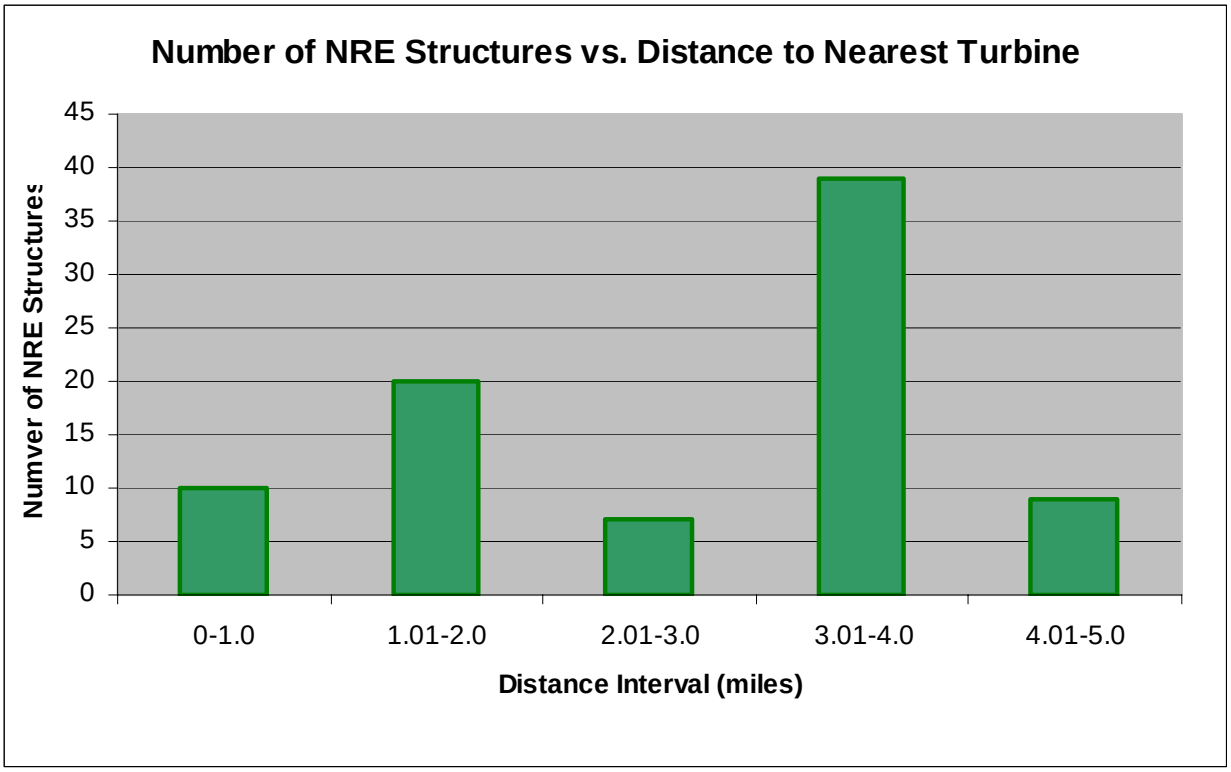

Figure 6.1. Bar graph indicating the numbers of NRE structures within distance intervals to the nearest proposed wind turbine.

Electrical lines connecting the turbines to each other and the existing substation will be carried on poles ranging from 55.5-75 feet (16.9 to 20.4 meters) tall, or placed underground, or installed along existing power line rights-or-way where possible. Since the collection lines are on average approximately 65 feet tall, some screening will be afforded by mature trees, shrubs and plantings for at least part of the year. The overhead line runs through a heavily forested area and over open fields in Hanover. In part, the utility poles will not extend above the natural canopy. NRE properties within the tree-mile visual APE of the proposed transmission line are listed in Table 6.2. The average distance from an NRE property to the proposed transmission line, within the three-mile radius, is 1.8 miles.

A review of the SPHINX database indicated that no National Register Listed (NRL) properties and eight previously determined NRE properties are in the positive visual five-mile APE. The five-mile visual APE is defined as the area from which the proposed undertaking may be visible (see Section 3.1). Properties within the five-mile APE are ordered according to distance in Appendix A.

Table 6.1. Properties within the Five-Mile APE of the Noble Ball Hill Windpark (bold and * are properties which fall within the transmission line visual APE).

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
1	33	4.69	T38		12182 Markhams Road	Cattaraugus	Dayton
2	54	3.85	T38	Erie RR Bridge over Cattaraugus Creek	Oaks Road, over Conewango Creek	Cattaraugus	Dayton
3	29	3.85	T55	Cottage Cemetery	Cottage Road, north side, west of Edwards Corners Road	Cattaraugus	Dayton
4	12	3.51	T55		12654 Cottage Road	Cattaraugus	Dayton
5	6	3.34	T38		27 Cherry Street	Cattaraugus	Dayton
6	46	3.65	T38	Factory Building	East Railroad Avenue, at south end.	Cattaraugus	Dayton
7	34	3.62	T38		73 East Railroad Avenue	Cattaraugus	Dayton
8	40	3.21	T38		62 Main Street	Cattaraugus	Dayton
9	17	3.34	T38		203 Maple Street	Cattaraugus	Dayton
10	9	3.25	T38		212 or 214 Maple Street	Cattaraugus	Dayton
11	28	3.63	T38	Harry Austin Milling Co.	Mill Street, between tracks, east side	Cattaraugus	Dayton
12	40	3.35	T38		227 Oak Street	Cattaraugus	Dayton
13	59	3.57	T38		8143 Oaks Road	Cattaraugus	Dayton
14	35	3.63	T38		107 Pine Street	Cattaraugus	Dayton
15	32	3.43	T38		309 Pine Street	Cattaraugus	Dayton
16	24	3.4	T38		312 Pine Street	Cattaraugus	Dayton
17	32	3.38	T38	Wilson House	319 Pine Street	Cattaraugus	Dayton
18	30	3.29	T38		413 Pine Street	Cattaraugus	Dayton
19	11	2.68	T61	Perrysburg Cemetery	NY 39, west of west Perrysburg road	Cattaraugus	Perrysburg
20	15	4.47	T61		12316 NY 39	Cattaraugus	Perrysburg
***21**	**57**	**3.45**	**T66**	**Rugg-town West Perrysburg Cemetery**	**West Perrysburg Road, west side, north of NY 39**	**Cattaraugus**	**Perrysburg**
22	15	3.43	T66		10929 West Perrysburg Road	Cattaraugus	Perrysburg
23	60	3.39	T1	Weaver Cemetery	Center Road, west side, north of weaver road	Chautauqua	Arkwright

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
24	7	4.34	T6		8129 Griswold Road	Chautauqua	Arkwright
25	49	2.78	T14	Rose Farm	1936 Ruttenbur Road	Chautauqua	Arkwright
26	33	3.14	T1		2667 NY 83	Chautauqua	Arkwright
27	49	1.66	T6	Wooley Farm Complex	8903 Farrington Hollow	Chautauqua	Arkwright
28	49	1.62	T6	Arkwright Summit Cemetery	Farrington Hollow Road, east side, south of NY 83	Chautauqua	Arkwright
29	50	1.56	T5	Maple-Camp Farm/Black Farm	2083 NY 83	Chautauqua	Arkwright
30	15	2.39	T66		10917 Alleghany Road	Chautauqua	Hanover
***31**	**54**	**5.27**	**T66**		**12168 Alleghany Road**	**Chautauqua**	**Hanover**
32	51	3.19	T66	Evergreen Cemetery	Angell Street, south side, east of Denison Road	Chautauqua	Hanover
33	4	3.19	T64	Forestville Depot	Center Street, NE corner Erie Street	Chautauqua	Hanover
***34**	**5**	**5.08**	**T66**	**Christy Road Cemetery**	**Christy Road, north side, east of Allegany Road**	**Chautauqua**	**Hanover**
35	38	0.84	T66		Hanover Road, West side, south of Hopper Road	Chautauqua	Hanover
36	40	0.72	T61	Livemore Homestead	10079 Hanover Road	Chautauqua	Hanover
37	20	1.3	T58	Hurlburt Road/Swift Cemetery	Hurlburt Road	Chautauqua	Hanover
38	11	1.35	T58		Hurlburt Road, south side, east of Prospect Road	Chautauqua	Hanover
39	42	0.58	T66		469 NY 39	Chautauqua	Hanover
40	28	0.43	T66		503 NY 39	Chautauqua	Hanover
41	60	0.21	T65		675 NY 39	Chautauqua	Hanover
42	31	2.07	T64		1411 NY 39	Chautauqua	Hanover
43	51	4.85	T65		11776 Old Forestville Road	Chautauqua	Hanover
44	18	3.27	T64	Pioneer Cemetery	Old Forestville Road, south of 11051	Chautauqua	Hanover
45	25	3.37	T64		11103 Old Forestville Road	Chautauqua	Hanover

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
***46**	**54**	**5.82**	**T65**	**Mt. Carmel Cemetery**	**Old Main Street**	**Chautauqua**	**Hanover**
***47**	**54**	**5.75**	**T65**	**Glenwood Cem**	**Old Main St**	**Chautauqua**	**Hanover**
***48**	**54**	**5.57**	**T65**		**11935 Old Main Street**	**Chautauqua**	**Hanover**
49	20	2.72	T67	Prospect Hill Cemetery	Prospect Street, east side, south of Forestville Village	Chautauqua	Hanover
50	56	4.74	T65	Doty Cemetery	Stebbins Road, South side, west of Old Forestville Rd.	Chautauqua	Hanover
51	31	2.85	T66	Ball Valley Farms	11037 Allegany Road	Chautauqua	Hanover
52	40	2.93	T66	Balltown Cemetery	Mackinaw Road, north side @ Allegany Road	Chautauqua	Hanover
53	52	4.78	T66		12010 Angel Road	Chautauqua	Hanover
54	52	4.86	T66		12021 Angel Road	Chautauqua	Hanover
55	51	4.61	T66	Golden Harvest	967 Hanover Road	Chautauqua	Hanover
56	51	4.74	T66		11991 Hanover Road	Chautauqua	Hanover
57	14	1.47	T61	Nashville Cemetery	Alleghany Road	Chautauqua	Hanover
58	27	1.5	T61	Church	NY 39, south side, west of Allegany Road	Chautauqua	Hanover
59	17	3.57	T66	Smith's Mill Cemetery	Hanover Road, West side at York Road	Chautauqua	Hanover
60	5	3.46	T67	Bridge over Walnut Creek	Bradigan Road, south of water street	Chautauqua	Hanover
61	13	3.31	T64		13 Cedar Street	Chautauqua	Hanover
62	2	3.19	T64		18 Center Street	Chautauqua	Hanover
63	6	3.22	T64		28 Center Street	Chautauqua	Hanover
64	2	3.21	T64		11-15 Main Street	Chautauqua	Hanover
65	8	3.31	T64		26 Main Street	Chautauqua	Hanover
66	7	3.25	T64		27 Main Street	Chautauqua	Hanover
67	13	3.43	T67	Forestville Free Methodist Church	32 Main Street	Chautauqua	Hanover
68	10	3.33	T64		43 Main Street	Chautauqua	Hanover

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
69	1	3.19	T64		2 Pearl Street	Chautauqua	Hanover
70	7	3.41	T67		9 Water Street	Chautauqua	Hanover
***71**	**3**	**7.35**	**T65**	**Clark Mansion on Lighthouse Point**	**Beachview Avenue, facing the lake**	**Chautauqua**	**Hanover**
***72**	**4**	**7.2**	**T65**		**10 Beachview Avenue**	**Chautauqua**	**Hanover**
***73**	**3**	**7.01**	**T65**		**130 Central Avenue**	**Chautauqua**	**Hanover**
***74**	**33**	**6.94**	**T65**		**147 Central Avenue**	**Chautauqua**	**Hanover**
***75**	**55**	**6.92**	**T65**		**151 Central Avenue**	**Chautauqua**	**Hanover**
***76**	**35**	**6.86**	**T65**	**Our Lady of Carmel**	**165 Central Avenue**	**Chautauqua**	**Hanover**
***77**	**56**	**6.61**	**T65**		**338 Central Avenue**	**Chautauqua**	**Hanover**
***78**	**56**	**6.65**	**T65**		**350 Central Avenue**	**Chautauqua**	**Hanover**
***79**	**56**	**6.53**	**T65**		**5 Christy Street**	**Chautauqua**	**Hanover**
***80**	**56**	**6.51**	**T65**		**9 Christy Street**	**Chautauqua**	**Hanover**
***81**	**22**	**6.66**	**T65**		**4 Dana Drive**	**Chautauqua**	**Hanover**
***82**	**55**	**6.39**	**T65**		**12370 Hanover Road**	**Chautauqua**	**Hanover**
***83**	**57**	**6.8**	**T65**		**16 Hanover Road**	**Chautauqua**	**Hanover**
***84**	**37**	**6.96**	**T66**		**Howard Street, SW side of Buffalo Street**	**Chautauqua**	**Hanover**
***85**	**1**	**7.06**	**T65**	**Skew Arch Bridge**	**Jackson Street, Over Jackson Street**	**Chautauqua**	**Hanover**
***86**	**55**	**7.03**	**T65**	**Nickel Plate Bridge over Jackson Street**	**Jackson Street, Over Jackson Street**	**Chautauqua**	**Hanover**
***87**	**50**	**7.07**	**T65**	**Hanover Bridge**	**Lake Avenue, Between Lake @ Jackson.**	**Chautauqua**	**Hanover**
***88**	**30**	**7.08**	**T65**	**Stone Bridge**	**Lake Avenue, Over Lake Avenue**	**Chautauqua**	**Hanover**
***89**	**50**	**7.05**	**T65**	**Nickel Plate Bridge over Lake Avenue**	**Lake Avenue, Over Lake Avenue**	**Chautauqua**	**Hanover**

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
*90	52	6.94	T65		6/8 Lake Avenue	Chautauqua	Hanover
*91	23	6.88	T65	St. Albans	38 Lake Avenue	Chautauqua	Hanover
*92	44	6.7	T65		18 Oak Street	Chautauqua	Hanover
*93	56	6.77	T65		30 Oak Street	Chautauqua	Hanover
*94	9	6.41	T65		117 Old Main Street	Chautauqua	Hanover
*95	52	6.31	T65		151 Old Main Street	Chautauqua	Hanover
*96	55	6.3	T65		155 Old Main Street	Chautauqua	Hanover
*97	24	6.75	T65		1 Oliver Place	Chautauqua	Hanover
*98	15	6.74	T65		5 Oliver Place	Chautauqua	Hanover
*99	40	6.84	T65	Swift House	6 Parkway Street	Chautauqua	Hanover
*100	43	6.84	T65		9 Parkway Street	Chautauqua	Hanover
*101	44	6.81	T65		17 Parkway Street	Chautauqua	Hanover
*102	35	6.77	T65	Erbin House	27 Parkway Street	Chautauqua	Hanover
*103	57	6.93	T65	Trinity Lutheran Church	Porter Avenue, NE side @ Adams Porter Avenue	Chautauqua	Hanover
*104	57	6.95	T65		Porter Avenue, south of 21	Chautauqua	Hanover
*105	57	6.96	T65		21 Porter Avenue	Chautauqua	Hanover
*106	55	6.31	T65		45 Robinson Street	Chautauqua	Hanover
*107	57	7.02	T65		16 Rumsey Street	Chautauqua	Hanover
*108	55	6.54	T65		28 Ward Place	Chautauqua	Hanover
*109	57	6.59	T65		1873 East Middle Road	Chautauqua	Sheridan
*110	48	4.71	T64		1980 King Road	Chautauqua	Hanover
*111	43	5.5	T64		2023 Stebbins Road	Chautauqua	Sheridan
*112	48	5.77	T64		2248 Stebbins Road	Chautauqua	Sheridan
113	38	1.12	T55	Wheeler Cemetery	Hanover Road, East side	Chautauqua	Villenova

Map Point	Num. of Turbines Visible	Distance to Nearest Turbine (miles)	Nearest Turbine	Property Name	Address	County	Town
114	38	0.28	T21	School No. 10	9129 North Hill Road	Chautauqua	Villenova
115	3	0.72	T17		NY 83, South side, west of Hamlet	Chautauqua	Villenova
116	49	3.17	T38		8025 NY 83	Chautauqua	Villenova
117	49	3.08	T38		8052 NY 83	Chautauqua	Villenova
118	41	1.63	T38		8562 NY 83	Chautauqua	Villenova
119	44	1.71	T38		307 Philips Road	Chautauqua	Villenova
120	52	0.95	T22	Pope Hill Cemetery	Pope Hill Road, South side, east of Round Top Road	Chautauqua	Villenova
121	42	0.26	T29	Forestville Wesleyan Church/School/Ball Hill Cem	9495 Prospect Road	Chautauqua	Villenova
122	39	1.7	T38		641 South Dayton Road	Chautauqua	Villenova
123	40	1.71	T38		691 South Dayton Road	Chautauqua	Villenova
124	41	1.7	T38	Dye Homestead	558 South Dayton-Hamlet Road	Chautauqua	Villenova
125	4	0.82	T17	Hamlet Cemetery	NY 83, South side, west of Hamlet	Chautauqua	Villenova
126	16	1.07	T17		1141 NY 83	Chautauqua	Villenova
127	15	1.06	T17	Villenova Grange	NY 83, West side	Chautauqua	Villenova
128	9	1.07	T17	Hamlet School District No. 2	School Street, East side at bend.	Chautauqua	Villenova
129	18	1.12	T17	Hamlet United Methodist Church	1119 South Dayton Road	Chautauqua	Villenova
130	18	1.11	T17		1129 South Dayton Road	Chautauqua	Villenova
131	16	1.08	T17	IOOF	South Dayton Road, north side, east of South Hill Road	Chautauqua	Villenova
132	31	1.29	T38	Villenova Cemetery	Cemetery Road, East side.	Chautauqua	Villenova

Table 6.2. Properties within the Three-Mile APE of the Noble Ball Hill Transmission Line.

Map Point	Distance to transmission line (miles)	Property Name	Address	County	Town
21	4.71	Rugg-town West Perrysburg Cemetery	West Perrysburg Road, west side, north of NY 39	Cattaraugus	Perrysburg
31	2.72		12168 Alleghany Road	Chautauqua	Hanover
32	1.03	Evergreen Cemetery	Angell Street, south side, east of Denison Road	Chautauqua	Hanover
33	1.12	Forestville Depot	Center Street, NE corner Erie Street	Chautauqua	Hanover
37	0.76	Hurlburt Road/Swift Cemetery	Hurlburt Road	Chautauqua	Hanover
38	0.83		Hurlburt Road, south side, east of Prospect Road	Chautauqua	Hanover
39	1.82		469 NY 39	Chautauqua	Hanover
41	0.95		675 NY 39	Chautauqua	Hanover
42	0.34		1411 NY 39	Chautauqua	Hanover
43	0.42		11776 Old Forestville Road	Chautauqua	Hanover
44	0.96	Pioneer Cemetery	Old Forestville Road, south of 11051	Chautauqua	Hanover
45	0.71		11103 Old Forestville Road	Chautauqua	Hanover
47	1.24	Glenwood Cemetery	Old Main Street	Chautauqua	Hanover
48	1.05		11935 Old Main Street	Chautauqua	Hanover
49	1.09	Prospect Hill Cemetery	Prospect Street, east side, south of Forestville Village	Chautauqua	Hanover
50	0.25	Doty Cemetery	Stebbins Road, South side, west of Old Forestville Rd.	Chautauqua	Hanover
53	1.58		12010 Angel Road	Chautauqua	Hanover
54	1.68		12021 Angel Road	Chautauqua	Hanover
55	1.2	Golden Harvest	967 Hanover Road	Chautauqua	Hanover
56	1.21		11991 Hanover Road	Chautauqua	Hanover
60	1.84	Bridge over Walnut Creek	Bradigan Road, south of water street	Chautauqua	Hanover
61	1.39		13 Cedar Street	Chautauqua	Hanover
62	1.25		18 Center Street	Chautauqua	Hanover
63	1.39		28 Center Street	Chautauqua	Hanover
64	1.52		11-15 Main Street	Chautauqua	Hanover
65	1.44		26 Main Street	Chautauqua	Hanover
66	1.64		27 Main Street	Chautauqua	Hanover
67	1.53	Forestville Free Methodist Church	32 Main Street	Chautauqua	Hanover

Map Point	Distance to transmission line (miles)	Property Name	Address	County	Town
68	1.36		43 Main Street	Chautauqua	Hanover
69	1.68		2 Pearl Street	Chautauqua	Hanover
70	2.51		9 Water Street	Chautauqua	Hanover
74	2.5		147 Central Avenue	Chautauqua	Hanover
75	2.38		151 Central Avenue	Chautauqua	Hanover
77	2.44		338 Central Avenue	Chautauqua	Hanover
78	2.26		350 Central Avenue	Chautauqua	Hanover
79	2.24		5 Christy Street	Chautauqua	Hanover
80	2.27		9 Christy Street	Chautauqua	Hanover
82	2.55		12370 Hanover Road	Chautauqua	Hanover
83	2.61		16 Hanover Road	Chautauqua	Hanover
86	2.68	Nickel Plate Bridge over Jackson Street	Jackson Street, Over Jackson Street	Chautauqua	Hanover
89	2.4	Nickel Plate Bridge over Lake Avenue	Lake Avenue, Over Lake Avenue	Chautauqua	Hanover
92	2.46		18 Oak Street	Chautauqua	Hanover
93	1.83		30 Oak Street	Chautauqua	Hanover
95	1.81		151 Old Main Street	Chautauqua	Hanover
96	2.41		155 Old Main Street	Chautauqua	Hanover
100	2.62		9 Parkway Street	Chautauqua	Hanover
103	2.64	Trinity Lutheran Church	Porter Avenue, NE side @ Adams Porter Avenue	Chautauqua	Hanover
104	2.65		Porter Avenue, south of 21	Chautauqua	Hanover
105	2.68		21 Porter Avenue	Chautauqua	Hanover
107	2.07		16 Rumsey Street	Chautauqua	Hanover
110	2.08		1980 King Road	Chautauqua	Hanover
112	1.96		2248 Stebbins Road	Chautauqua	Sheridan
113	2.5	Wheeler Cemetery	Hanover Road, East side	Chautauqua	Villenova

7.0 Mitigation

There are 146 properties located within the study area in Cattaraugus and Chautauqua counties that are eligible or potentially eligible for listing in the National Register of Historic Places (NRHP). Of the 146, there are eight properties that NYSHPO has previously determined to be NRE and none are listed on the NRHP. The number of turbines that can be seen from NRE properties spans the full range of values. The average number of turbines that can be seen is 29.1 with an average distance of 2.7 miles. The average distance from an NRE property to the proposed transmission line, within the three-mile radius, is 1.8 miles. While some of these properties are grouped together within villages or hamlets, along roads or in associated complexes such as farmsteads, on the whole, the properties are widely dispersed across the area. As noted in Section 6.0, the impacts to these resources vary with the surrounding topography, distance from the turbines and electrical lines, existing landscaping and vegetation, and surrounding land uses.

Some screening will be afforded by mature trees, shrubs and plantings for at least part of the year. This observation is especially true for buildings/structures in the areas surrounding streams and steep embankments. The topography of some portions of the five-mile visual APE will provide additional screening. Nevertheless, there are visual impacts to the area associated with the construction of the Ball Hill Windpark that will require mitigation.

Noble is obligated to mitigate adverse visual effects to NRE and NRL properties under Section 106 of the National Historic Preservation Act as well as to mitigate significant visual impacts under Article 8 of the New York State Environmental Conservation Law (ECL) and 6NYCRR Part 617 as delineated in the New York State Department of Environmental Conservation's (NYSDEC) *Assessing and Mitigating Visual Impacts* (2000). In the case of the Ball Hill Windpark, both Section 106 and NYSDEC mitigation were triggered by the same occurrence: the inclusion of NRE or potentially NRE properties within the project visual APE. NYSDEC lists specific mitigation strategies, while Section 106 does not; the two are not mutually exclusive, however, and strategies for each can have common characteristics.

The mitigation of visual effects to these properties presents an opportunity for a number of alternative mitigative strategies. The usual mitigative approaches can be applied; however, broader alternative strategies can encourage local community input and assist those communities through the undertaking of "hometown" cultural resource projects that are commonly in need of financial and professional assistance. The mitigative strategies below are grouped into several categories. These categories overlap; and some of the categories include the more traditional mitigative alternatives.

PROJECT CRITERIA

Noble proposes the following working criteria for any proposed "historical mitigation" project or activity. These criteria provide that the subject of any such project should:

1. Be consistent with the guidance of NYSHPO
2. Have historical significance
3. Serve a public historic purpose
4. Be a good investment
5. Be appropriate to the state of preservation of local historical resources

PROFESSIONAL DESIGN AND SITING

NYSDEC considers a properly designed and sited project the best way to mitigate potential impacts. The Noble Ball Hill Windpark is designed to mitigate the visual impact of the turbines where practical. The color of the towers is a non-specular neutral white or off-white so the towers will blend into a white sky. The turbines are laid out in a random, natural pattern so that the flow of the landscape is not interrupted. FAA lighting is not required on every turbine. Permanent access roads are only 12 feet (3.6 m) wide and temporary access roads are only 32 feet (9.7 m) wide.

Electrical lines connecting the turbines to each other and the existing substation will be carried on poles ranging from 55.5-75 feet (16.9 to 20.4 meters) tall, or placed underground, or installed along existing power line rights-or-way where possible. Since the collection lines are on average approximately 65 feet tall, some screening will be afforded by mature trees, shrubs and plantings for at least part of the year. The overhead line runs through a heavily forested area and over open fields in Hanover. In part, the utility poles will not extend above the natural canopy.

MAINTENANCE

NYSDEC considers the maintenance of buildings/structures and landscapes and the decommissioning of objects or buildings/structures as part of a mitigation strategy. Proper maintenance prevents “eyesores” and is an integral part of Noble’s plan for the Ball Hill Windpark.

Local laws require a decommissioning plan to be put into place to remove obsolete and unused turbines. The plan will include cost estimates for the removal of towers and the reclamation of the areas including concrete foundations, access roads, seeding and re-vegetation and salvage of various materials.

SURVEYS

The completion of various types of surveys is a more traditional form of Section 106 mitigation; nevertheless it can also be used as a type of “offset” as described by NYSDEC. An “offset” is the correction of an existing aesthetic problem identified within a Zone Visual Influence (ZVI) as compensation for project impacts. Elements of these surveys can include:

- GIS mapping of the county’s cultural resources within the affected area
- Complete a detailed architectural survey of Chautauqua County
- Conduct surveys identifying specific architectural styles and types of buildings, structures and landscapes within the counties, towns, villages and hamlets affected by the project
- Listing NRE resources
- Sites/buildings/structures/objects/districts/landscapes that have been identified as NRE, but never listed within the area affected by the project
- Completing formal recordation documents (e.g., Historic American Buildings Survey [HABS], Historic American Engineering Record [HAER], Historic American Landscape Survey [HALS]) for the power houses/dams as well as sites, buildings, structures, landscapes that have been identified but never completed within the APE.

MONETARY CONTRIBUTIONS

The creation of a pool of funds overseen by a third party is a less traditional, but effective way of offsetting project impacts.

- Establish a monetary fund, with NYSHPO oversight, to initiate an historic landscape preservation program to support the preservation of historic landscapes in New York State. The introduction of such a program would offer technical assistance to municipalities and not-for-profit organizations to increase awareness of historic landscapes in New York State.
- Establish a cemetery maintenance program that can disburse funds to maintain the many small historic cemeteries in the area.
- Provide funds towards the construction of a "Historic Center" for storage and display of historic material. The location can be determined upon consultation with the county and affected towns.
- Donations to libraries in the affected area for purchase of local and Chautauqua County material.
- Create an Historic Property Visual Mitigation Grant Fund for use by the owners of historic structures affected by the project. Funds from grants would be used to purchase onsite screening or make repairs to affected historic structures. The details of oversight, submission protocols, and eligibility will be negotiated with the NYSHPO.

HERITAGE TOURISM

The creation of Heritage Tourism materials has become an important part of municipalities, regions, and states promotional activities. These materials can be easily used by many individuals and widely distributed. Most of the activities listed below fall within the traditional Section 106 mitigation sphere, and all can be used as offset.

- 10-Minute Video Presentation. A video presentation can be used in schools, for presentations to civic groups, and on public access television.
- Brochure. A brochure highlighting historic architecture can be distributed at public libraries, visitor's centers, etc., within the affected area.
- Posters. Posters can be produced highlighting the area and its history.
- Driving/Walking tours. Tours can be conducted out of the public library, visitor's centers, etc., within the affected area.
- Exhibit. Exhibits focusing on history and architecture can be set up in libraries, visitor's centers, town halls, etc., within the affected area.
- Power-Point Presentation. This can be used in schools, for presentations to civic groups within the affected area

EDUCATIONAL ACTIVITIES

Educational activities have a broad appeal and can target a wide age group. Activities for school-age groups can help raise awareness of cultural resources within the community at an early age and engender excitement within the school system. Educational activities of various

types are traditional Section 106 mitigation options; however, the creation of a graphic novel is a twist on this traditional use. The items below are also excellent offset activities.

- Grade Appropriate Lesson Plans. Packages can include teacher information, student activities, and possible field trips, long- and short-term class projects centered on the affected area and distributed via Internet.
- Graphic Novel (comic book) about the history of the area.
- Host Public History Day. A special event can be staged in conjunction with schools and chambers of commerce within the affected area

HISTORY ACTIVITIES

Activities related to historic resources are the most traditional of Section 106 mitigation strategies. Nevertheless, they can be useful and an important offset activity.

- Popular Written History of the County. Produce a history highlighting specific county contributions to state and country, addressing the towns, villages and hamlets within the affected area.
- Historic Brochure and/or series of brochures addressing various aspects of the county's, town's, village's and hamlet's history within the affected area.
- Oral History Project.
- Placing Historic Markers.
- Creation of Context/s. Produce historical/architectural histories and contexts specific to the area, particularly a regional farming context.

Local community input is vital to the success of any mitigation strategy. Local historians, town officials, and agencies will be contacted by Noble to begin the process of determining community needs. NYSHPO staff will also play a major role in this process. This investigation of probable community needs is preliminary at best and in no way represents a final accounting of those needs.

8.0 Annotated List of NRE Properties

Approximately 146 primary buildings (i.e., principal structures) and other historic resources (e.g., cemeteries, bridges) were documented during this architectural survey. Of these properties, 132 recommended National Register-eligible (NRE) properties are presented in the Annotated List of Properties that follows; the remaining 14 properties were documented as part of the proposed Ewing Park Historic District (Section 10.4). Other structures or objects of interest are represented, but outbuildings associated with farm or residential properties are not included in the total number of surveyed properties.

For the purpose of clarity and organization of data, the annotated list is arranged in sequential alpha-numerical order by county, town, village or hamlet, and street address. The table includes three columns: 1) a thumbnail-sized photograph of each resource; 2) name, location, date, alterations, map point number, and 3) description. If applicable, the second column also includes S/NRHP[1] eligibility status. The third column lists relevant Unique Site Numbers (USN) on file in the SPHINX database. Dates are presented as *circa,* based on exterior stylistic details and historic materials. A margin of error of approximately ten years should be assumed when "circa" is applied. Providing an accurate and precise time of construction of barns and farm buildings is usually difficult, especially when limited to a reconnaissance survey. Often, in rural settings, many dates are approximations based on physical evidence and the general historic context rather than on documented historical information.

Locations of the listed properties are keyed by map point on the project maps presented in at the end of the report. The maps also show the locations of the turbines and transmission line and the area from which no turbines are visible. The map points showing structure locations are also color-keyed to indicate the number of turbines visible from each.

A compact disc (CD) with full resolution images of each property photographed in the annotated list accompanies this report to supplement NYSHPO review. Geographic Information System (GIS) project data will be submitted to NYSHPO for their agency database (to be submitted after NYSHPO review of the five-mile APE survey report).

[1] No Det. = No Determination on file; U = Undetermined status; NRE (I) = Individual NRE property on file; NRL = National Register Listed; NHL = National Historic Landmark

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Cattaraugus County
Town: Dayton

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 1	12182 Markhams Road Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086
 Photo Number: 2	12182 Markhams Road (cont'd) Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086
 Photo Number: 3	**(cont'd)** 12182 Markhams Road Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	Style: Italianate Stories: Two Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Not visible Sash: New **Details:** Previously inventoried-det. NRE; USN:00906.000086

Cattaraugus County
Town: Dayton

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 4	**(cont'd)** 12182 Markhams Road Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086
 Photo Number: 5	12182 Markhams Road (cont'd) Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086
 Photo Number: 6	12182 Markhams Road (cont'd) Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086

Cattaraugus County
Town: Dayton

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 7	12182 Markhams Road (cont'd) Town: Dayton MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 1 **Recommend: NRE(I)**	**Details:** Previously inventoried-det. NRE; USN:00906.000086
 Photo Number: 8	**Erie RR Bridge over Conewango Creek** Oaks Road, Over Conewango Creek Town: Dayton MCD: 00906 Cattaraugus County Map Point: 2 **Recommend: Possibly eligible**	**Details:** Concrete deck girder bridge over Conewango Creek.
 Photo Number: 9	**Erie RR Bridge over Conewango Creek (cont'd)** Oaks Road, Over Conewango Creek Town: Dayton MCD: 00906 Cattaraugus County Map Point: 2 **Recommend: Possibly eligible**	**Details:**

Cattaraugus County
Town: Dayton
Cottage (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 10	**Cottage Cemetery** Cottage Road, north side, west of Edwards Corners Road Town: Dayton Cottage (h) MCD: 00906 Cattaraugus County Map Point: 3 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 11	12654 Cottage Road Town: Dayton Cottage (h) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 4 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Rectangular with side ell Roof: Side gable Ext. Siding: Clapboard Foundation: Fieldstone Sash: Two-over-two **Details:** A largely-intact example of a Vernacular residential dwelling located in the Hamlet of Cottage. The building features; symmetrical massing, two-over-two sash, pedimented windowhoods, cornice along roofline and Craftsman era full width enclosed porch clad in wood shingle.
 Photo Number: 12	12654 Cottage Road (cont'd) Town: Dayton Cottage (h) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 4 **Recommend: Possibly eligible**	**Details:** East façade.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 13	27 Cherry Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1930 Map Point: 5 **Recommend: Possibly eligible**	Style: Tudor Revival Stories: One-and-a-half Plan: Irregular Roof: Cross gable Ext. Siding: Brick veneer Foundation: Brick Sash: Other **Details:** A highly-intact example of a Tudor Revival residential dwelling with Colonial Revival detailing. The building includes; asymmetrical massing, single dominate front gable, end chimney, three-over-one windows, and arched integral porch. There is a later two car garage located behind the structure.
 Photo Number: 14	27 Cherry Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1930 Map Point: 5 **Recommend: Possibly eligible**	**Details:** East façade.
 Photo Number: 15	**Factory Building** East Railroad Avenue, at south end Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca 1930 Map Point: 6 **Recommend: Possibly eligible**	Style: No style Stories: Two Plan: Irregular Roof: Flat Ext. Siding: Brick Foundation: Concrete slab Sash: Other **Details:** Factory along the Erie Railroad. The building is a large two story building executed in brick with steel sash windows.

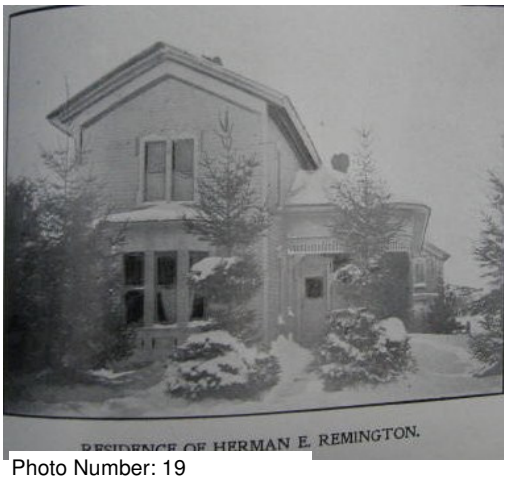
Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 16	**Factory Building (cont'd)** East Railroad Avenue, at south end Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca 1930 Map Point: 6 **Recommend: Possibly eligible**	**Details:** View from the railroad tracks.
 Photo Number: 17	73 East Railroad Avenue Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1870 Map Point: 7 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: One-over-one **Details:** A highly-intact Queen Anne residential dwelling executed in frame. The building features, asymmetrical massing, gabled main bay with polygonal bay, side wing with excellent wrap around porch. The home was once owned by prominent South Dayton businessman Herman Remington (Shults 1901).
 Photo Number: 18	73 East Railroad Avenue (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1870 Map Point: 7 **Recommend: Possibly eligible**	**Details:** Porch detail.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 19	73 East Railroad Avenue (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1870 Map Point: 7 **Recommend: Possibly eligible**	**Details:** Historic Photo (Shults 1901).
 Photo Number: 20	62 Main Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 8 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Square with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A good example of a frame Italianate building. Stylistic elements include; square main block under hipped roof, side wing, four-over-four windows on the first story and two-over-four windows on the second floor, arch window w/ hoods, and double bracketing along the eaves.
 Photo Number: 21	62 Main Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 8 **Recommend: Possibly eligible**	**Details:**

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 22	62 Main Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 8 **Recommend: Possibly eligible**	**Details:** Detail of bracketing.
 Photo Number: 23	62 Main Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 8 **Recommend: Possibly eligible**	**Details:** Detail of porch. It is clad in flushboard.
 Photo Number: 24	203 Maple Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1890 Alterations: New windows. Map Point: 9 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Cross gable Ext. Siding: Clapboard Foundation: Parged Sash: New **Details:** A largely-intact example of a Queen Anne building executed in frame. Stylistic elements include; asymmetrical massing, wraparound porch with turned post spindles, clapboard and shingle exterior, window detail, polygonal bays, and original entry door.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 25	212 or 214 Maple Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1910 Alterations: built up roof, porch removed Map Point: 10 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Side gable Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: One-over-one **Details:** An interesting example of a rusticated block building located in a residential neighborhood of South Dayton. The building features; symmetrical massing, one-over-one windows with cast sills and lintels.
 Photo Number: 26	**Harry Austin Milling Co.** Mill Street, west side, north of Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1883 Map Point: 11 **Recommend: Possibly eligible**	Style: Other Stories: One Plan: Other Roof: Side gable Ext. Siding: Clapboard Foundation: Concrete slab Sash: Other **Details:** Large mill complex along Erie Railroad tracks. The mill, now expanded, has remained in its current location since 1883. It was home to Hurd and Dye Feed Mill (Sanborn 1913, 1924). By 1941 it was Harry Austin Milling Company (Sanborn 1941).
 Photo Number: 27	**Harry Austin Milling Co. (cont'd)** Mill Street, west side, north of Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1883 Map Point: 11 **Recommend: Possibly eligible**	**Details:** A small side gable building, most likely one of the oldest buildings in the complex.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 28	**Harry Austin Milling Co. (cont'd)** Mill Street, west side, north of Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1883 Map Point: 11 **Recommend: Possibly eligible**	**Details:** Silos.
 Photo Number: 29	**Harry Austin Milling Co. (cont'd)** Mill Street, west side, north of Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1875 Map Point: 11 **Recommend: Possibly eligible**	**Details:** Storage barn.
 Photo Number: 30	227 Oak Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Alterations: Rear addition Map Point: 12 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: Two-over-two **Details:** A highly-intact transitional Greek Revival to Italianate structure. The building features a gable front and wing configuration, paired windows with pointed arch lintels, entry doors on main gable and wing, simple cornice, overhanging eaves and a early 20th century classically designed porch.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 31	227 Oak Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1860 Map Point: 12 **Recommend: Possibly eligible**	**Details:** East façade.
 Photo Number: 32	8143 Oaks Road Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Alterations: New windows Map Point: 13 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two Plan: Irregular Roof: Gable Ext. Siding: Concrete block Foundation: Rusticated concrete block Sash: New **Details:** A highly-intact rusticated concrete block Sears farmhouse set along Conewango Creek, surrounded by cultivated fields. Stylistic elements include; symmetrical massing and full width porch supported by Ionic columns. The house was built in 1920 by relatives of the current owner. The concrete was cast using sand from the creek.
 Photo Number: 33	8143 Oaks Road (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Map Point: 13 **Recommend: Possibly eligible**	**Details:** North façade.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 34	8143 Oaks Road (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Map Point: 13 **Recommend: Possibly eligible**	**Details:** Barn complex located across from the farmhouse. The earliest barn dates from 1900 and has several modern additions.
 Photo Number: 35	8143 Oaks Road (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Map Point: 13 **Recommend: Possibly eligible**	**Details:** Truss bride over creek located to the rear of the house was salvaged from construction work along NY 62.
 Photo Number: 36	107 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1870 Map Point: 14 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A largely-intact Vernacular structure located along the Erie Railroad tracks. The house was possibly used as a hotel or boarding house.

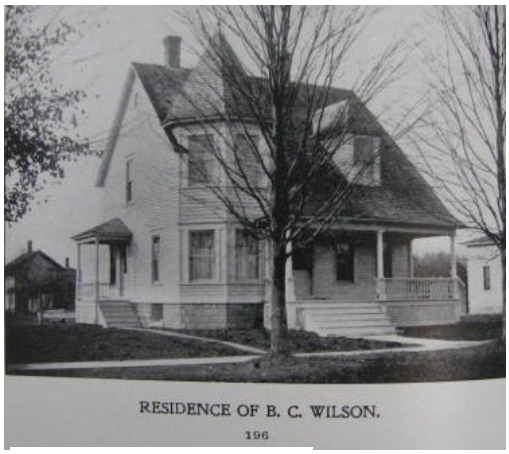
Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 37	107 Pine Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1870 Map Point: 14 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 38	309 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1910 Map Point: 15 **Recommend: Possibly eligible**	Style: Craftsman Stories: Two Plan: Rectangular with rear ell Roof: Mansard Ext. Siding: Brick veneer Foundation: Rusticated concrete block Sash: New **Details:** A interesting example of a Craftsman structure located along Pine Street in the Village of South Dayton. The building features Craftsman styling, full width porch and RCB foundation. It is topped by an unusual mansard roof with hipped roof dormers.
 Photo Number: 39	312 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1900 Map Point: 16 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Rectangular Roof: Gable-on-hip Ext. Siding: Brick Foundation: Rusticated concrete block Sash: New **Details:** A largely-intact exampled of a Queen Anne brick structure. Stylistic elements include; asymmetrical massing, full width porch, stone sills and lintels and gable on hip roof.

Cattaraugus County
Town: Dayton
South Dayton (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 40	**Wilson House** 319 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1890 Alterations: New windows and porch supports. Map Point: 17 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Side gable Ext. Siding: Weatherboard Foundation: Rusticated concrete block Sash: One-over-one **Details:** A fairly-intact example of a Queen Anne cottage. Stylistic elements include; asymmetrical massing, corner tower, steeply sloped main roof, integral porch, hipped roof dormer and central chimney. To the rear of the property is a house barn.
 Photo Number: 41	**Wilson House (cont'd)** 319 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1890 Map Point: 17 **Recommend: Possibly eligible**	**Details:** Historic Photo (Shults 1901).
 Photo Number: 42	413 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Alterations: Windows filled in, stucco sides. Map Point: 18 **Recommend: Possibly eligible**	Style: Other Stories: One Plan: Rectangular Roof: False-front Ext. Siding: Brick Foundation: Concrete slab Sash: Other **Details:** A largely-intact commercial building. Stylistic elements include, brick face, parapet, steel sash windows along the north and south facades.

Cattaraugus County
Town: Perrysburg

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 43	**Perrysburg Cemetery** NY 39, south side, west of West Perrysburg Road Town: Perrysburg MCD: 00951 Cattaraugus County Map Point: 19 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 44	12316 NY 39 Town: Perrysburg MCD: 00951 Cattaraugus County Date: ca 1860 Alterations: Rear addition, porch removed, modern door. Map Point: 20 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Limestone Sash: Other **Details:** A fairly-intact transitional Greek Revival to Italianate frame structure. Stylistic elements include; L-shape configuration, pedimented windowhoods, some six-over-six, four-over-four and two-over-two windows.
 Photo Number: 45	12316 NY 39 (cont'd) Town: Perrysburg MCD: 00951 Cattaraugus County Date: ca 1860 Map Point: 20 **Recommend: Possibly eligible**	**Details:** The building maintains some of its historic storm shutters.

Cattaraugus County
Town: Perrysburg
West Perrysburg (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 46	**Rugg-town West Perrysburg Cemetery** West Perrysburg Road, west side, north of NY 39 Town: Perrysburg West Perrysburg (h) MCD: 00951 Cattaraugus County Map Point: 21 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 47	10929 West Perrysburg Road Town: Perrysburg West Perrysburg (h) MCD: 00951 Cattaraugus County Date: ca. 1939 Map Point: 22 **Recommend: Possibly eligible**	**Details:** Farm complex with vineyard to west.
 Photo Number: 48	**(cont'd)** 10929 West Perrysburg Road Town: Perrysburg West Perrysburg (h) MCD: 00951 Cattaraugus County Date: ca. 1939 Map Point: 22 **Recommend: Possibly eligible**	Style: Dutch Colonial Revival Stories: One-and-a-half Plan: Rectangular with side ell Roof: Gambrel Ext. Siding: Weatherboard Foundation: Poured concrete Sash: Other **Details:** A largely-intact Dutch Colonial Revival dwelling executed in frame. Stylistic elements include; symmetrical fenestration, six-over-one wooden sash, pedimented entry, shed roof dormer, and exposed rafter tails.

Cattaraugus County
Town: Perrysburg
West Perrysburg (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 49	10929 West Perrysburg Road (cont'd) Town: Perrysburg West Perrysburg (h) MCD: 00951 Cattaraugus County Date: ca. 1939 Map Point: 22 **Recommend: Possibly eligible**	**Details:** North elevation.
 Photo Number: 50	10929 West Perrysburg Road (cont'd) Town: Perrysburg West Perrysburg (h) MCD: 00951 Cattaraugus County Date: ca. 1939 Map Point: 22 **Recommend: Possibly eligible**	**Details:** Period garage south of the farmhouse.
 Photo Number: 51	**Weaver Cemetery** Center Road, west side, north of Weaver Road Town: Arkwright MCD: 01301 Chautauqua County Map Point: 23 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Arkwright

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 52	8129 Griswold Road Town: Arkwright MCD: 01301 Chautauqua County Date: 1847 Map Point: 24 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Irregular Roof: Gable front Ext. Siding: Wood shingle Foundation: Not visible Sash: One-over-one **Details:** A largely-intact unusual example of a butterfly subtype with recessed entry Greek Revival farmhouse. Stylistic elements include; symmetrical massing, symmetrical fenestration, recessed entry, and cornice returns.
 Photo Number: 53	8129 Griswold Road (cont'd) Town: Arkwright MCD: 01301 Chautauqua County Date: 1847 Map Point: 24 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 54	8129 Griswold Road (cont'd) Town: Arkwright MCD: 01301 Chautauqua County Date: 1847 Map Point: 24 **Recommend: Possibly eligible**	**Details:** Side gable barn located across the road from farmhouse.

Chautauqua County
Town: Arkwright

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 55	**Rose Farm** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	**Details:** Active farm complex located on Ruttenbur Road.
 Photo Number: 56	**Rose Farm (cont'd)** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 57	**Rose Farm (cont'd)** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Irregular Roof: Hipped Ext. Siding: Asphalt Foundation: Not visible Sash: Two-over-two **Details:** A fairly-intact Vernacular farmhouse. The farmhouse has a low hipped roof, enclosed front porch and two gabled wings.

Chautauqua County
Town: Arkwright

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 58	**Rose Farm (cont'd)** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	**Details:** Side gambrel roof barn with milk house.
 Photo Number: 59	**Rose Farm (cont'd)** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	**Details:** Two side gable barns connected by a hyphen.
 Photo Number: 60	**Rose Farm (cont'd)** 1936 Ruttenbur Road Town: Arkwright MCD: 01301 Chautauqua County Date: ca 1870 Map Point: 25 **Recommend: Possibly eligible**	**Details:** Gable front garage.

Chautauqua County
Town: Arkwright
Arkwright (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 61	2667 NY 83 Town: Arkwright Arkwright (h) MCD: 01301 Chautauqua County Date: ca. 1915 Map Point: 26 **Recommend: Possibly eligible**	Style: Craftsman Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Clapboard Foundation: Concrete block Sash: One-over-one **Details:** An unusual building type located along NY 83 in the Town of Villenova. The structure features; 6 bays by 3 bays, clapboard on the first story, wood shingles on the second, entrances on side elevations, and metal ridge ventilator.
 Photo Number: 62	2667 NY 83 (cont'd) Town: Arkwright Arkwright (h) MCD: 01301 Chautauqua County Date: ca. 1915 Map Point: 26 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 63	2667 NY 83 (cont'd) Town: Arkwright Arkwright (h) MCD: 01301 Chautauqua County Date: ca. 1915 Map Point: 26 **Recommend: Possibly eligible**	**Details:**

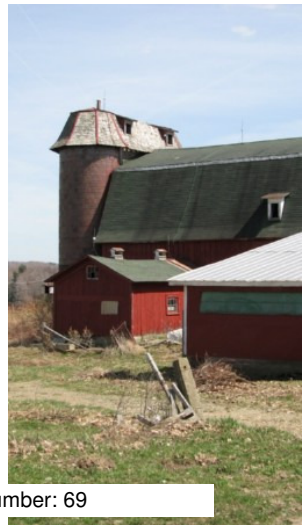
Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 64	**Wooley Farm Complex** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Setting shot of the Wooley farm, sited in cultivated fields with barn and farmhouse on opposite sides of Farrington Hollow Road.
 Photo Number: 65	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Rectangular Roof: Side gable Ext. Siding: Vinyl siding Foundation: Fieldstone Sash: One-over-one **Details:** The original farmhouse, constructed ca. 1850 for the Abbey family (the Wooley family are decedents). According to the homeowner the farm was the first in the town to be electrified in 1936.
 Photo Number: 66	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:**

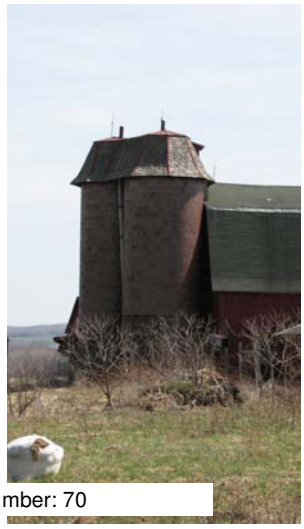
Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 67	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Compromised Vernacular farmhouse located on the Wooley Farm.
 Photo Number: 68	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Large barn with several additions located across from the main farmhouse.
 Photo Number: 69	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** The barn features three tile silos incorporated under one roof, according to the homeowner it was the first of its kind to be constructed in Chautauqua County and possibly the state. The silos were constructed in 1939.

Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 70	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Three tile silos incorporated under one roof.
 Photo Number: 71	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Outbuildings located east of the main barn.
 Photo Number: 72	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Detail of gable front barn, one of the three tile silos is visible a right.

Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 73	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Outbuildings clustered around the main barn.
 Photo Number: 74	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Highly-intact Greek Revival barn located across from the main house.
 Photo Number: 75	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Outbuilding located to the east of the property.

Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 76	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Outbuilding associated with the Wooley Farm, located to the south of the main house.
 Photo Number: 77	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Outbuildings associated with Wooley Farm.
 Photo Number: 78	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Associated outbuilding located behind the farmhouse.

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 79	**Wooley Farm Complex (cont'd)** 8903-8911 Farrington Hollow Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1850 Map Point: 27 **Recommend: Possibly eligible**	**Details:** Associated outbuilding located behind the farmhouse.
 Photo Number: 80	**Arkwright Summit Cemetery** Farrington Hollow Road, east side, south of NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca. 1832 Map Point: 28 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 81	**Maple-Camp Farm/Black Farm** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with rear ell Roof: Hipped Ext. Siding: Clapboard Foundation: Limestone Sash: Two-over-two **Details:** Setting shot of the Black's Corners. The Black farmhouse and barn complex are located on opposite sides of the road set in cultivated fields along NY 83.

Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 82	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Alterations: altered fenestration, partially rebuilt porch and rear addition. Map Point: 29 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with rear ell Roof: Hipped Ext. Siding: Clapboard Foundation: Limestone Sash: Two-over-two **Details:** Black homestead was constructed by Nicolas Black. The farmhouse when originally constructed was three stories. The third story was razed by a fire. The building maintains its full width porch, segmented arch windows, some two-over-two windows and a later period Colonial Revival hipped dormer.
 Photo Number: 83	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** East façade of farmhouse, showing side additions.
 Photo Number: 84	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** Large side gable barn at Black's Corners. The barn features sliding wagon doors, a milk house and several additions along the east side.

Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 85	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** West façade.
 Photo Number: 86	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** East façade of barn.
 Photo Number: 87	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** Side gable long barn located on the east side of the main barn.

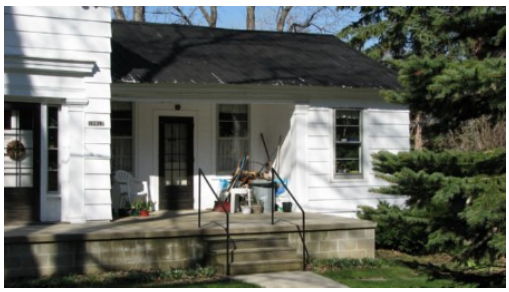
Chautauqua County
Town: Arkwright
Blacks Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 88	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** Painted sign on barn.
 Photo Number: 89	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** Associated outbuildings located south of the farmhouse.
 Photo Number: 90	**Maple-Camp Farm/Black Farm (cont'd)** 2083 NY 83 Town: Arkwright Blacks Corners (h) MCD: 01301 Chautauqua County Date: ca 1870-farm. house pre-civil Map Point: 29 **Recommend: Possibly eligible**	**Details:** Converted chicken house located at the south end of the property.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 91	10917 Alleghany Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1850 Alterations: Aluminum siding, concrete block porch. Map Point: 30 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Gable front with wing Roof: Gable front Ext. Siding: Aluminum siding Foundation: Limestone Sash: Two-over-two **Details:** A largely-intact example of a gable front and wing Greek Revival farmhouse, sited along Silver Creek. Stylistic elements include; simple entablature door surround with sidelights, recessed entry on wing, cornice and returns.
 Photo Number: 92	10917 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 30 **Recommend: Possibly eligible**	**Details:** South and east elevations.
 Photo Number: 93	10917 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1850 Map Point: 30 **Recommend: Possibly eligible**	**Details:** Detail of recessed entry on wing.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 94	10917 Alleghany Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1850 Map Point: 30 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Gable front with wing Roof: Gable front Ext. Siding: Aluminum siding Foundation: Limestone Sash: Two-over-two **Details:** Detail of door enframment.
 Photo Number: 95	10917 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1850 Map Point: 30 **Recommend: Possibly eligible**	**Details:** Gable front outbuilding.
 Photo Number: 96	10917 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1850 Map Point: 30 **Recommend: Possibly eligible**	**Details:** View of Silver Creek from property line.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 97	12168 Alleghany Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1895 Map Point: 31 **Recommend: Possibly eligible**	**Details:** Farmhouse set in vineyards.
 Photo Number: 98	**(cont'd)** 12168 Alleghany Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1895 Alterations: Reconstructed porch Map Point: 31 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two-and-a-half Plan: Rectangular Roof: Gable front Ext. Siding: Brick Foundation: Concrete block Sash: Other **Details:** A moderately intact Queen Anne farmhouse executed in brick. The house features a concrete block foundation, full width porch, symmetrical fenestration, shingle in the gable, and gable roof dormers on the north and south facades.
 Photo Number: 99	12168 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1895 Map Point: 31 **Recommend: Possibly eligible**	**Details:** South façade.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 100	12168 Alleghany Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1895 Map Point: 31 **Recommend: Possibly eligible**	**Details:** Outbuilding associated with the property.
 Photo Number: 101	**Evergreen Cemetery** Angell Road, south side, east of Denison Road Town: Hanover MCD: 01314 Chautauqua County Date: Early 19th c. Map Point: 32 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 102	**Forestville Depot** Center Street, NE corner at Erie Street Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 33 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Side gable Ext. Siding: Clapboard Foundation: Wood Sash: Two-over-two **Details:** Forestville Depot, located along the tracks of the abandoned Erie Railroad. The building is a rare Greek Revival passenger and freight depot.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 103	**Forestville Depot (cont'd)** Center Street, NE corner at Erie Street Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 33 **Recommend: Possibly eligible**	**Details:** Track side of building. *note ticket bay.
 Photo Number: 104	**Forestville Depot (cont'd)** Center Street, NE corner at Erie Street Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 33 **Recommend: Possibly eligible**	**Details:** Historic Photo (Western New York Rail Archive n.d.).
 Photo Number: 105	**Christy Road Cemetery** Christy Road, north side, east of Alleghany Road Town: Hanover MCD: 01314 Chautauqua County Map Point: 34 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 106	Hanover Road, West side, south of Hopper Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Inactive farm complex set in fallow fields.
 Photo Number: 107	**(cont'd)** Hanover Road, West side, south of Hopper Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Alterations: raised on a concrete block foundation. Map Point: 35 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Concrete block Sash: Six-over-six **Details:** A vacant farmhouse, possibly under restoration set in fallow fields. This Italianate structure features, a main 3 bay by 2 bay block with attached wing, recessed entry in wing, six-over-six sash, symmetrical massing, central entrance, with outstanding scroll work (possibly done by a local miller), single brackets and a hipped roof.
 Photo Number: 108	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** North and east façade.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 109	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 110	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Detail of main block.
 Photo Number: 111	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Detail of wing with recessed entry.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 112	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Door detail, side pilaster with cornice supported by brackets and elaborate scrollwork. An eagle is visible below the cornice.
 Photo Number: 113	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Door detail, straight shot.
 Photo Number: 114	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Detail of bracketing and second story six-over-six wooden sash.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 115	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Associated outbuildings located to the south of the farmhouse.
 Photo Number: 116	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Collapsed barn located to the south of the farmhouse.
 Photo Number: 117	Hanover Road, West side, south of Hopper Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: Ca. 1860 Map Point: 35 **Recommend: Possibly eligible**	**Details:** Outbuildings located behind the farmhouse.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 118	**Livemore Homestead** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Fieldstone Sash: Other **Details:** Setting shot of the Livemore Homestead, an inactive farm complex located on both sides of Hanover Road. The complex is set in fallow fields.
 Photo Number: 119	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Fieldstone Sash: Other **Details:** A highly-intact example of an Italianate frame farmhouse. Stylistic elements include; symmetrical fenestration on main block, entrance on wing, flushboard on wing, elongated two-over-four wooden sash, round arch windows, single bracketing on main bay and double brackets on wing.
 Photo Number: 120	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 121	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Symmetrical main block, 2 bay by two bay.
 Photo Number: 122	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 123	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Detail of single bracketing on main bay.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 124	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Detail of double bracketing on the wing.
 Photo Number: 125	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Detail of fieldstone foundation.
 Photo Number: 126	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Gable front Greek Revival farmhouse associated with farm. The farmhouse is now vacant.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 127	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** The Greek Revival building featured, simple entablature door surround, two-over-two sash on the first floor and six-over six on the second, and cornice with returns.
 Photo Number: 128	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Gable front barn located to the south of the property.
 Photo Number: 129	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Detail of north and west façades.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 130	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** South façade of barn.
 Photo Number: 131	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Associated outbuilding.
 Photo Number: 132	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Associated gable front outbuilding.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 133	**Livemore Homestead (cont'd)** 10079 Hanover Road Town: Hanover MCD: 01314 Chautauqua County Date: Ca 1830? Map Point: 36 **Recommend: Possibly eligible**	**Details:** Farm buildings on the opposite side of the road.
 Photo Number: 134	**Hurlburt Road/Swift Cemetery** Hurlburt Road Town: Hanover MCD: 01314 Chautauqua County Date: 1845-1906 Map Point: 37 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 135	Hurlburt Road, south side, east of Prospect Road Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 38 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Stone Sash: Six-over-six **Details:** An abandoned Greek Revival farmhouse located along the heavily forested Hurlburt Road. The building features; gable front and wing configuration, six-over-six windows and simple cornice along the roofline.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 136	Hurlburt Road, south side, east of Prospect Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 38 **Recommend: Possibly eligible**	**Details:** Detail of main bay.
 Photo Number: 137	Hurlburt Road, south side, east of Prospect Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 38 **Recommend: Possibly eligible**	**Details:** Foundation detail.
 Photo Number: 138	469 NY 39 Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Not visible Sash: Six-over-six **Details:** Inactive farm complex set at the busy crossroads of NY 39 and Hanover Road.

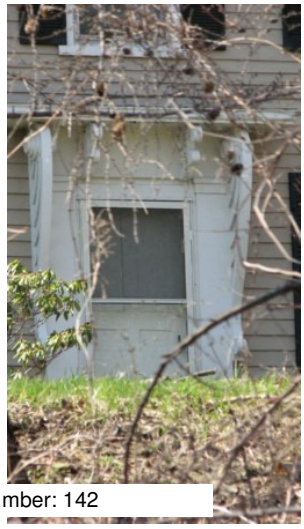
Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 139	**(cont'd)** 469 NY 39 Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Not visible Sash: Six-over-six **Details:** A largely-intact example of a frame Italianate farmhouse. Stylistic elements include, symmetrical main bay with central entrance, side wing with recessed entry, six-over-six sash, single bracketing along the roof line and a central chimney.
 Photo Number: 140	469 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	**Details:** North façade.
 Photo Number: 141	469 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 142	469 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	**Details:** Detail of door enframment similar to that of the farmhouse located on the west side of Hanover Road, south of Hopper Road. The door surround features side pilasters and cornice supported by single brackets and elaborate scrollwork.
 Photo Number: 143	469 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	**Details:** Gable front barn associated with the property.
 Photo Number: 144	469 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 39 **Recommend: Possibly eligible**	**Details:** Associated outbuildings.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 145	503 NY 39 Town: Hanover MCD: 01314 Chautauqua County Alterations: some new windows. Map Point: 40 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Cross gable Ext. Siding: Clapboard Foundation: Parged Sash: New **Details:** A largely-intact Queen Anne building executed in frame. Stylistic elements include; asymmetrical massing, wrap around porch with turned post spindles, balustrade and frieze and paired one-over-one windows.
 Photo Number: 146	503 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 40 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 147	503 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 40 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 148	503 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Map Point: 40 **Recommend: Possibly eligible**	**Details:** Front gambrel barn with sliding wagon doors located east of the property.
 Photo Number: 149	675 NY 39 Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 41 **Recommend: Possibly eligible**	**Details:** Active farmhouse and barn complex located on the same side of the road. The property is surrounded by cultivated fields. It is located in the project footprint.
 Photo Number: 150	**(cont'd)** 675 NY 39 Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1860 Alterations: Some vinyl siding and new windows. Map Point: 41 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Square with side ell Roof: Hipped Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A moderately-intact Italianate building with many stylistic details intact. The building features, some two-over-two windows, lintels, historic entry doors and bracketing.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 151	675 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 41 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 152	675 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 41 **Recommend: Possibly eligible**	**Details:** Barn complex.
 Photo Number: 153	1411 NY 39 Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1840 Map Point: 42 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Rectangular with side ell Roof: Side gable Ext. Siding: Asbestos shingle Foundation: Limestone Sash: Six-over-six **Details:** A largely-intact example of a vernacular Greek Revival side gable building executed in frame. This five bay by two bay structure features symmetrical massing with central entrance, six-over-six wooden sash windows, central chimney and side wing.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 154	1411 NY 39 (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1840 Map Point: 42 **Recommend: Possibly eligible**	**Details:** The property no longer maintains any of its outbuildings.
 Photo Number: 155	11776 Old Forestville Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1905 Map Point: 43 **Recommend: NRE(I)**	**Details:** Previously determined NRE (I); USN: 01314.000056.
 Photo Number: 156	**(cont'd)** 11776 Old Forestville Road Town: Hanover MCD: 01314 Chautauqua County Date: ca 1905 Map Point: 43 **Recommend: NRE(I)**	Style: Other Stories: Two-and-a-half Plan: Rectangular Roof: Deck-hip Ext. Siding: Clapboard Foundation: Not visible Sash: Other **Details:** Previously determined NRE (I); USN: 01314.000056.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 157	11776 Old Forestville Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1905 Map Point: 43 **Recommend: NRE(I)**	**Details:** Previously determined NRE (I); USN: 01314.000056.
 Photo Number: 158	11776 Old Forestville Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1905 Map Point: 43 **Recommend: NRE(I)**	**Details:** Previously determined NRE (I); USN: 01314.000056.
 Photo Number: 159	11776 Old Forestville Road (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca 1905 Map Point: 43 **Recommend: NRE(I)**	**Details:** Previously determined NRE (I); USN: 01314.000056.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 160	**Pioneer Cemetery** 11049? Old Forestville Road, south of 11051 Town: Hanover MCD: 01314 Chautauqua County Map Point: 44 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 161	11103 Old Forestville Road Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 45 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: L-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Concrete block Sash: One-over-one **Details:** A largely-intact Italianate building with later Queen Anne and Colonial Revival detailing. The building features; an L-shape configuration, gabled main bay with bracketing, segmented arch windows, polygonal bay, and classical wraparound porch on wing.
 Photo Number: 162	**Mt. Carmel Cemetery** Old Main Street Town: Hanover MCD: 01314 Chautauqua County Date: 1926 Map Point: 46 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 163	**Glenwood Cemetery** Old Main Street Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1810 Map Point: 47 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 164	11935 Old Main Street Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 48 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular with rear ell Roof: Cross gable Ext. Siding: Novelty siding Foundation: Not visible Sash: Other **Details:** A highly-intact roadside stand featuring, gable entry, six-over-one sash, exposed rafter tails, board and batten rear addition, steeply pitched roofs and side bay.
 Photo Number: 165	11935 Old Main Street (cont'd) Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 48 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Hanover

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 166	**Prospect Hill Cemetery** Prospect Street, east side, south of Forestville Village Town: Hanover MCD: 01314 Chautauqua County Date: ca. 1812 Map Point: 49 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 167	**Doty Cemetery** Stebbins Road, south side, west of Old Forestville Road Town: Hanover MCD: 01314 Chautauqua County Map Point: 50 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 168	**Ball Valley Farms** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** Ball Valley Farms is located at the intersection of Mackinaw and Allegany Roads. It is an active complex set in cultivated fields.

Chautauqua County
Town: Hanover
Balltown (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 169	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Irregular Roof: Side gable Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** An early side gable five bay farmhouse flanked by two wings. The main bay features symmetrical massing and fenestration with a central entry, and two-over-two double hung wooden sash windows. The wing on the north side has a recessed entry.
 Photo Number: 170	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 171	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** North wing with recessed entry

Chautauqua County
Town: Hanover
Balltown (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 172	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** Detail of main entry door.
 Photo Number: 173	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** Gable front barn with sliding wagon doors.
 Photo Number: 174	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** Side gable barn located behind the farmhouse.

Chautauqua County
Town: Hanover
Balltown (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 175	**Ball Valley Farms (cont'd)** 11037 Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: est. 1810 Map Point: 51 **Recommend: Possibly eligible**	**Details:** Associated outbuilding.
 Photo Number: 176	**Balltown Cemetery** Mackinaw Road, north side, at Alleghany Road Town: Hanover Balltown (h) MCD: 01314 Chautauqua County Date: 1811 Map Point: 52 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 177	12010 Angell Road Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 53 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Side gable Ext. Siding: Brick veneer Foundation: Brick Sash: Other **Details:** A highly-intact Craftsman Bungalow surrounded by vineyards. Stylistic elements include; porch under roofline, heavy brick piers, steeply sloped roof, shed dormer, three-over-one windows, lead glass window on first story, side oriel, and overhanging eaves supported by brackets.

Chautauqua County
Town: Hanover
Hanover Center (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 178	12010 Angell Road (cont'd) Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 53 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 179	12021 Angell Road Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Date: ca 1905 Alterations: rear addition. Map Point: 54 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two-and-a-half Plan: Irregular Roof: Cross gable Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Other **Details:** A highly intact Queen Anne structure, set in vineyards. Stylistic elements include; asymmetrical fenestration, varying wall textures; clapboard on the first story and shingles in gable, three-over-one windows, full width hipped porch, square posts, gable bay on north side, and side porch under bay.
 Photo Number: 180	**Golden Harvest** 967 Hanover Road Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Date: ca. 1890 Map Point: 55 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Side gable Ext. Siding: Vinyl siding Foundation: Parged Sash: New **Details:** Compromised tenant house across from large barn complex, surrounded by vineyard in the Hamlet of Hanover Center.

Chautauqua County
Town: Hanover
Hanover Center (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 181	**Golden Harvest (cont'd)** 967 Hanover Road Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Map Point: 55 **Recommend: Possibly eligible**	**Details:** Massive barn complex located along Hanover Road. The building features a gable front barn attached with a hyphen to a gambrel roof barn.
 Photo Number: 182	11991 Hanover Road Town: Hanover Hanover Center (h) MCD: 01314 Chautauqua County Date: ca. 1920 Alterations: Some new windows. Map Point: 56 **Recommend: Possibly eligible**	Style: Tudor Revival Stories: Two Plan: Irregular Roof: Gable front Ext. Siding: Stucco Foundation: Not visible Sash: New **Details:** A largely-intact Tudor Revival building clad in stucco and half timbers. Stylistic elements include; asymmetrical massing, gabled entry with recessed rounded arch entry door, steeply pitched roof, with shed roof dormers, and side porch topped by balcony.
 Photo Number: 183	**Nashville Cemetery** Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Map Point: 57 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

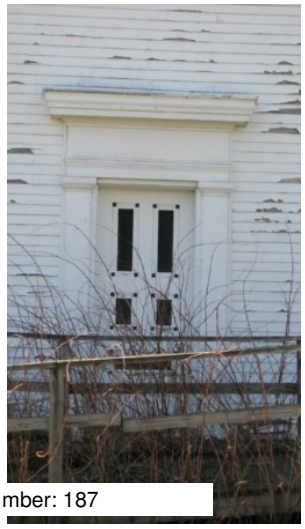
Chautauqua County
Town: Hanover
Nashville (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 184	**Church** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: Other **Details:** A highly-intact Greek Revival church building. Stylistic elements include; symmetrical massing, double door entry, full pediment, square belfry, side pilasters and elongated side windows.
 Photo Number: 185	**Church (cont'd)** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 186	**Church (cont'd)** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Hanover
Nashville (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 187	**Church (cont'd)** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	**Details:** Detail of entry door.
 Photo Number: 188	**Church (cont'd)** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	**Details:** Detail of pediment.
 Photo Number: 189	**Church (cont'd)** NY 39, south side, west of Alleghany Road Town: Hanover Nashville (h) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 58 **Recommend: Possibly eligible**	**Details:** Detail of four-over-four side windows.

Chautauqua County
Town: Hanover
Smith's Mill (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 190	**Smith's Mill Cemetery** Hanover Road, West side at York Road Town: Hanover Smith's Mill (h) MCD: 01314 Chautauqua County Date: ca 1850 Map Point: 59 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 191	**Bridge over Walnut Creek** Bradigan Road, south of Water Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: 1936 Map Point: 60 **Recommend: Possibly eligible**	**Details:** Concrete bridge with concrete abutments spanning Walnut Creek in the Village of Forestville. Constructed by the WPA.
 Photo Number: 192	**Bridge over Walnut Creek** Bradigan Road, south of Water Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: 1936 Map Point: 60 **Recommend: Possibly eligible**	**Details:** WPA stamp on bridge.

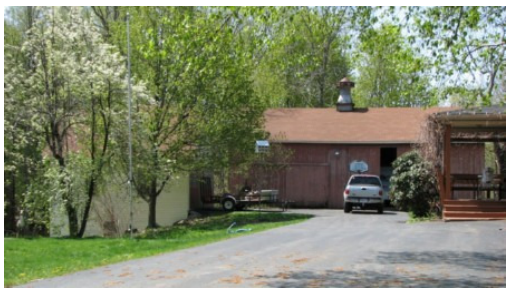
Chautauqua County
Town: Hanover
Forestville (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 193	13 Cedar Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 61 **Recommend: Possibly eligible**	Style: Other Stories: One-and-a-half Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Limestone Sash: Other **Details:** A highly-intact transitional Greek Revival to Italianate residential dwelling. Stylistic elements include; gable front and wing configuration, four-over-four windows with segmented arch lintels and a ca. 1890 Colonial Revival porch on wing.
 Photo Number: 194	18 Center Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1890 Map Point: 62 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Gable-on-hip Ext. Siding: Asbestos shingle Foundation: Concrete block Sash: One-over-one **Details:** A largely-intact example of a Queen Anne building. Stylistic elements include; asymmetrical massing, wraparound porch supported by turned post spindles, one-over-one sash, jettied bay, and gable on hip roof.
 Photo Number: 195	18 Center Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1890 Map Point: 62 **Recommend: Possibly eligible**	**Details:** Center Street façade.

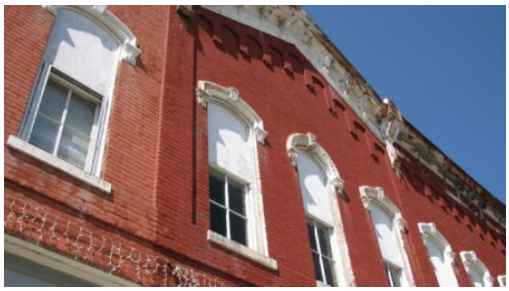
Chautauqua County
Town: Hanover
Forestville (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 196	28 Center Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 63 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Square with side ell Roof: Hipped Ext. Siding: Brick Foundation: Fieldstone Sash: Two-over-two **Details:** An excellent example of an Italianate masonry building. Stylistic elements include; square main bay with wing, side hall plan, elongated windows with two-over-two wooden sash, carved lintels, double bracketing and overhanging eaves under a hipped roof. There is a later period Colonial Revival full width porch on the main bay.
 Photo Number: 197	28 Center Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 63 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 198	28 Center Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 63 **Recommend: Possibly eligible**	**Details:** Carriage house located behind the main house.

Chautauqua County
Town: Hanover
Forestville (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 199	11-15 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca, 1870 Alterations: Altered storefront. Map Point: 64 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Brick Foundation: Not visible Sash: Other **Details:** A largely-intact Victorian commercial building. Stylistic elements include; symmetrical massing, flat roof with center gable, segmented arch windowhoods flanking the central rounded arch window with hood, corbelling along the cornice and cast iron storefronts. Previously inventoried, no det.; USN: 01352.000047
 Photo Number: 200	11-15 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca, 1870 Map Point: 64 **Recommend: Possibly eligible**	**Details:** Detail of windowhoods.
 Photo Number: 201	26 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1830 Alterations: vinyl siding, new windows, rear additions Map Point: 65 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Irregular Roof: Gable front Ext. Siding: Vinyl siding Foundation: Not visible Sash: New **Details:** A highly-intact Greek Revival structure prominently sited on Main Street. Stylistic elements include; gable front, side hall plan, pilasters, full temple front with oculus window, polygonal bay on main façade. Previously inventoried, no det.; USN: 01352.000055.

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Photograph	Property Information	Description
 Photo Number: 202	26 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 65 **Recommend: Possibly eligible**	**Details:** Detail of temple front.
 Photo Number: 203	26 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 65 **Recommend: Possibly eligible**	**Details:** Rear carriage barn.
 Photo Number: 204	27 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 66 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Other Foundation: Not visible Sash: One-over-one **Details:** A highly-intact frame commercial building. The storefront maintains its historic display windows and recessed entry and bracketed cornice. Previously inventoried, no det.; USN01352.000056

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Photograph	Property Information	Description
 Photo Number: 205	27 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 66 **Recommend: Possibly eligible**	**Details:** Barns located at the rear of the property.
 Photo Number: 206	27 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 66 **Recommend: Possibly eligible**	**Details:** Gable front barn with sliding wagon door located behind the property.
 Photo Number: 207	27 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 66 **Recommend: Possibly eligible**	**Details:** Outbuildings associated with the store.

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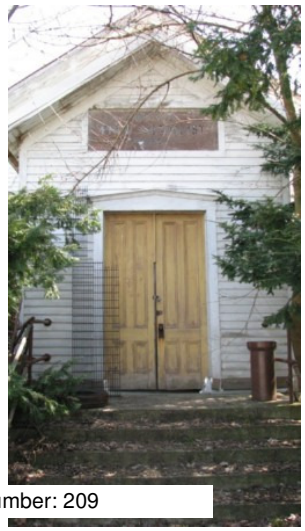
Photograph	Property Information	Description
 Photo Number: 208	**Forestville Free Methodist Church** 32 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 67 **Recommend: Possibly eligible**	Style: Gothic Revival Stories: One Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Other **Details:** A highly-intact Gothic Revival church. The building features a gable front main block with a gabled vestibule, historic four panel double entry doors, pedimented surrounds, elongated four-over-four windows, and a simple cornice. Previously inventoried, no det.; USN: 01352.000058.
 Photo Number: 209	**Forestville Free Methodist Church (cont'd)** 32 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 67 **Recommend: Possibly eligible**	**Details:** Detail of main entry.
 Photo Number: 210	43 Main Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1812 Alterations: Vinyl siding and rear additions. Map Point: 68 **Recommend: Possibly eligible**	Style: Federal Stories: Two Plan: Rectangular with rear ell Roof: Side gable Ext. Siding: Aluminum siding Foundation: Parged Sash: Other **Details:** It is believed to be the oldest house in the Village of Forestville. It is a good example of a Federal style residence. The building features, a five bay by two bay main block, interior end chimneys, twelve-over-twelve windows, simple entablature door surround with fluted pilasters and sidelights. Previously inventoried, no det.; USN: 01352.000065.

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Photograph	Property Information	Description
 Photo Number: 211	43 Main Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 68 **Recommend: Possibly eligible**	**Details:** Detail of entry.
 Photo Number: 212	2 Pearl Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 69 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Stone Sash: Other **Details:** Simple Vernacular commercial building. The building is a gable front structure with central entry, elongated four-over-four windows and a simple cornice.
 Photo Number: 213	9 Water Street Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Alterations: New windows Map Point: 70 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Brick Foundation: Stone Sash: New **Details:** A highly-intact example of an Italianate structure executed in brick. It is sited along Walnut Creek.

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Photograph	Property Information	Description
 Photo Number: 214	9 Water Street (cont'd) Town: Hanover Forestville (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 70 **Recommend: Possibly eligible**	**Details:** Stylistic elements include; three bay by two bay two story main block with single story wing, pedimented hoods, hipped roof with overhanging eaves, and a Craftsman era front porch.
 Photo Number: 215	**Clark Mansion on Lighthouse Point** Beachview Avenue, facing the lake Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1900 Map Point: 71 **Recommend: Possibly eligible**	**Details:** Prominently sited on a cliff overlooking Lake Erie. It was once the site of an 1832 lighthouse, decommissioned in 1886. The lighthouse fell to ruins. In 1902 the property was purchased by H.E. Montgomery. She built an estate on the property, for use as a summer home. Fire destroyed the home in 1942. The current structure was erected soon after on the foundation of the original summer house (Donohue 1984).
 Photo Number: 216	**Clark Mansion on Lighthouse Point (cont'd)** Beachview Avenue, facing the lake Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1945 Map Point: 71 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Not noted Plan: Rectangular Roof: Hipped Ext. Siding: Brick veneer Foundation: Not visible Sash: Other **Details:** Located on private property, could not gain access to evaluate condition.

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Photograph	Property Information	Description
 Photo Number: 217	**Clark Mansion on Lighthouse Point (cont'd)** Beachview Avenue, facing the lake Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1900 Map Point: 71 **Recommend: Possibly eligible**	**Details:** Located on private property, could not gain access to evaluate condition.
 Photo Number: 218	**Clark Mansion on Lighthouse Point (cont'd)** Beachview Avenue, facing the lake Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1900 Map Point: 71 **Recommend: Possibly eligible**	**Details:** View of the lake from corner of property.
 Photo Number: 219	10 Beachview Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1930 Map Point: 72 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Side gable Ext. Siding: Wood shingle Foundation: Concrete block Sash: Other **Details:** A largely-intact Craftsman summer cottage, located overlooking Lake Erie. Stylistic elements include; asymmetrical roofline, pedimented entry flanked by two three part windows, band of three windows in the gable, shed roof dormers and side sun porch addition.

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Photograph	Property Information	Description
 Photo Number: 220	130 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 73 **Recommend: NRE(I)**	Style: Greek Revival Stories: Two Plan: T-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Parged Sash: New **Details:** Previously determined NRE(I); USN: 01346.000008
 Photo Number: 221	130 Central Avenue (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 73 **Recommend: NRE(I)**	**Details:** Previously determined NRE(I); USN: 01346.000008
 Photo Number: 222	130 Central Avenue (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1830 Map Point: 73 **Recommend: NRE(I)**	**Details:** Previously determined NRE(I); USN: 01346.000008

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Photograph	Property Information	Description
 Photo Number: 223	147 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 74 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: L-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Limestone Sash: Two-over-two **Details:** A largely-intact example of an Italianate structure executed in frame. Stylistic elements include; two-over-two windows, pedimented windowhoods, rounded arch window in gable, polygonal bay, slightly overhanging eaves with a simple cornice and later period wraparound porch.
 Photo Number: 224	151 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 75 **Recommend: NRE(I)**	Style: Italianate Stories: Two Plan: Irregular Roof: Hipped Ext. Siding: Brick Foundation: Parged Sash: New **Details:** Previously determined NRE(I); USN: 01346.00050
 Photo Number: 225	151 Central Avenue (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 75 **Recommend: NRE(I)**	**Details:** Previously determined NRE(I); USN: 01346.00050.

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Photograph	Property Information	Description
 Photo Number: 226	**Our Lady of Carmel** 165 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1931/1846, 1950/1960 Map Point: 76 **Recommend: NRE(I)**	**Details:** Previously determined NRE(I); USN: 01346.000006.
 Photo Number: 227	**Our Lady of Carmel (cont'd)** 165 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1950/1960 Map Point: 76 **Recommend: NRE(I)**	Style: Modern Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Brick veneer Foundation: Concrete slab Sash: Other **Details:** Previously determined NRE(I); USN: 01346.000006.
 Photo Number: 228	**Our Lady of Carmel (cont'd)** 165 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1846 Map Point: 76 **Recommend: NRE(I)**	Style: Federal Stories: Two Plan: Rectangular Roof: Side gable Ext. Siding: Brick Foundation: Stone Sash: Six-over-six **Details:** Previously determined NRE(I); USN: 01346.000001.

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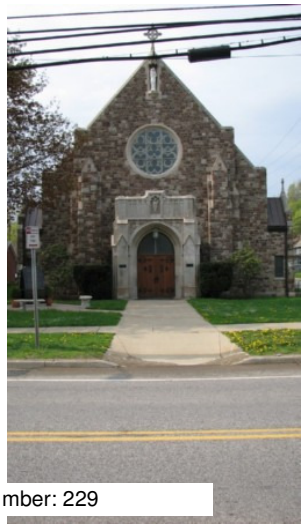
Photograph	Property Information	Description
 Photo Number: 229	**Our Lady of Carmel (cont'd)** 165 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1931 Map Point: 76 **Recommend: NRE(I)**	Style: Gothic Revival Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Stone Foundation: Stone Sash: Other **Details:** Previously determined NRE(I); USN: 01346.000006.
 Photo Number: 230	**Our Lady of Carmel (cont'd)** 165 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1931/1846, 1950/1960 Map Point: 76 **Recommend: NRE(I)**	**Details:** Previously determined NRE(I); USN: 01346.000006.
 Photo Number: 231	338 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 77 **Recommend: Possibly eligible**	Style: Craftsman Stories: Two Plan: Rectangular Roof: Cross gable Ext. Siding: Wood shingle Foundation: Rusticated concrete block Sash: Other **Details:** A textbook example of a Craftsman bungalow executed in frame. Stylistic elements include; cross gable configuration, porch under roofline, squat piers, clapboard and shingle wall surfaces, rafter tails, side bay, half timber in gable, band of windows, and sun porch on Elm Street side, Previously inventoried, det. Not eligible; USN: 01346.000037.

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Photograph	Property Information	Description
 Photo Number: 232	338 Central Avenue (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 77 **Recommend: Possibly eligible**	**Details:** Detail of west façade.
 Photo Number: 233	350 Central Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 78 **Recommend: Possibly eligible**	Style: Craftsman Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Clapboard Foundation: Ornamental concrete block Sash: Other **Details:** A good example of a Craftsman structure executed in frame. Stylistic elements include; symmetrical massing, enclosed front porch with three-over-one windows, wide overhanging eaves, low hipped roof dormer and central chimney. Previously inventoried, determined not eligible; USN: 01346.000043.
 Photo Number: 234	350 Central Avenue (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 78 **Recommend: Possibly eligible**	**Details:** Associated outbuilding.

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Photograph	Property Information	Description
 Photo Number: 235	5 Christy Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca 1910 Map Point: 79 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Other **Details:** A largely-intact Colonial Revival dwelling. Stylistic elements include; symmetrical massing, full width front porch with square piers and balustrade, twelve-over-one windows and central chimney.
 Photo Number: 236	9 Christy Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 80 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Side gable Ext. Siding: Clapboard Foundation: Concrete block Sash: Other **Details:** A highly-intact example of a Craftsman bungalow. Stylistic elements include; steeply pitched side gable roof, full width porch with heavy square piers, clapboard on the first story, half timber on the second story and partial width gable dormer.
 Photo Number: 237	9 Christy Street (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 80 **Recommend: Possibly eligible**	**Details:**

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Photograph	Property Information	Description
 Photo Number: 238	4 Dana Drive Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 81 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Cross gable Ext. Siding: Wood shingle Foundation: Not visible Sash: Other **Details:** A highly-intact example of a Craftsman Bungalow. Stylistic elements include; cross gable configuration, integral screen porch, overhanging eaves with bracketing, massive exterior chimneys and gabled bay.
 Photo Number: 239	12370 Hanover Road Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Map Point: 82 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Irregular Roof: Cross gable Ext. Siding: Clapboard Foundation: Stone Sash: One-over-one **Details:** A good example of a Vernacular farmhouse set in vineyards.
 Photo Number: 240	12370 Hanover Road (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Map Point: 82 **Recommend: Possibly eligible**	**Details:** A largely-intact Vernacular structure. Stylistic elements include, cross gable roof, fieldstone foundation, and side polygonal bay.

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Photograph	Property Information	Description
 Photo Number: 241	16 Hanover Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 83 **Recommend: Possibly eligible**	Style: Dutch Colonial Revival Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Concrete block Sash: One-over-one **Details:** A highly-intact Dutch Colonial Revival. Stylistic elements include front gambrel roof, enclosed front porch with three-over-one windows, side oriel, and through dormer.
 Photo Number: 242	Howard Street, SW side of Buffalo Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1940 Map Point: 84 **Recommend: Possibly eligible**	Style: Modern Stories: One Plan: Rectangular Roof: Flat Ext. Siding: Concrete block Foundation: Concrete block Sash: Other **Details:** A largely-intact ca. 1940's concrete block garage. The building features two garage bays and side office with curved window wall. Previously inventoried-no determination; USN: 01346.000179
 Photo Number: 243	**Skew Arch Bridge** Jackson Street, Over Jackson Street, south of Lake Erie Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: 1869 Map Point: 85 **Recommend: Possibly eligible**	**Details:** Erected in 1869 by Buffalo & State Line Railroad. The bridge was constructed on an angle. Reportedly one of two of its type in the world when built.

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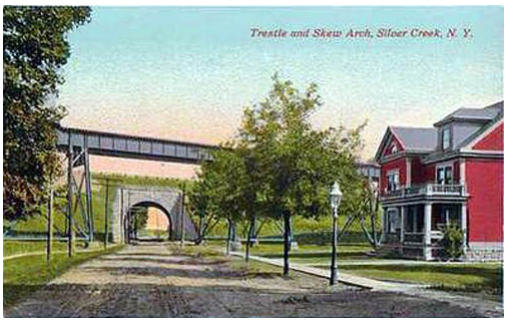
Photograph	Property Information	Description
 Photo Number: 244	**Nickel Plate Bridge over Jackson Street** Jackson Street, Over Jackson Street, south of Lake Erie Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1881 Map Point: 86 **Recommend: Possibly eligible**	**Details:** Nickel plate, riveted deck girder bridge over Jackson Street, in foreground. The bridge was completed for the Lake Shore and Michigan Southern Railway (New York Chicago and St. Louis).
 Photo Number: 245	**Skew Arch Bridge and Nickel Plate Bridge over Jackson Street** Jackson Street, Over Jackson Street, south of Lake Erie Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: 1869 Map Point: 86 **Recommend: Possibly eligible**	**Details:** Historic Postcard Trestle & Skew Arch Bridge 1900 (Davidson 2008).
 Photo Number: 246	**Hanover Bridge** Lake Avenue, Between Lake Avenue and Jackson Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1906 Map Point: 87 **Recommend: Possibly eligible**	**Details:** Double Arch bridge over Silver Creek Outlet. Constructed for the New York Central Railroad.

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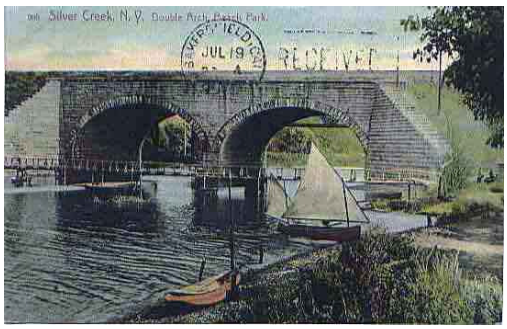
Photograph	Property Information	Description
 Photo Number: 247	**Hanover Bridge** Lake Avenue, Between Lake Avenue and Jackson Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1906 Map Point: 87 **Recommend: Possibly eligible**	**Details:** Historic Postcard 1906 (Davidson 2008).
 Photo Number: 248	**Stone Bridge** Lake Avenue, Over Lake Avenue, south of Lake Erie Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1860 1906 Map Point: 88 **Recommend: Possibly eligible**	**Details:** Stone arch railroad bridge over Lake Street. Earliest abutments are stone. There is a later concrete expansion.
 Photo Number: 249	**Nickel Plate Bridge over Lake Avenue** Lake Avenue, Over Lake Avenue, south of Lake Erie Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1930 Map Point: 89 **Recommend: Possibly eligible**	**Details:** Nickel plate, riveted deck girder bridge over Lake Avenue, in foreground. The bridge was completed for the Lake Shore and Michigan Southern Railway (New York Chicago and St. Louis).

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Photograph	Property Information	Description
 Photo Number: 250	6/8 Lake Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 90 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: L-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Not visible Sash: Other **Details:** A largely-intact example of an Italianate structure. Stylistic elements include; full width porch supported by turned post spindles, balustrade and frieze, some four-over-four windows and some two-over-two windows, pedimented window hoods, and overhanging eaves.
 Photo Number: 251	**St. Albans** 38 Lake Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1890 Map Point: 91 **Recommend: NRE(I)**	Style: Shingle Stories: One Plan: Rectangular with rear ell Roof: Gable front Ext. Siding: Vinyl siding Foundation: Concrete block Sash: Other **Details:** Previously determined NRE (I); USN : 01346.0000158
 Photo Number: 252	18 Oak Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 92 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Rectangular with side ell Roof: Gable front Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A largely-intact example of a Vernacular dwelling. Stylistic elements include; full width porch, Tuscan columns, and paired second story windows with pedimented window surrounds.

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Photograph	Property Information	Description
 Photo Number: 253	18 Oak Street (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1870 Map Point: 92 **Recommend: Possibly eligible**	**Details:** Associated outbuildings.
 Photo Number: 254	30 Oak Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 93 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Gable front with wing Roof: Gable front Ext. Siding: Wood shingle Foundation: Not visible Sash: One-over-one **Details:** A largely-intact Greek Revival structure executed in frame. Stylistic elements include; gable front and wing plan, decorative sills and lintels, porch on wing, some six-over-six windows and Italianate twin arch door.
 Photo Number: 255	30 Oak Street (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 93 **Recommend: Possibly eligible**	**Details:**

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Photograph	Property Information	Description
 Photo Number: 256	117 Old Main Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 94 **Recommend: Possibly eligible**	**Details:** An excellent example of a Neo-Classical structure. The building is prominently sited with a deep set back from the road.
 Photo Number: 257	**(cont'd)** 117 Old Main Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 94 **Recommend: Possibly eligible**	Style: Neo-Classical Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Other **Details:** Stylistic elements include; Rusticated block foundation, symmetrical fenestration on main block, full façade portico with heavy Doric columns, second story integral porch with balustrade, full temple front with fan light, twelve-over-one windows, single story polygonal bay on west façade and secondary entry on east façade.
 Photo Number: 258	151 Old Main Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 95 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Gable front Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: Other **Details:** A largely-intact example of a Craftsman Bungalow. Stylistic elements include; cross gable roof, enclosed front porch with three-over-one windows, first story RCB, second story half timber, band of three windows in the gable and period outbuilding.

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Photograph	Property Information	Description
 Photo Number: 259	155 Old Main Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1850 Map Point: 96 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One Plan: Rectangular with side ell Roof: Side gable Ext. Siding: Clapboard Foundation: Not visible Sash: Six-over-six **Details:** A highly-intact side gable Greek Revival structure with side gable wing. Stylistic elements include; symmetrical fenestration, central entry, six-over-six wooden sash, side pilasters and returns. There is an enclosed porch on the wing.
 Photo Number: 260	1 Oliver Place Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 97 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Hipped Ext. Siding: Wood shingle Foundation: Not visible Sash: Other **Details:** A largely-intact example of a Craftsman Bungalow. Stylistic elements include; enclosed front porch, overhanging eaves with exposed rater tails and hipped roof dormer. There is a period garage.
 Photo Number: 261	1 Oliver Place (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1910 Map Point: 97 **Recommend: Possibly eligible**	**Details:**

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Photograph	Property Information	Description
 Photo Number: 262	5 Oliver Place Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 98 **Recommend: Possibly eligible**	Style: Craftsman Stories: One-and-a-half Plan: Rectangular Roof: Side gable Ext. Siding: Wood shingle Foundation: Limestone Sash: Other **Details:** A highly-intact example of a Craftsman Bungalow. Stylistic elements include; steeply pitched side gable roof, porch incorporated under the main roofline, squat piers, oriel window with shed roof, shed roof side entrance, gabled dormer and exposed rafter tails. There is a period garage.
 Photo Number: 263	5 Oliver Place (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 98 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 264	**Swift House** 6 Parkway Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: 1914 Map Point: 99 **Recommend: Possibly eligible**	Style: Craftsman Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Wood shingle Foundation: Concrete block Sash: Six-over-six **Details:** A excellent example of a Craftsman structure. Stylistic elements include; partial width porch, six-over-six sash, windowhoods, side oriel, low hipped roof with overhanging eaves, and shed roof dormers.

Chautauqua County
Town: Hanover
Silver Creek (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 265	9 Parkway Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1930 Map Point: 100 **Recommend: Possibly eligible**	Style: Tudor Revival Stories: Two Plan: Rectangular Roof: Cross gable Ext. Siding: Stucco Foundation: Rusticated concrete block Sash: Other **Details:** A highly-intact example of a Tudor Revival structure. Stylistic elements include; stucco exterior, half timbering in the gable, six-over-one windows, brick exterior end chimney, shed roof dormer, and gabled entry porch.
 Photo Number: 266	17 Parkway Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1900 Map Point: 101 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Clapboard Foundation: Limestone Sash: Other **Details:** A highly-intact example of a Colonial Revival structure. Stylistic elements include; square massing, full width front porch, polygonal bay on second story, overhanging eaves, and gabled dormer.
 Photo Number: 267	**Erbin House** 27 Parkway Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1905 Map Point: 102 **Recommend: NRE(I)**	Style: Not Noted Stories: Two Plan: Irregular Roof: Hipped Ext. Siding: Brick Foundation: Poured concrete Sash: Other **Details:** Previously determined NRE (I); USN: 01346.000005.

Chautauqua County
Town: Hanover
Silver Creek (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 268	**Erbin House (cont'd)** 27 Parkway Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1905 Map Point: 102 **Recommend: NRE(I)**	**Details:** Previously determined NRE (I); USN: 01346.000005.
 Photo Number: 269	**Trinity Lutheran Church** Northeast side @ Adams Porter Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1880 Map Point: 103 **Recommend: Possibly eligible**	Style: Queen Anne Stories: One Plan: Rectangular Roof: Gable front Ext. Siding: Aluminum siding Foundation: Parged Sash: Other **Details:** A largely-intact example of a Queen Anne church building. Stylistic elements include, overall symmetrical massing, pedimented window enframment with stained glass windows, and steeple with elaborate scrollwork.
 Photo Number: 270	**Trinity Lutheran Church (cont'd)** Northeast side @ Adams Porter Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1880 Map Point: 103 **Recommend: Possibly eligible**	**Details:** Steeple detail.

Chautauqua County
Town: Hanover
Silver Creek (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 271	**Trinity Lutheran Church (cont'd)** Northeast side @ Adams Porter Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1880 Map Point: 103 **Recommend: Possibly eligible**	**Details:** Window detail.
 Photo Number: 272	19? Porter Avenue, south of 21 Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 104 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Two-over-two **Details:** Small inactive Vernacular church building. The building maintains its two-over-two windows.
 Photo Number: 273	21 Porter Avenue Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1920 Map Point: 105 **Recommend: Possibly eligible**	Style: Colonial Stories: Two Plan: Rectangular with rear ell Roof: Hipped Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: One-over-one **Details:** A highly-intact example of a Colonial Revival dwelling. Stylistic elements include, central portico with square posts, symmetrical fenestration, one-over-one wooden sash windows, simple cornice along the roofline and hipped roof dormers.

Chautauqua County
Town: Hanover
Silver Creek (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 274	45 Robinson Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1915 Map Point: 106 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: One-over-one **Details:** A highly-intact example of a RCB Colonial Revival structure. Stylistic elements include; full width front porch, stone water table, belt course, sills and lintels, side polygonal bay, and gable on hip roof.
 Photo Number: 275	16 Rumsey Street Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1860 Map Point: 107 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Rectangular Roof: Cross gable Ext. Siding: Clapboard Foundation: Not visible Sash: Two-over-two **Details:** A highly-intact example of an Italianate structure. Stylistic elements include; side hall plan, two-over-two rounded arch windows, decorative verge board, and side porch. There is a barn located behind the property.
 Photo Number: 276	28 Ward Place Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1920 Map Point: 108 **Recommend: Possibly eligible**	Style: Dutch Colonial Revival Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Rusticated concrete block Sash: Other **Details:** A highly-intact example of a Craftsman frame structure. Stylistic elements include, gable front, porch incorporated under the second story, band of windows in the gable, over hanging eaves, bracketing, and side gabled dormers.

Chautauqua County
Town: Hanover
Silver Creek (V)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 277	28 Ward Place (cont'd) Town: Hanover Silver Creek (V) MCD: 01314 Chautauqua County Date: ca. 1920 Map Point: 108 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 278	1873 East Middle Road Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1860 Map Point: 109 **Recommend: Possibly eligible**	Style: Vernacular Stories: One-and-a-half Plan: L-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A highly-intact Vernacular cottage. The building features gabled main bay, both two-over-two and four-over-four wooden sash, and Craftsman era porch on wing.
 Photo Number: 279	1980 King Road Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1830 Alterations: New windows, rear addition. Map Point: 110 **Recommend: Possibly eligible**	Style: Federal Stories: Two Plan: Rectangular with rear ell Roof: Side gable Ext. Siding: Brick Foundation: Limestone Sash: New **Details:** A largely-intact rare example of a masonry Federal style house in the study area. Stylistic elements include; five bay by two bay configuration, central entrance, fanlight above door, interior end chimneys, entablature and returns. Previously inventoried-no det.; USN: 01323.000008

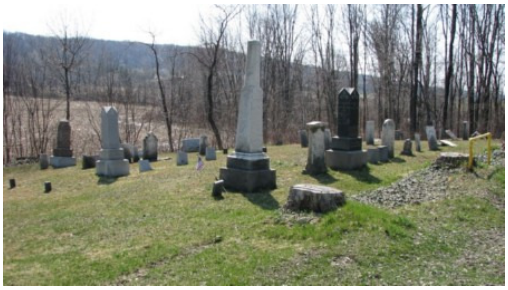
Chautauqua County
Town: Sheridan

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 280	2023 Stebbins Road Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1915 Map Point: 111 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two Plan: Rectangular Roof: Side gable Ext. Siding: Wood shingle Foundation: Parged Sash: Other **Details:** A highly-intact Colonial Revival with Craftsman elements. The building features; side gable roof, pedimented center entry, symmetrical fenestration, shed dormer, six-over-one windows, and brick end chimney.
 Photo Number: 281	2023 Stebbins Road (cont'd) Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1915 Map Point: 111 **Recommend: Possibly eligible**	**Details:** Associated side gable barn with high fieldstone foundation.
 Photo Number: 282	2023 Stebbins Road (cont'd) Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1915 Map Point: 111 **Recommend: Possibly eligible**	**Details:** Small brick outbuilding associated with the property.

Chautauqua County
Town: Sheridan

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 283	2248 Stebbins Road Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1870 Alterations: Some new windows. Map Point: 112 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Irregular Roof: Cross hip Ext. Siding: Clapboard Foundation: Limestone Sash: New **Details:** A largely-intact example of an Italianate structure. Stylistic elements include; segmented arch two-over-two windows, rectangular main block with side wing, flushboard porch, double brackets, hipped roof and topped with a widows walk and cresting.
 Photo Number: 284	2248 Stebbins Road (cont'd) Town: Sheridan MCD: 01323 Chautauqua County Date: ca. 1870 Map Point: 112 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 285	**Wheeler Cemetery** Hanover Road, east side, south of James Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1848 Map Point: 113 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 286	**School No. 10** 9129 North Hill Road Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1880 Map Point: 114 **Recommend: Possibly eligible**	Style: Vernacular Stories: Not noted Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Concrete block Sash: Other **Details:** Compromised schoolhouse no. 10.
 Photo Number: 287	NY 83, South side, west of Hamlet Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:** Inactive farm complex with barns and farmhouse located on opposite sides of the road.
 Photo Number: 288	**(cont'd)** NY 83, South side, west of Hamlet Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: Irregular Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: Two-over-two **Details:** Largely-intact Italianate farmhouse executed in frame. Stylistic elements include; rounded arch windows, some four-over-four sash, and wrap around porch supported by turned post spindles.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 289	NY 83, South side, west of Hamlet (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 290	NY 83, South side, west of Hamlet (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:** East façade.
 Photo Number: 291	NY 83, South side, west of Hamlet (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:** Side gable bank barn with sliding wagon doors. Located across the road from the farmhouse.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 292	NY 83, South side, west of Hamlet (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:** Gable front barn converted to a garage. Located across the road from the farmhouse.
 Photo Number: 293	NY 83, South side, west of Hamlet (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 115 **Recommend: Possibly eligible**	**Details:** Associated outbuildings located
 Photo Number: 294	8025 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1920 Map Point: 116 **Recommend: Possibly eligible**	Style: Colonial Revival Stories: Two-and-a-half Plan: Rectangular Roof: Gable front Ext. Siding: Brick veneer Foundation: Rusticated concrete block Sash: Other **Details:** A highly-intact Colonial Revival farmhouse and barn complex located on the same side of the road. The property is surrounded by cultivated fields.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 295	8025 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1920 Map Point: 116 **Recommend: Possibly eligible**	**Details:** Stylistic elements of this building include; symmetrical massing, partial width front porch, some lead glass windows, 14/1 windows, and one-over-one windows, integral porch in gable, stone sills and lintels, wood cornice and polygonal bay on south façade.
 Photo Number: 296	8025 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1920 Map Point: 116 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 297	8025 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1920 Map Point: 116 **Recommend: Possibly eligible**	**Details:** Barn complex.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 298	8052 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	Style: Italianate Stories: Two Plan: L-shaped Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: New **Details:** A largely-intact Italianate farmhouse house. Stylistic elements include; gabled main bay with side wing, full flushboard porch on wing, decorative iron scrollwork, pedimented windowhoods, and simple cornice along the roofline.
 Photo Number: 299	8052 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 300	8052 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:** Expansive side gable barn with concrete silo and square wooden silo.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 301	8052 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:** Gambrel roof barn with sliding wagon doors.
 Photo Number: 302	8052 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:** Associated outbuildings.
 Photo Number: 303	8052 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:** Outbuilding located behind the farmhouse.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 304	8052 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1860 Map Point: 117 **Recommend: Possibly eligible**	**Details:** An active farm with farmhouse and barns on the same side of the road, surrounded by cultivated fields.
 Photo Number: 305	8562 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 118 **Recommend: Possibly eligible**	**Details:** Active farm complex with farmhouse and barn located on the same side of the road.
 Photo Number: 306	**(cont'd)** 8562 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 118 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: L-shaped Roof: Gable Ext. Siding: Vinyl siding Foundation: Limestone Sash: New **Details:** A modified transitional Greek Revival/Italianate farmhouse executed in frame. Stylistic elements include; 3 bay by 2 bay main block with side wing, side hall plan with recessed entry, and decorative lintels.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 307	8562 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 118 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 308	8562 NY 83 (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 118 **Recommend: Possibly eligible**	**Details:** There is a horse pasture to the west of the barn.
 Photo Number: 309	8562 NY 83 Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 118 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: L-shaped Roof: Gable Ext. Siding: Vinyl siding Foundation: Limestone Sash: New **Details:** Side gambrel roof barn with gabled dormer sliding door entry on barn side. It is the best surviving example of its type in study area.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 310	307 Philips Road Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1830 Map Point: 119 **Recommend: Possibly eligible**	**Details:** Farmhouse and barn complex located on opposite sides of the road. The complex is surrounded by cultivated fields.
 Photo Number: 311	**(cont'd)** 307 Philips Road Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1830 Map Point: 119 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Rectangular Roof: Side gable Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A highly-intact example of an early Greek Revival farmhouse. Stylistic elements include; symmetrical fenestration, side gable main bay with side gable wing, side pilasters, full pediment with fanlight, two-over-two windows, simple door enframment with pilasters and cornice, simple cornice along the roofline with returns.
 Photo Number: 312	307 Philips Road (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1830 Map Point: 119 **Recommend: Possibly eligible**	**Details:**

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 313	307 Philips Road (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1830 Map Point: 119 **Recommend: Possibly eligible**	**Details:** Long side gambrel roof barn with concrete silos and milk house, located across from the farmhouse.
 Photo Number: 314	307 Philips Road (cont'd) Town: Villenova MCD: 01326 Chautauqua County Date: ca. 1830 Map Point: 119 **Recommend: Possibly eligible**	**Details:** Associated outbuildings.
 Photo Number: 315	**Pope Hill Cemetery** Pope Hill Road, South side, east of Round Top Road Town: Villenova MCD: 01326 Chautauqua County Date: Ca. 1830 Map Point: 120 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 316	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1858 Map Point: 121 **Recommend: Possibly eligible**	**Details:** The rural Church, former school and cemetery sited on Ball Hill surrounded by cultivated fields.
 Photo Number: 317	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1858 Map Point: 121 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.
 Photo Number: 318	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1858 Alterations: vinyl siding, new windows Map Point: 121 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Gambrel Ext. Siding: Vinyl siding Foundation: Poured concrete Sash: New **Details:** A modified Vernacular church with gabled vestibule and bell tower. The church was organized in 1859 and the current building erected in 1881.

Chautauqua County
Town: Villenova

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 319	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1858 Map Point: 121 **Recommend: Possibly eligible**	**Details:** Historic photograph of the church, available in the church hall.
 Photo Number: 320	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1860 Map Point: 121 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Rectangular Roof: Cross gable Ext. Siding: Vinyl siding Foundation: Poured concrete Sash: New **Details:** School no. 7 stands to the north of the church, it was erected around 1860. Today the school has been heavily altered and used as a meeting hall for the church.
 Photo Number: 321	**Forestville Wesleyan Church/School/Ball Hill Cemetery** 9495 Prospect Road Town: Villenova MCD: 01326 Chautauqua County Date: ca 1858 Map Point: 121 **Recommend: Possibly eligible**	**Details:** Historic photograph of the School no. 7, available in the church hall.

Chautauqua County
Town: Villenova
Balcom (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 322	641 South Dayton Road Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Map Point: 122 **Recommend: Possibly eligible**	**Details:** Active farm complex with farmhouse and outbuilding located on the same side of the road.
 Photo Number: 323	**(cont'd)** 641 South Dayton Road Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Alterations: Metal roof, several addition. Map Point: 122 **Recommend: Possibly eligible**	Style: Vernacular Stories: One-and-a-half Plan: Irregular Roof: Gable front Ext. Siding: Clapboard Foundation: Limestone Sash: One-over-one **Details:** A largely-intact example of a Vernacular farmhouse executed in frame. The building features, a gabled main block and a wing with a deck hip roof, pointed arch windows and side recessed entry.
 Photo Number: 324	641 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Map Point: 122 **Recommend: Possibly eligible**	**Details:** North façade.

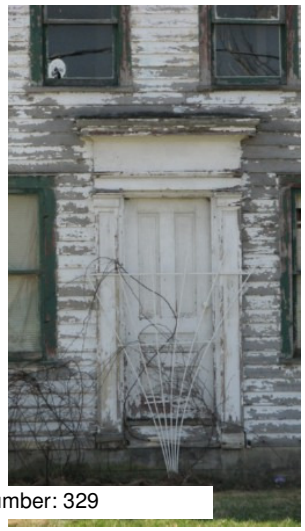
Chautauqua County
Town: Villenova
Balcom (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 325	641 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Map Point: 122 **Recommend: Possibly eligible**	**Details:** Gambrel roof barn with clapboard siding and attached milk house.
 Photo Number: 326	641 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Map Point: 122 **Recommend: Possibly eligible**	**Details:** Small storage building at left and sugar shack at right.
 Photo Number: 327	691 South Dayton Road Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Date: ca 1845 Map Point: 123 **Recommend: Possibly eligible**	Style: Greek Revival Stories: One-and-a-half Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Limestone Sash: One-over-one **Details:** A fairly-intact gable front and wing Greek Revival dwelling. Surviving stylistic elements include; symmetrical massing on the main block, central entrance with simple entablature enframment, side pilasters, cornice and returns. The building has a few remaining two-over-two wooden sash windows.

Chautauqua County
Town: Villenova
Balcom (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 328	691 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Date: ca 1845 Map Point: 123 **Recommend: Possibly eligible**	**Details:** Detail of main block.
 Photo Number: 329	691 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Date: ca 1845 Map Point: 123 **Recommend: Possibly eligible**	**Details:** Detail of door enframment.
 Photo Number: 330	691 South Dayton Road (cont'd) Town: Villenova Balcom (h) MCD: 01326 Chautauqua County Date: ca. 1845 Map Point: 123 **Recommend: Possibly eligible**	**Details:** Associated outbuilding.

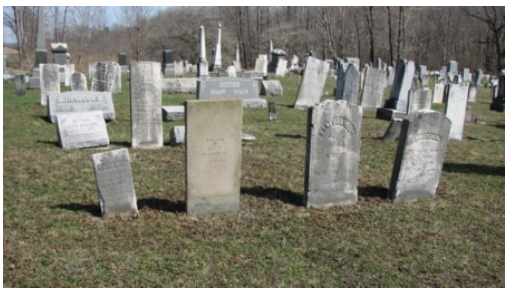
Chautauqua County
Town: Villenova
Balcom Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 331	**Dye Homestead** 558 South Dayton-Hamlet Road Town: Villenova Balcom Corners (h) MCD: 01326 Chautauqua County Date: ca. 1890 Map Point: 124 **Recommend: Possibly eligible**	**Details:** Compromised farmhouse and barn complex on the same side of the road, surrounded by cultivated fields. Previously inventoried; no determination; USN: 01326.000016.
 Photo Number: 332	**Dye Homestead (cont'd)** 558 South Dayton-Hamlet Road Town: Villenova Balcom Corners (h) MCD: 01326 Chautauqua County Date: ca. 1890 Map Point: 124 **Recommend: Possibly eligible**	Style: Queen Anne Stories: Two Plan: Irregular Roof: Gable front Ext. Siding: Wood shingle Foundation: Parged Sash: New **Details:** Compromised Queen Anne farmhouse.
 Photo Number: 333	**Dye Homestead (cont'd)** 558 South Dayton-Hamlet Road Town: Villenova Balcom Corners (h) MCD: 01326 Chautauqua County Date: ca. 1890 Map Point: 124 **Recommend: Possibly eligible**	**Details:** Outbuildings located to the east of the farmhouse.

Chautauqua County
Town: Villenova
Balcom Corners (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 334	**Dye Homestead (cont'd)** 558 South Dayton-Hamlet Road Town: Villenova Balcom Corners (h) MCD: 01326 Chautauqua County Date: ca. 1890 Map Point: 124 **Recommend: Possibly eligible**	**Details:** A highly-intact RCB side gambrel roof bank barn. The barn features, sliding wagon doors, side gambrel wing, shed roof dormer and roof monitors.
 Photo Number: 335	**Dye Homestead (cont'd)** 558 South Dayton-Hamlet Road Town: Villenova Balcom Corners (h) MCD: 01326 Chautauqua County Date: ca. 1890 Map Point: 124 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 336	**Hamlet Cemetery** NY 83, South side, west of Hamlet Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1830 Map Point: 125 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 337	1141 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 126 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Gable front with wing Roof: Gable front Ext. Siding: Clapboard Foundation: Parged Sash: Two-over-two **Details:** A highly-intact example of a Greek Revival residential dwelling sited on a hill overlooking the hamlet of Hamlet. Stylistic elements include; side hall plan with recessed entry, simple entablature enframment with sidelights, two-over-two wooden sash, side pilasters, cornice and returns. Previously inventoried: det. Not eligible; USN: 01326.000041.
 Photo Number: 338	1141 NY 83 (cont'd) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 126 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 339	1141 NY 83 (cont'd) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 126 **Recommend: Possibly eligible**	**Details:** Detail of enframment.

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 340	**Villenova Grange Hall** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	Style: Greek Revival Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: Two-over-two **Details:** The Villenova Grange Hall is a gable front Greek Revival structure. The building maintains its recessed central entrance with transom, two-over-two wooden sash windows, and overhanging eaves.
 Photo Number: 341	**Villenova Grange Hall (cont'd)** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	**Details:** Main façade
 Photo Number: 342	**Villenova Grange Hall (cont'd)** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	**Details:** North and west elevation.

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 343	**Villenova Grange Hall (cont'd)** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	**Details:** Grange sign is still visible.
 Photo Number: 344	**Villenova Grange Hall (cont'd)** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	**Details:** Detail of recessed entry.
 Photo Number: 345	**Villenova Grange Hall (cont'd)** 1150 NY 83 Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Map Point: 127 **Recommend: Possibly eligible**	**Details:** South elevation, portions are deteriorating.

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 346	**Hamlet School District No. 2** School Street, east side at bend Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: June 1881 Map Point: 128 **Recommend: Possibly eligible**	Style: Vernacular Stories: One Plan: Irregular Roof: Cross gable Ext. Siding: Clapboard Foundation: Parged Sash: Other **Details:** Hamlet District School no. 2 is largely-intact. It has been converted to a residential dwelling. The building maintains its cross gable configuration, central entrance and four-over-four windows.
 Photo Number: 347	**Hamlet School District No. 2 (cont'd)** School Street, east side at bend Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: June 1881 Map Point: 128 **Recommend: Possibly eligible**	**Details:** An alley of mature hardwood trees forms a path to the front door.
 Photo Number: 348	**Hamlet United Methodist Church** 1119 South Dayton Road (NY 83) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: 1812 Map Point: 129 **Recommend: Possibly eligible**	Style: Gothic Revival Stories: One Plan: Rectangular with rear ell Roof: Gable front Ext. Siding: Clapboard Foundation: Fieldstone Sash: Other **Details:** The Hamlet United Methodist Church is sited at the heart of Hamlet. The building maintains its clapboard siding, lancet windows and side bell tower. A modern vestibule entrance was added sometime in the late twentieth century. Previously inventoried, determined Not eligible; USN: 01326.000038

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 349	**Hamlet United Methodist Church (cont'd)** 1119 South Dayton Road (NY 83) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: 1812 Map Point: 129 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 350	**Hamlet United Methodist Church (cont'd)** 1119 South Dayton Road (NY 83) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: 1812 Map Point: 129 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 351	1129 South Dayton Road (NY 83) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 130 **Recommend: Possibly eligible**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Clapboard Foundation: Fieldstone Sash: Two-over-two **Details:** A fairly-intact example of a Vernacular residential dwelling located in Hamlet. It is sited at the busy intersection of NY 83 and Cherry Hill Road. Previously inventoried, determined not eligible; USN: 01326.000039

Chautauqua County
Town: Villenova
Hamlet (h)

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 352	1129 South Dayton Road (NY 83) (cont'd) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 130 **Recommend: Possibly eligible**	**Details:** Stylistic elements include, asymmetrical massing, full width porch two-over-two windows heavy cornice and hipped roof.
 Photo Number: 353	1129 South Dayton Road (NY 83) (cont'd) Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1870 Map Point: 130 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 354	**IOOF** South Dayton Road (NY 83), north side, east of South Hill Road Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1905 Map Point: 131 **Recommend: Possibly eligible**	Style: Other Stories: Two Plan: Rectangular Roof: Hipped Ext. Siding: Concrete block Foundation: Concrete block Sash: One-over-one **Details:** The IOOF Hall is a largely-intact commercial storefront in Hamlet. It is the only surviving intact commercial structure in the hamlet. Previously inventoried, determined Not eligible; USN: 01326.000040.

Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 355	**IOOF (cont'd)** South Dayton Road (NY 83), north side, east of South Hill Road Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1905 Map Point: 131 **Recommend: Possibly eligible**	**Details:** This symmetrical building features two plate glass display windows flanking the main entrance, a stone cornice above and hipped roof with overhanging eaves.
 Photo Number: 356	**IOOF (cont'd)** South Dayton Road (NY 83), north side, east of South Hill Road Town: Villenova Hamlet (h) MCD: 01326 Chautauqua County Date: ca 1905 Map Point: 131 **Recommend: Possibly eligible**	**Details:**
 Photo Number: 357	**Villenova Cemetery** Cemetery Road, east side, south of Villenova Road Town: Villenova Wright's Corners (h) MCD: 01326 Chautauqua County Date: ca 1812 Map Point: 132 **Recommend: Possibly eligible**	**Details:** See Cemetery Section.

9.0 Cemeteries

The Chautauqua County Local History and Genealogy website provides a listing of the cemeteries in the county. The information was compiled by local citizens and documented by Virginia W. Barden, Lois Barris, and Norwood Barris in *A Guide to Chautauqua County Cemeteries & Burial Sites*. Records for Cattaraugus County cemeteries can be accessed at the Cattaraugus County Historical Society in Machias, New York. In addition, a partial listing of cemeteries is available on the Cattaraugus County Local History and Genealogy website (Allen 2006). Burial records were obtained from church records and local citizen transcribers.

Several cemeteries in the survey area contain cast zinc monuments. The Monumental Bronze Company of Bridgeport, Connecticut, produced sand-cast zinc grave markers (advertised as "White Bronze") from 1874 to 1914. These were sold throughout the United States and Canada. Zinc markers stand out from other stone markers because of the distinctive blue-gray color. Early zinc markers can be distinguished from later ones by their bases. Early markers have plain, slab bases, while later ones usually have the look of roughly chipped granite.

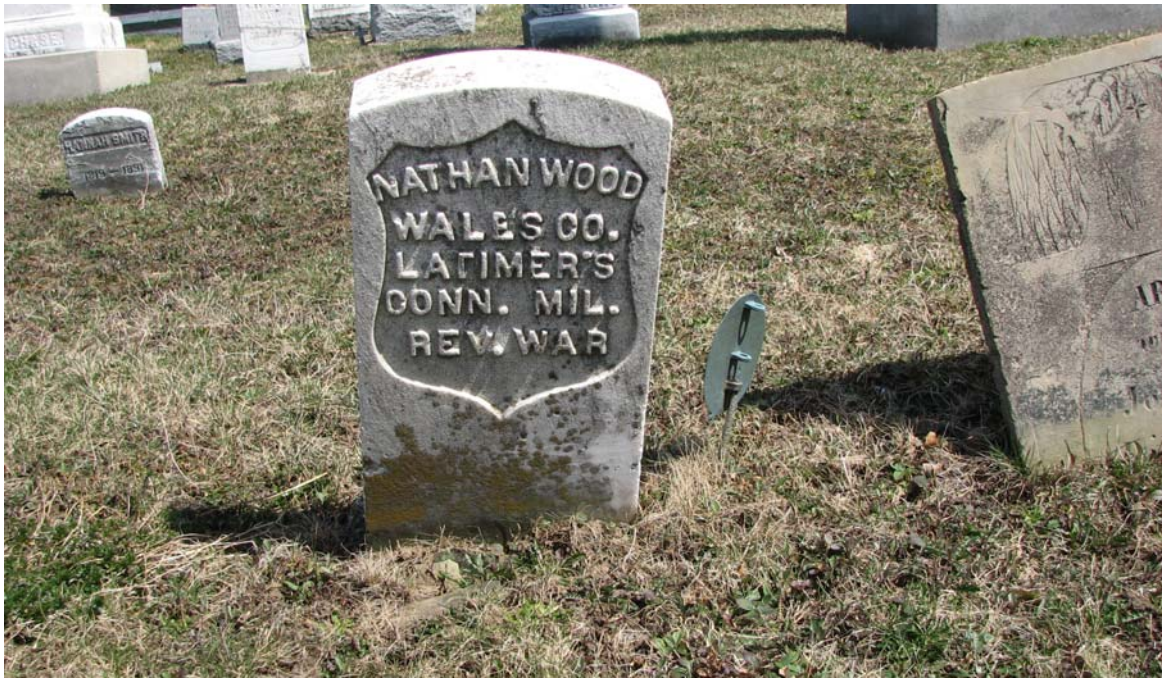
Note: numerous small cemeteries are scattered throughout the region and are located on private land. In such cases, these isolated cemeteries might not have been identified because of either a lack of access or an unconfirmed location. Only those cemeteries located in the viewshed were documented.

ARKWRIGHT SUMMIT CEMETERY

Arkwright Summit Cemetery (ca. 1810-present) is located on the east side of Farrington Hollow Road, south of NY 83 in the Hamlet of Blacks Corners, Town of Arkwright, Chautauqua County. It is a small community cemetery, surrounded by agricultural lands. It is a one-acre plot situated on flat ground with little landscaping. The entire cemetery is surrounded by a pipe fence with a central gated entrance at Farrington Road. The oldest section is located on the south side. The headstones range in form from tombstone to the more elaborate pulpit marker and pedestal tombs. Arkwright Summit Cemetery houses to remains of several members of the Wooley and Abbey families as well as the Black family of Blacks Corners. Arkwright Summit Cemetery contains the remains of Revolutionary War soldiers, Nathan Wood and John Abbey. In addition, veterans from the Civil War and World War II were laid to rest here. A transcribed list of burials is available online at the Chautauqua County GenWeb site.

Photograph 9.1. Arkwright Summit Cemetery entrance gate, facing east (*Panamerican 2008).*

Photograph 9.2. View from center of the cemetery, facing southeast (*Panamerican 2008*).



Photograph 9.3. Gravesite of Revolutionary War soldier Nathan Wood, facing east (*Panamerican 2008*).

BALL HILL CEMETERY

Photograph 9.4. Overview of Ball Hill Cemetery, School No. 7 and Forestville Wesleyan Church, facing west (*Panamerican 2008*).

Ball Hill Cemetery (1865-ca. 1970) is located at 9495/9497 Prospect Road, Town of Villenova, Chautauqua County. It is situated at the height of Ball Hill, surrounded by agricultural fields. Found to the north of Forestville Wesleyan Church and old District School No. 7, the cemetery is well maintained. It is completely enclosed with an iron bow-and-picket fence and a gated pedestrian entrance at the west side. Mature deciduous hardwood trees line the west side of the cemetery. Located within the proposed project footprint, Ball Hill Cemetery contains a collection of tombstones, tab in socket, obelisks and pedestal tombs. The majority of stones are made of marble and granite. A transcribed list of burials is available online at the Cattaraugus County GenWeb site.

Photograph 9.5. View from center of Ball Hill Cemetery, facing west. Proposed turbine locations will be in the background (*Panamerican 2008*).

BALLTOWN CEMETERY

Ball Town Cemetery (1811-present) is on the east side of Mackinaw Road, southeast of Alleghany Road in the Hamlet of Balltown, Town of Hanover, Chautauqua County. The first burial was Joan Joseph in 1811, and it remains an active cemetery. Balltown Cemetery contains mostly simple tombstones executed in marble. Remnants of earlier slate stones were identified, however, the inscriptions on many are illegible. The cemetery houses the remains of Revolutionary War, War of 1812, and Civil War veterans. According to the USGS map, the cemetery was located near the grounds of Hanover School Number 8. The school has been demolished or moved. Balltown Cemetery was transcribed in 1925 by May Christy and digitized in 1999 by Donna Mills. The partial list is available online Chautauqua County Genweb.

Photograph 9.6. Overview of Ball Town Cemetery, facing north (*Panamerican 2008*).

Photograph 9.7. View from cemetery entrance, facing north (*Panamerican 2008*).

CHRISTY ROAD CEMETERY

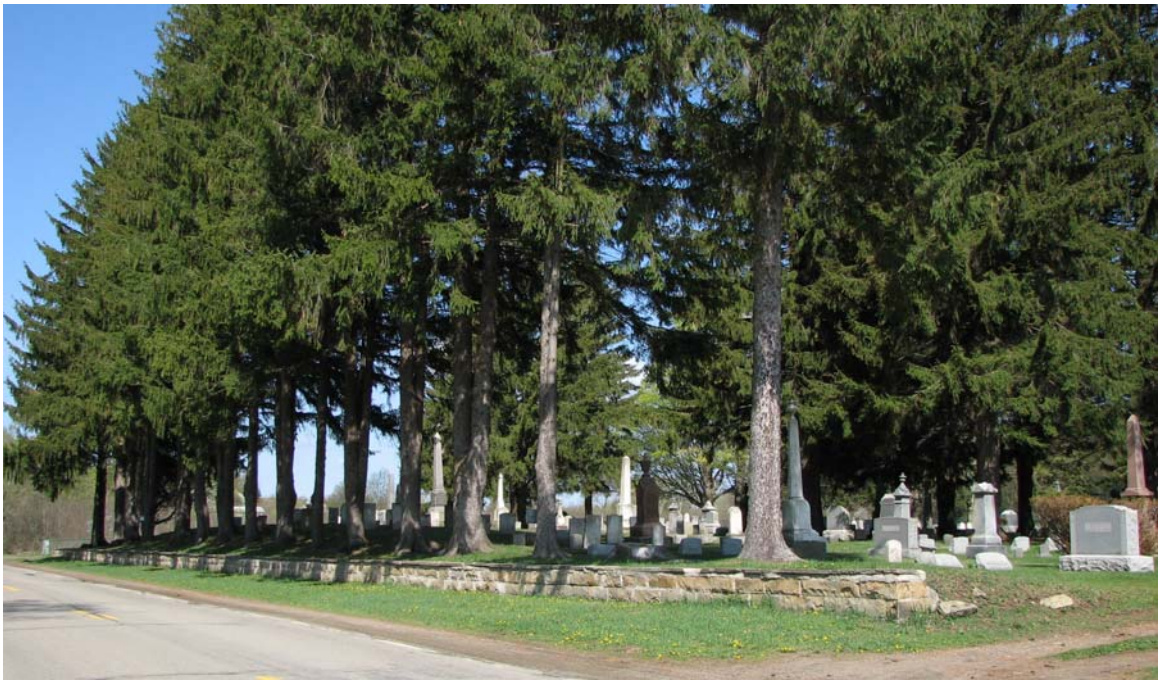
Christy Road Cemetery (also know as, Log Village Cemetery and Maple Grove Cemetery) (ca. 1830-1965) is located on the north side of Christy Road, east of Alleghany Road, Town of Hanover. It is set approximately 400 feet back from Christy Road. The graveyard is surrounded by vineyards. Hardwoods and evergreens provide screening for the grave stones. An iron pipe fence surrounds the north, east and west sides. Christy Road Cemetery contains a moderate assortment of grave-marker types and materials. The majority are simple stones executed in marble. The high style markers include obelisk and pedestal tombs. War veterans from the War of 1812, Civil War, and World War I were identified in the cemetery. The cemetery was transcribed by May Christy in 1925 (Chautauqua nd). The earliest burial appears to be Philo Newton in 1839 and the last in 1965. The later graves are not included in the list compiled by Christy.

Photograph 9.8. Christy Road Cemetery from Christy Road, facing east (*Panamerican 2008*).

Photograph 9.9. The gravesite of a Civil War soldier, facing south. Vineyards are visible in the background (*Panamerican 2008*).

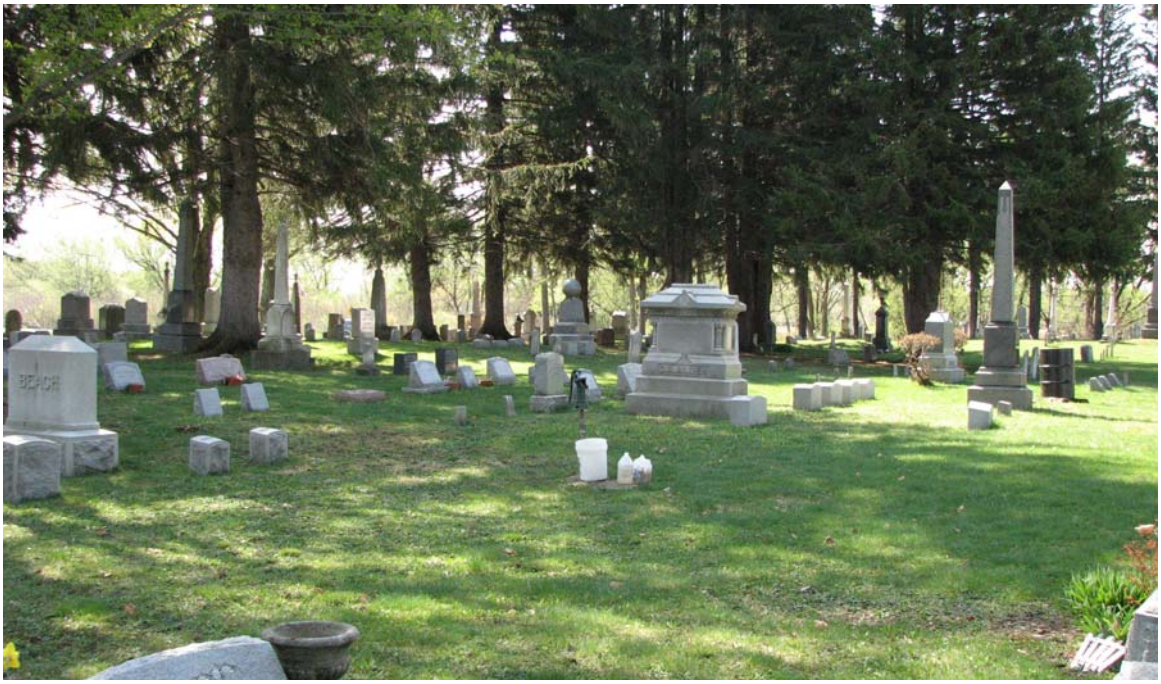
COTTAGE CEMETERY

Cottage Cemetery (ca. 1820-present) is located on the north side of Cottage Road, west of Edwards Corner Road in the Hamlet of Cottage, Town of Dayton, Cattaraugus County. A stone retaining wall topped with mature evergreen trees form the entrance to the cemetery. A wagon path provides an access ring around the grounds. The surrounding land is largely agricultural. The grounds are very well maintained, as mature hardwood and evergreen trees dot the landscape. The monuments vary in type and material. The oldest stones are slate tombstones located at the center of the cemetery grounds. The cemetery contains some high style monuments including obelisks, pedestal tombs and a tree stump. The cemetery contains the remains of war veterans from the Revolutionary War through the Vietnam War. A transcribed list of burials is available online at the Cattaraugus County GenWeb site.



Photograph 9.10. Main entrance to Cottage Cemetery, facing west (*Panamerican 2008*).

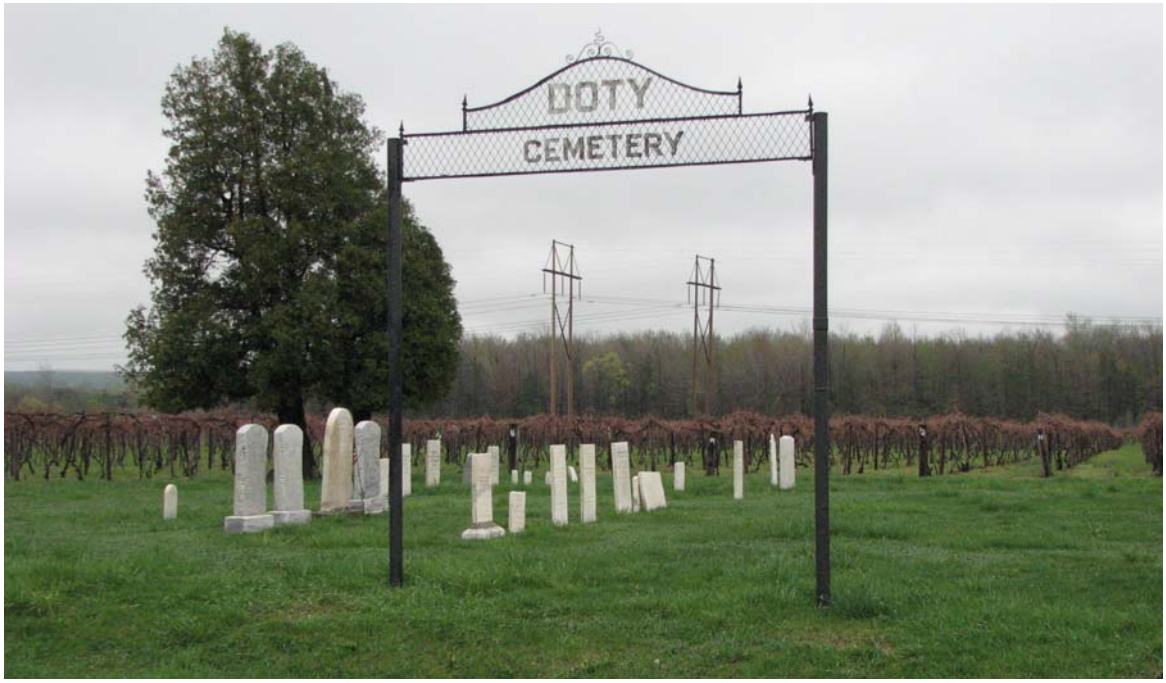
Photograph 9.11. View of the northeast corner of the cemetery, facing northeast (*Panamerican 2008*).



Photograph 9.12. View of various monument types in Cottage Cemetery, facing east (*Panamerican 2008*).

DOTY CEMETERY

Doty Cemetery (ca. 1810-1900) is a small family cemetery situated on the south side of Stebbins Road, west of Old Forestville Road in the Town of Hanover, Chautauqua County. On



Photograph 9.13. Entrance gate at Doty Cemetery, facing south (*Panamerican 2008*).

level ground, the cemetery has vineyards on the east, west and south. To the north are views of I-90. The monuments are simple tombstones and die-on-base executed mainly in marble. Several local families are buried here including: Doty, Barris, Christy, Spink, and Whitney. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.14. View of the cemetery facing west. Vineyards are visible in the background (*Panamerican 2008*).

EVERGREEN LAWN CEMETERY

Located on the south side of Angell Road at Denison Road, Town of Hanover, Chautauqua County, Evergreen Lawn Cemetery (ca. 1820- present) covers approximately two acres and is surrounded by agricultural lands. It was originally called the Hanover Center Burying Ground Society. Established in 1820, the cemetery contains a large selection of monument forms and materials. The older markers are largely tab-in-socket constructed in marble. There are several high style grave markers executed in marble and granite. Veterans from all the major wars are buried here, including at least one Revolutionary War veteran, William Ingram. A list of burials from the Records of Evergreen Lawn Cemetery at Hanover Center, New York is available online at Chautauqua County Genweb. The original list dates from the 1920s and was updated in the summer of 1984 by Catherine Fox and Mary F. Bailey.

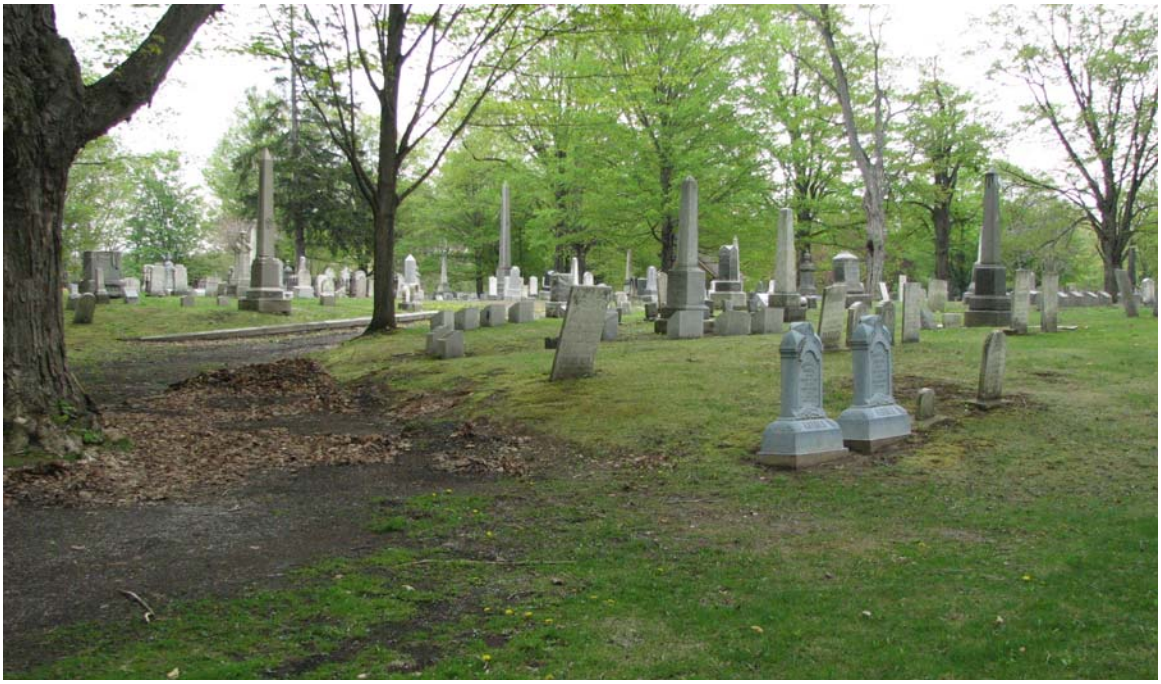
Photograph 9.15. View from the southwest corner of Evergreen Lawn Cemetery, facing northeast (*Panamerican 2008*).

Photograph 9.16. View showing the varying monument types in the cemetery, facing east (*Panamerican 2008*).

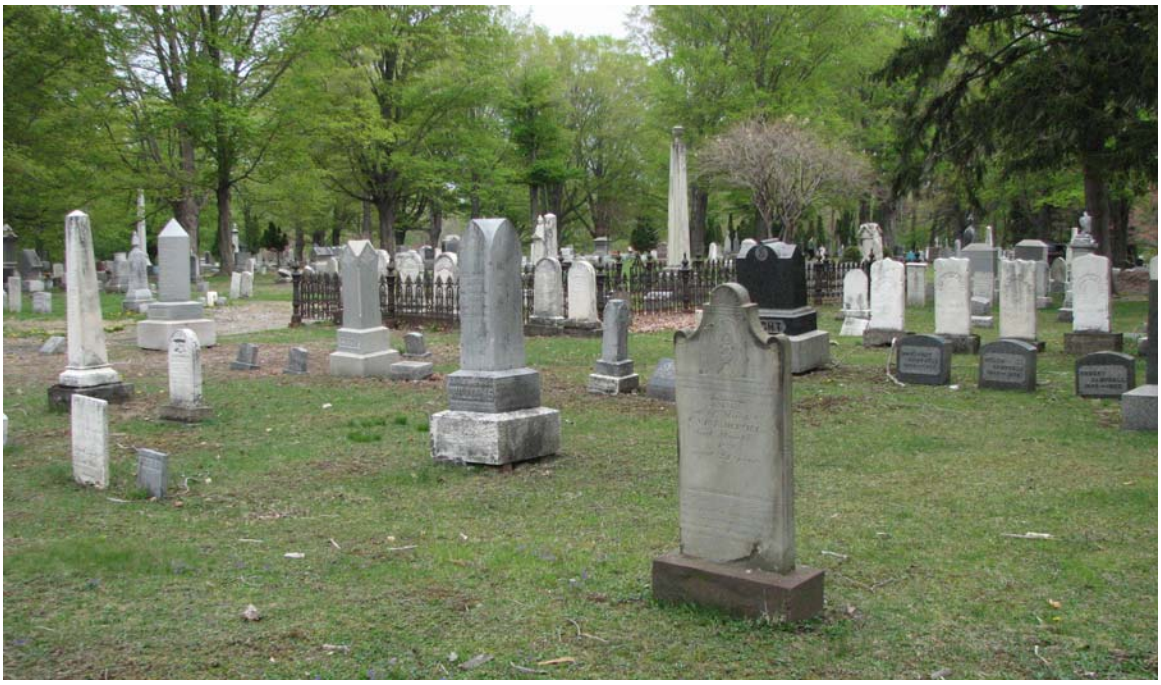
GLENWOOD CEMETERY

Glenwood Cemetery (ca. 1815-present) is located on the east side of Old Main Street, south of NY 20 in the Village of Silver Creek, Town of Hanover, Chautauqua County. The surrounding land is largely residential. Glenwood Cemetery and Our Lady of Mount Carmel Cemetery are sited on one large parcel with an access road connecting the two. The large municipal cemetery has stone entrance piers at Old Main Street and a wagon road that provides access to the graves. Glenwood Cemetery contains a wide variety of monument types and materials. Simple tombstones lay alongside more elaborate obelisks. The materials range from slate to zinc. Mature hardwood trees shade the graves. Glenwood contains the remains of veterans from the Revolutionary War to the Vietnam War. The cemetery is very well maintained and still in use. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.17. Entrance piers to Glenwood Cemetery, facing east (*Panamerican 2008*).



Photograph 9.18. View from main access road, facing east. Note the two zinc monuments at right center (*Panamerican 2008*).

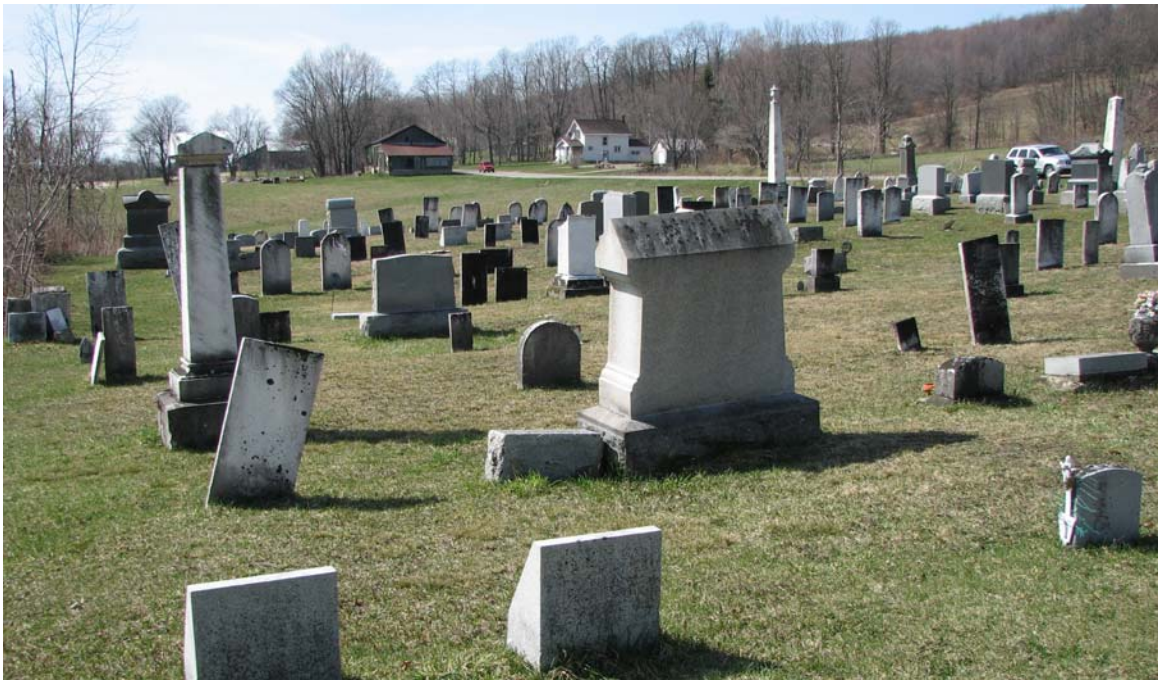


Photograph 9.19. The oldest section of the cemetery, shown here, is located along Old Main Street, facing east (*Panamerican 2008*).

Photograph 9.20. Cast-iron gate around the Swift/Lee family burial plot, facing east (*Panamerican 2008*).

HAMLET CEMETERY

Hamlet Cemetery (ca. 1830-present) is located on the south side of NY 83, west of the Hamlet of Hamlet, Town of Villenova, Chautauqua County. The surrounding environment is largely agricultural. The cemetery is well maintained with a variety of headstones including: tombstones and tab-in-socket, pedestal tombs and obelisks. The Hamlet Cemetery contains the graves of Revolutionary War, War of 1812, Civil War and World War II veterans. The cemetery is surrounded by a fence of hardwood trees, and all the stones face west. A transcribed list of burials is available online at the Chautauqua County GenWeb site.



Photograph 9.21. View from the center of the cemetery, facing west. NY 83 is visible in the background *(Panamerican 2008).*

Photograph 9.22. Various monument types and ages in Hamlet Cemetery, facing east (*Panamerican 2008*).

Photograph 9.23. The oldest stone in the cemetery, identified as Haley Clark, who died at the age of 80 in 1837, facing east (*Panamerican 2008*).

NASHVILLE CEMETERY

Nashville Cemetery (1813-early twentieth century) is situated on the west side of Alleghany Road, north of NY 39, south of the Hamlet of Nashville, Town of Hanover, Chautauqua County. A rural cemetery located on a hill, the cemetery is surrounded by active and inactive farmsteads and a heavily forested area to the east. A wagon road on the south side provides pedestrian access to the graves. The oldest section is found at the northwest corner. It is a well-maintained cemetery with a several different marker forms and materials. The majority of stones are tombstones and tab-in-sockets, however, there are a number of high style monuments including obelisk and pedestal tomb headstones. Stones are executed in slate, marble and granite. Two Revolutionary War soldiers are buried in Nashville Cemetery—Enos Schofield and Silas Nash, Nashville's namesake. A transcribed list of names is available at Chautauqua County Genweb.

Photograph 9.24. Overview of Nashville Cemetery from Alleghany Road, facing southwest (*Panamerican 2008*).

Photograph 9.25. The western end of the cemetery, facing west (*Panamerican 2008*).

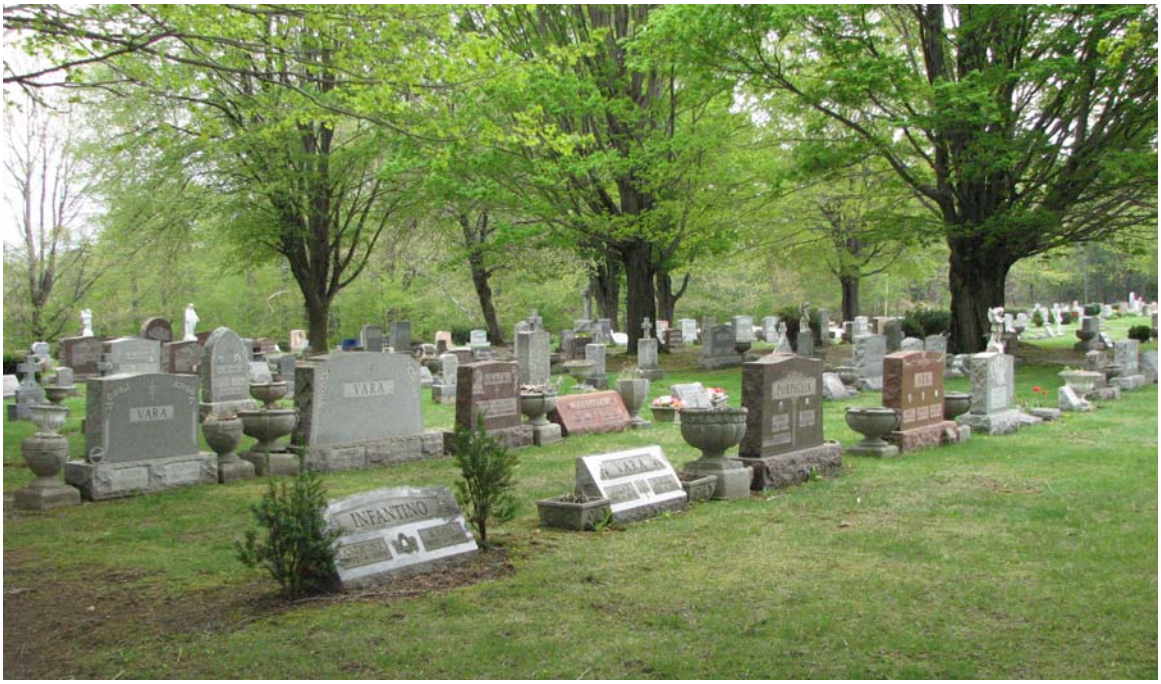
Photograph 9.26. Some of the oldest slate stones are deteriorating (*Panamerican 2008*).

OUR LADY OF MOUNT CARMEL

Our Lady of Mount Carmel Cemetery (1927-present) is found on the north side of Old Main Street, south of NY 20, in the Village of Silver Creek, Chautauqua County. It is associated with the Our Lady of Mount Carmel Roman Catholic Church in the Village of Silver Creek. The surrounding land is largely residential. Glenwood Cemetery and Our Lady of Mount Carmel Cemetery are sited on one large parcel with an access road connecting the two. Two brick piers topped with urns adorn the main entrance path. Very well maintained, the cemetery contains modern, twentieth-century headstones executed in marble and granite. Mature hardwood trees dot the grounds.

Photograph 9.27. The entrance to Our Lady of Mount Carmel Cemetery, facing east (*Panamerican 2008*).

Photograph 9.28. A high style-associated outbuilding located at the north side of the cemetery, east of the entrance. According to the cornerstone, the building was erected in 1927 (*Panamerican 2008*).

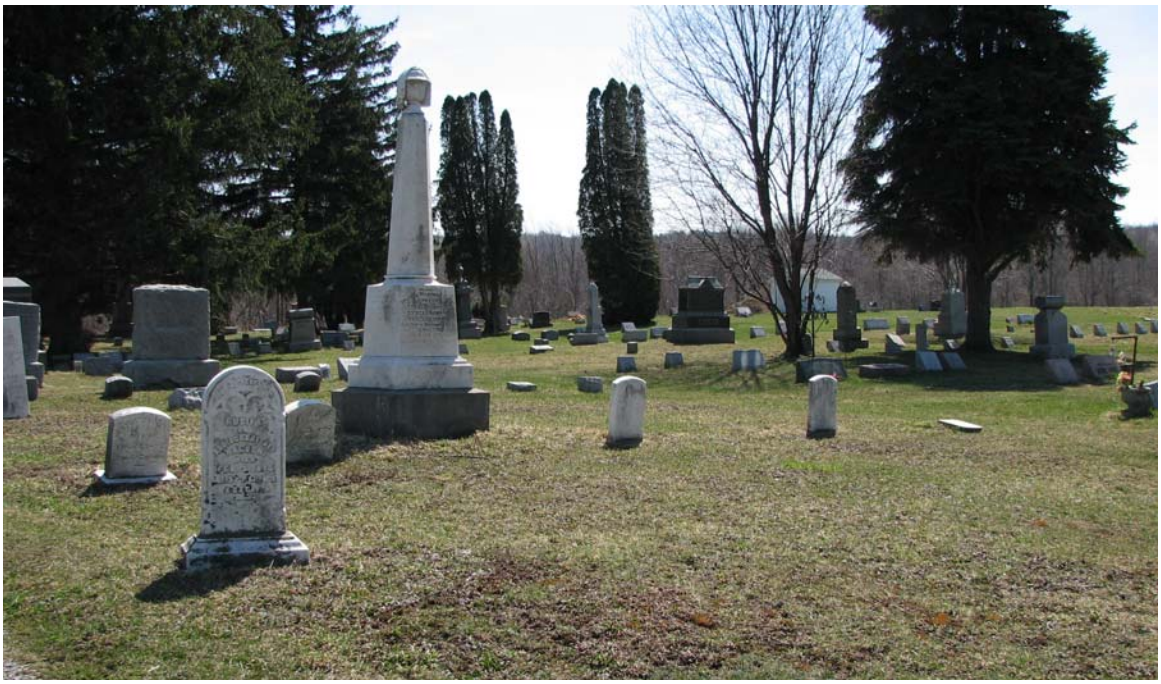


Photograph 9.29. View from the west side access road, facing east (*Panamerican 2008*).

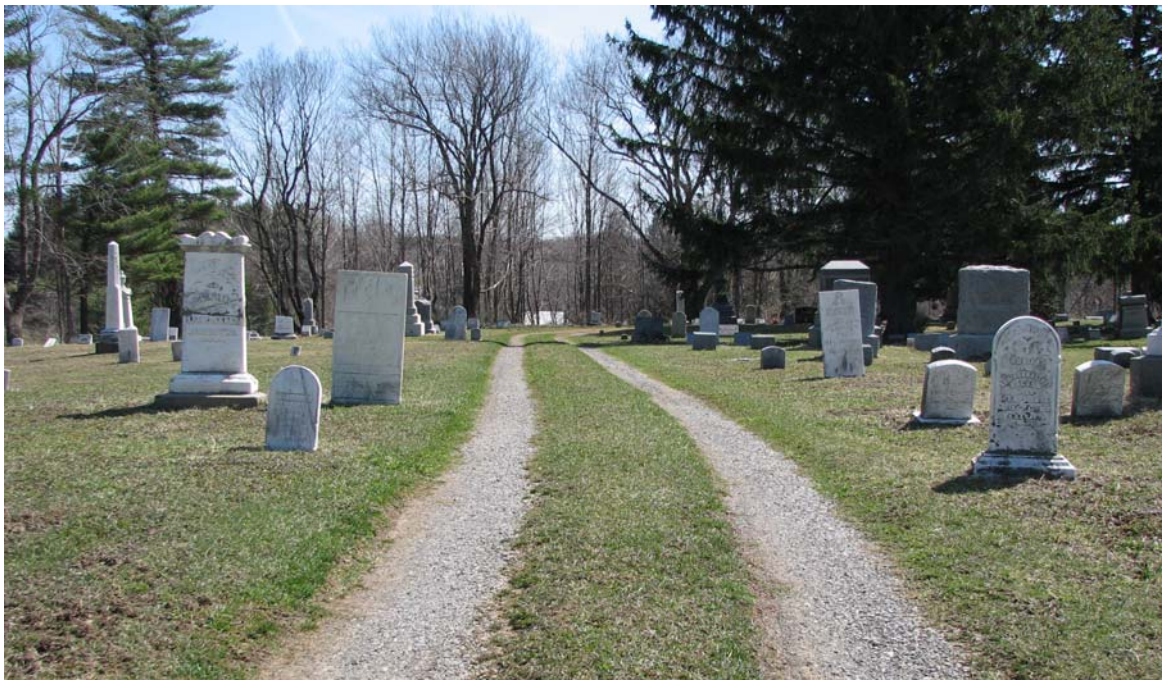
PERRYSBURG CEMETERY

Perrysburg Cemetery (ca. 1830-present) is located on the south side of NY 39, east of the Chautauqua County line in the Town of Perrysburg, Cattaraugus County. The cemetery covers flat ground west of the Village of Perrysburg. At the entrance is a water pump and simple wooden sign. A narrow wagon road provides access around the cemetery, which is dotted with hardwoods and evergreens. It contains a variety of markers ranging from simple tombstones to more elaborate monuments, including the pedestal tomb with a draped urn on top. The oldest section of the cemetery is found along the north side, closest to the road. It holds the graves of many veterans from the Civil War through World War II.

Photograph 9.30. View of the cemetery's entrance, facing south (*Panamerican 2008*).



Photograph 9.31. View from the central access road, facing west *(Panamerican 2008).*



Photograph 9.32. View along the central access road, facing east (*Panamerican 2008*).

PIONEER CEMETERY

Pioneer Cemetery (1824-present) is located at 11051 Old Forestville Road in the Town of Hanover, Chautauqua County. It is situated on the hilly uplands north of the Village of Forestville, with Walnut Creek ravine forming its southern boundary. The surrounding landscape is a mixture of old family farmsteads and vineyards. The cemetery landscape is dominated by mature deciduous and evergreen trees, which provide shade for the monuments. A winding wagon path lined with hardwood trees circles the cemetery providing access to the headstones. The majority of markers face east. The cemetery holds the graves of veterans from the Revolutionary War to the Vietnam War. The oldest section of the cemetery is located at the eastern edge of the grounds along Old Forestville Road. The stones in this section are largely tombstones and tab-in-sockets executed in marble; many of which have been repaired. In addition, there are some high style pedestal tombs and obelisks. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.33. The main entrance to Pioneer Cemetery, facing west *(Panamerican 2008).*

Photograph 9.34. The various monument styles in the cemetery, facing southwest (*Panamerican 2008*).

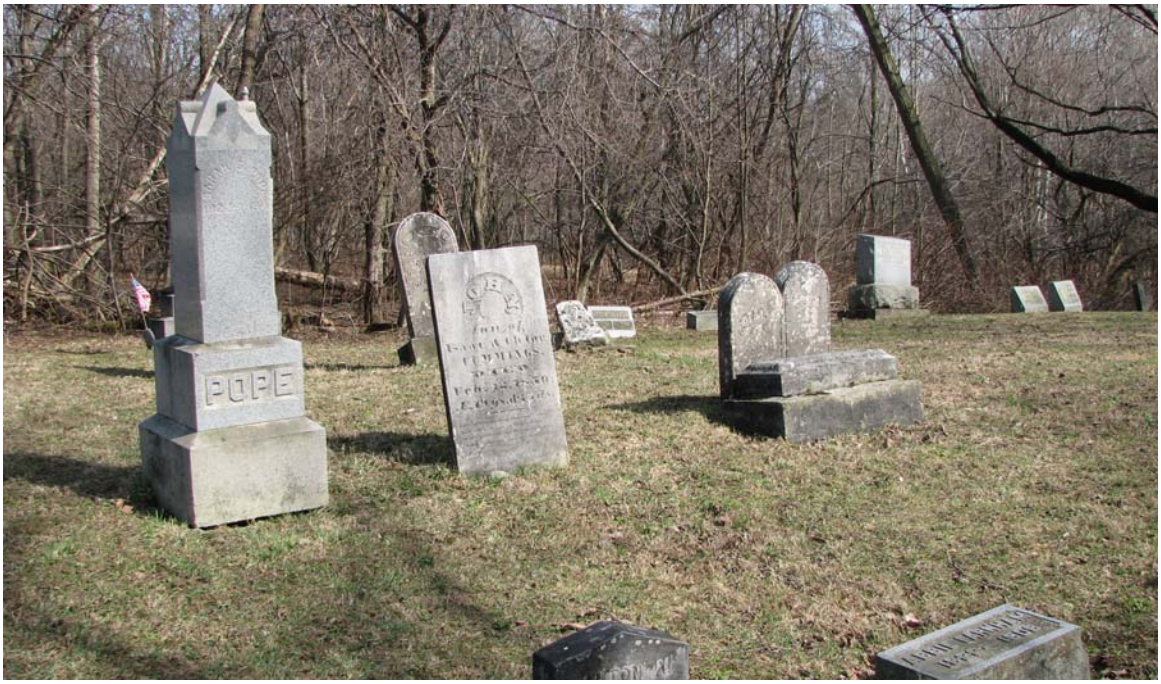
Photograph 9.35. View along the main access road, facing west (*Panamerican 2008*).

Photograph 9.36. The Bradley family burial plot at the far western end of Pioneer Cemetery. Enclosed by a cast-iron fence, the plot is accessed by a gate at the south end. The centerpiece of the plot is the pedestal tomb topped by an urn (*Panamerican 2008*).

POPE HILL CEMETERY

Pope Hill Cemetery (ca. 1830-1985) is located on the south side of Pope Hill Road, east of Round Top Road in the Town of Villenova, Chautauqua County. Amid the heavily wooded uplands of Pope Hill Road, the small family cemetery is flanked by deciduous hardwood trees to the east, west and south. The graves face west. The cemetery contains the graves of the Pope family. Veterans from the Civil War are buried here. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.37. View of the cemetery from Pope Hill Road, facing south *(Panamerican 2008).*

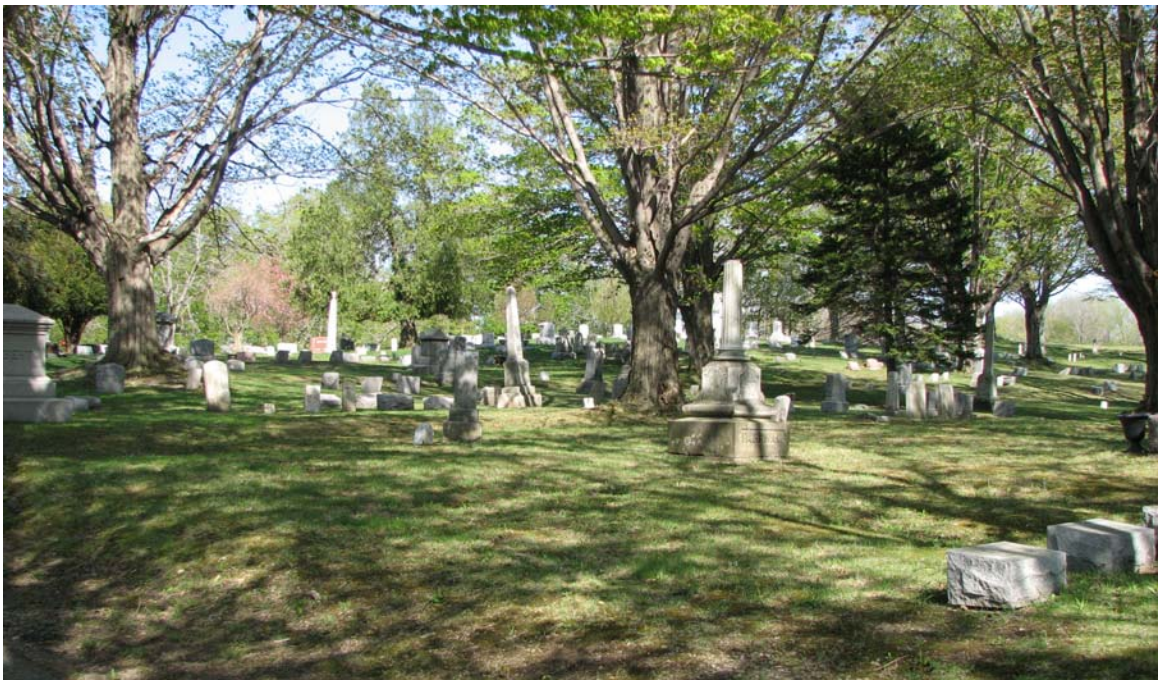


Photograph 9.38. Detail of the high style Pope monument (*Panamerican 2008*).

PROSPECT HILL CEMETERY

Prospect Hill Cemetery (ca. 1860-present) is located on the south side of Prospect Road in the Town of Hanover, Chautauqua County. A large municipal cemetery, it is situated on a hill south of the Village of Forestville. Surrounding land use is a mix of residential and old family farmsteads. A paved path encircles the cemetery. Mature hardwoods and evergreens provide screening. The early markers in the cemetery are largely simple tab-in-socket monuments constructed in marble. There are a large number of high style markers, such as the die, base-and-cap, and obelisks, as well as a handful of zinc monuments. The twentieth-century monuments are plaque markers and raised top, executed in granite. Several veterans of the Civil War to World War II are buried here. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.39. View from Prospect Road looking along the cemetery access road, facing east (*Panamerican 2008*).



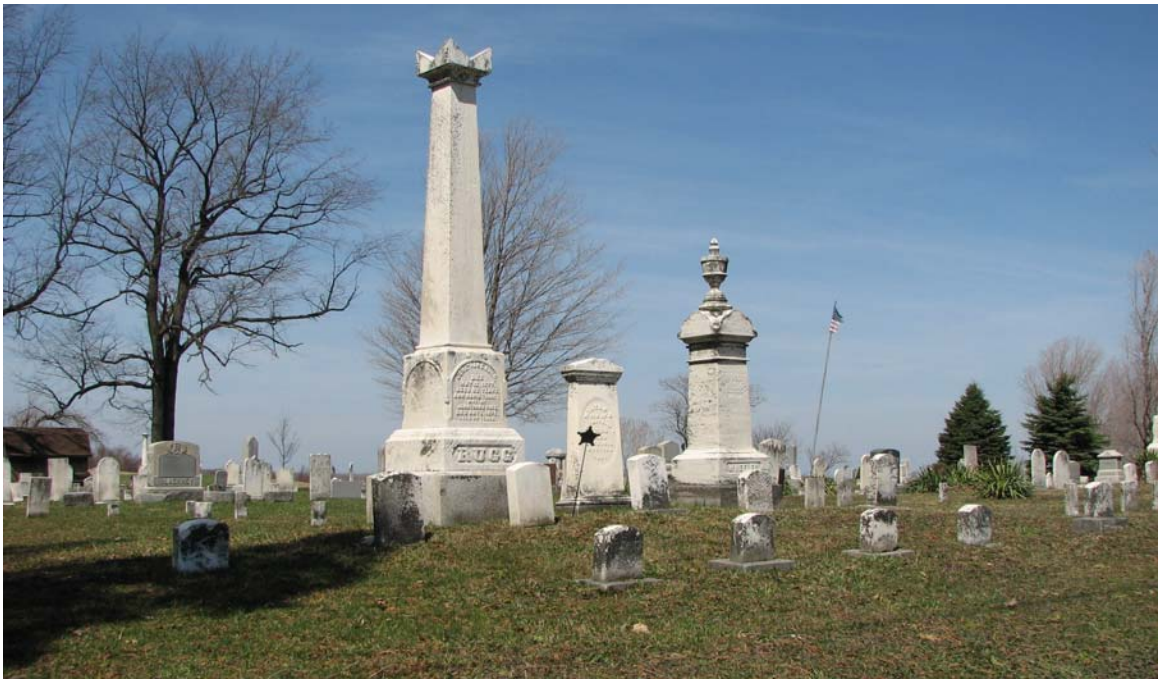
Photograph 9.40. The eastern end of the cemetery, facing east (*Panamerican 2008*).

Photograph 9.41. The western edge of the cemetery, facing southwest. Note the zinc monument at center (*Panamerican 2008*).

RUGG-TOWN WEST PERRYSBURG CEMETERY

Rugg-Town West Perrysburg Cemetery (ca. 1820-present) is found on the west side of West Perrysburg Road south of Mackinaw Road in the hamlet of West Perrysburg, Town of Perrysburg, Cattaraugus County. Located on a terraced hill above NY 39, the cemetery is surrounded by largely agricultural lands with both active and inactive farmsteads. A wagon path at the north end of the cemetery accesses West Perrysburg Road. The cemetery is well maintained, and contains hardwood and evergreen trees throughout. The oldest trees and graves are located at the east end of the cemetery along West Perrysburg Road. The cemetery has a mix of headstone forms and materials, which range from simple tombstones to more elaborate monuments. The majority of stones are executed in marble. The cemetery contains the graves of several Revolutionary War soldiers including Isaac Rugg. In addition, graves of veterans from the War of 1812, Civil War, World War I, and World War II were identified. A transcribed list of names is available online (Van Vlack 1996).

Photograph 9.42. The entrance to Rugg-Town Cemetery, facing west *(Panamerican 2008).*



Photograph 9.43. View of the high style monuments and simpler forms at the cemetery, facing west (*Panamerican 2008*).

Photograph 9.44. Gravesite of Isaac Rugg, Revolutionary War soldier and namesake of Rugg-Town (*Panamerican 2008*).

Photograph 9.45. Late nineteenth-century, marble headstones at the north end of the cemetery (*Panamerican 2008*).

SMITH'S MILLS CEMETERY

Smith's Mill Cemetery (ca. 1830-present) is located on the west side of Hanover Road west of York Road in the Hamlet of Smith Mills, Town of Hanover, Chautauqua County. The cemetery is sited at a 45 degree angle to the road with the Silver Creek ravine forming the southern boundary. Smith's Mill Cemetery is enclosed on three sides by a dense tree barrier. The surrounding land use is both agricultural and heavily forested. A wagon path forms a ring road around the cemetery. The cemetery has an interesting mix of monument forms and materials. The oldest section is located at the northwest end of the cemetery. The cemetery contains the remains of Revolutionary War veteran Asa Gage as well as veterans from the Civil War, both World Wars and the Vietnam War. A transcribed list of names is available online at Chautauqua County Genweb

Photograph 9.46. The entrance to Smith's Mill Cemetery, facing northwest (*Panamerican 2008*).

Photograph 9.47. Gravesite of Asa Gage (*Panamerican 2008*).

Photograph 9.48. The high style Hiller family monuments, pedestal tombs topped with crowns (*Panamerican 2008*).

SWIFT CEMETERY

Swift Cemetery (ca. 1840-ca.1900) is situated on the north side of Hurlburt Road, east of Prospect Road in the Town of Hanover, Chautauqua County. Panamerican architectural historians were unable to obtain access to the cemetery. Photographs were taken from the road. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.49. Swift Cemetery from Hurlburt Road, facing north *(Panamerican 2008).*

VILLENOVA CEMETERY

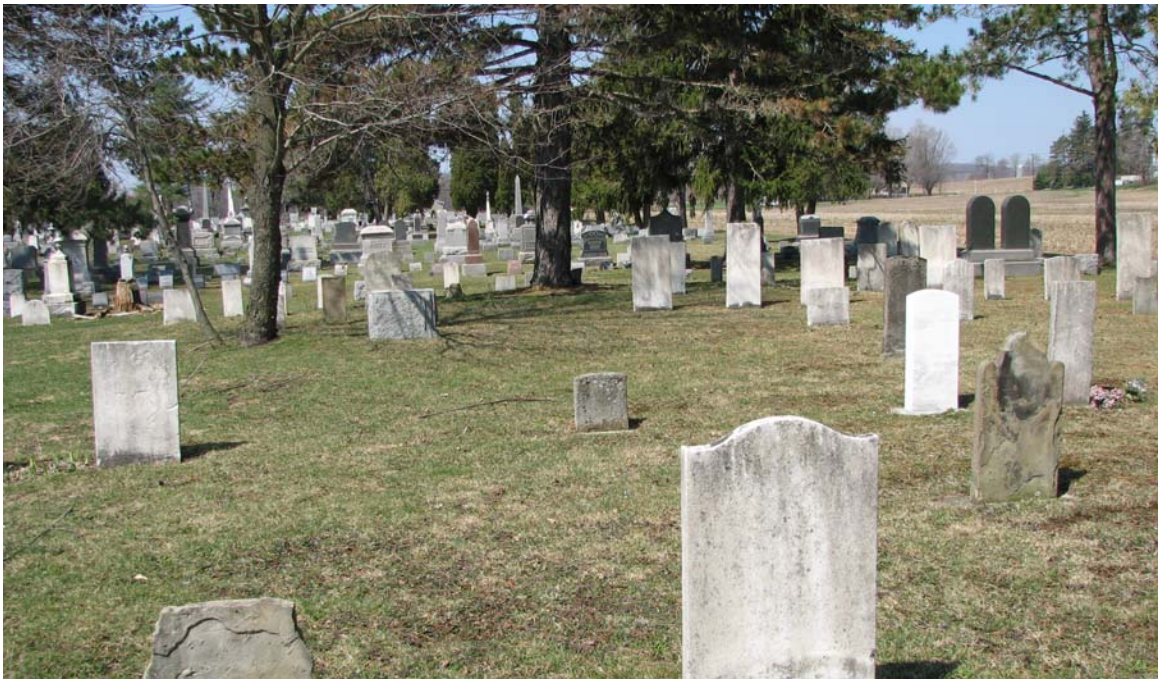
Villenova Cemetery (1811-present) is along the east side of Cemetery Road, south of Phillips Road in the Town of Villenova, Chautauqua County. It is a large municipal cemetery located in the Hamlet of Wrights Corners. Marked by two brick piers, the main entrance path is off Cemetery Road and lined with hardwood trees. The interior of the cemetery is well maintained and dotted with evergreen shrubbery and mature deciduous trees. The oldest section of the cemetery located at the eastern edge of the cemetery. The graves are marked with a variety of tombstones, tab-in-sockets and obelisks, executed in slate marble, and the late nineteenth-century stones in granite. The first burial in the cemetery was "John, son of Eli Arnold, died Nov. 2 1811, Age 15 years." Reverend Eli Arnold was one of the first settlers of the Town of Villenova, and he buried his son on their farmstead. Shortly after the burial, other deaths in the town occurred. Arnold gave permission to have them buried near his son. Eventually, this area became known as the Villenova or Wrights Corners Cemetery and a cemetery committee was formed. By 1857, Rev. Arnold had died and his property was purchased by William Pierce. The cemetery committee offered to buy one and one-half acres of the Pierce farm for a larger cemetery. In 1888, a road was constructed on the south side of the cemetery and the land was surveyed and mapped. In 1890, single graves sold for $5.00,

digging and filling the grave cost $3.00. Grave owners were assessed $1.00 to be used for cemetery improvements only. In 1914, it was voted that the price of all graves include perpetual care (Chautauqua County Genweb 1997). A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.50. Overview of Villenova Cemetery from Phillips Road, facing south *(Panamerican 2008).*

Photograph 9.51. Main entrance of Villenova Cemetery off Cemetery Road, facing east (*Panamerican 2008*).

Photograph 9.52. Two of the oldest graves in the cemetery, located at the extreme eastern edge. The headstones are slate (*Panamerican 2008*).



Photograph 9.53. The eastern edge of the cemetery, facing east (*Panamerican 2008*).

WEAVER CEMETERY

Located on the west side of Center Road, north of Weaver Road in the Town of Arkwright, Chautauqua County, Weaver Cemetery (1848-1905) is sited on a slight knoll surrounded by a clustering of trees. It is the burial site of the Weaver family. There are 14 grave stones, all executed in marble. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.54. Weaver Cemetery from Center Road, facing west *(Panamerican 2008).*

WHEELER CEMETERY

Wheeler Cemetery (ca. 1830-1912) is found on the east side of Hanover Road, south of James Road in the Town of Villenova, Chautauqua County. It is a small family cemetery surrounded by cultivated farmland. The stumps of mature hardwood trees were identified along Hanover Road. Wheeler Cemetery contains the graves of the several local families including the Wheeler, Baker, Balcom, True, and West families. The graves all face west. The cemetery appears to be maintained, but many of the stones are in fair condition with cracks and/or leaning. A transcribed list of names is available online at Chautauqua County Genweb.

Photograph 9.55. Wheeler Cemetery from Hanover Road, facing east *(Panamerican 2008).*

Photograph 9.56. The southern end of the cemetery, facing southeast (*Panamerican 2008*).

10.0 Village of South Dayton Ewing Park Historic District

10.1 INTRODUCTION

The Village of South Dayton is situated between Conewango Creek on the west and the former Buffalo & Southwestern branch of the Erie Railroad on the east. Located in the Town of Dayton, Cattaraugus County, New York, the village is surrounded by historically agricultural land with a long tradition of lumbering and dairy farming. The village is centered on two main roads: Cottage Road, a busy rural thoroughfare with a north-south orientation at the western edge of the village, and Pine Street (NY 322), an east-west road that extends from Villenova, Chautauqua County to Dayton, Cattaraugus County. Subsequent residential and commercial neighborhoods developed around these two linear corridors to form a village based on the grid-iron system. The village's historic core is situated along Conewango Creek with development spreading eastward after the extension of the railroad to South Dayton. The importance of the railroad in South Dayton is evidenced today by the village's extant, post-railroad historic nineteenth-century building stock. A small commercial district was established on the village green, present-day Ewing Park, which advanced the community's role as a railroad center. The proposed Village of South Dayton Ewing Park Historic District retains the most intact and cohesive historic streetscape in the village (Figure 10.1). The entire proposed historic district is located in the positive ZVI.

The proposed Ewing Park Historic District is an approximately 3.7-acre (161,203-sq ft) area bound by Park Street on the west, the Erie Railroad tracks on the east, Maple Street on the north, and Pine Street on the south. The proposed district includes 14 properties (13 contributing buildings, and 1 non-contributing building) on all sides of Ewing Park. Table 10.1 presents a breakdown of architectural styles represented in the proposed historic district. Contributing and non-contributing properties are keyed to a parcel map of the proposed historic district (Figure 10.2; see Figure 10.1). The proposed historic district is recommended as eligible for listing to the National Register of Historic Places under Criterion A, for its association as the commercial and industrial hub in the village, and Criterion C, for its collection of largely intact, late nineteenth-century through early twentieth-century commercial buildings. The proposed Ewing Park Historic District has a period of significance extending from 1875 to 1950.

Table 10.1. Summary of Architectural Styles in the proposed Ewing Park Historic District.

Style/Type	No. of Contributing	No. of Non-Contributing
Craftsman	1	
Italianate	3	
Modern		1
Neo-Classical	2	
No Style/Other	2	
Vernacular	5	

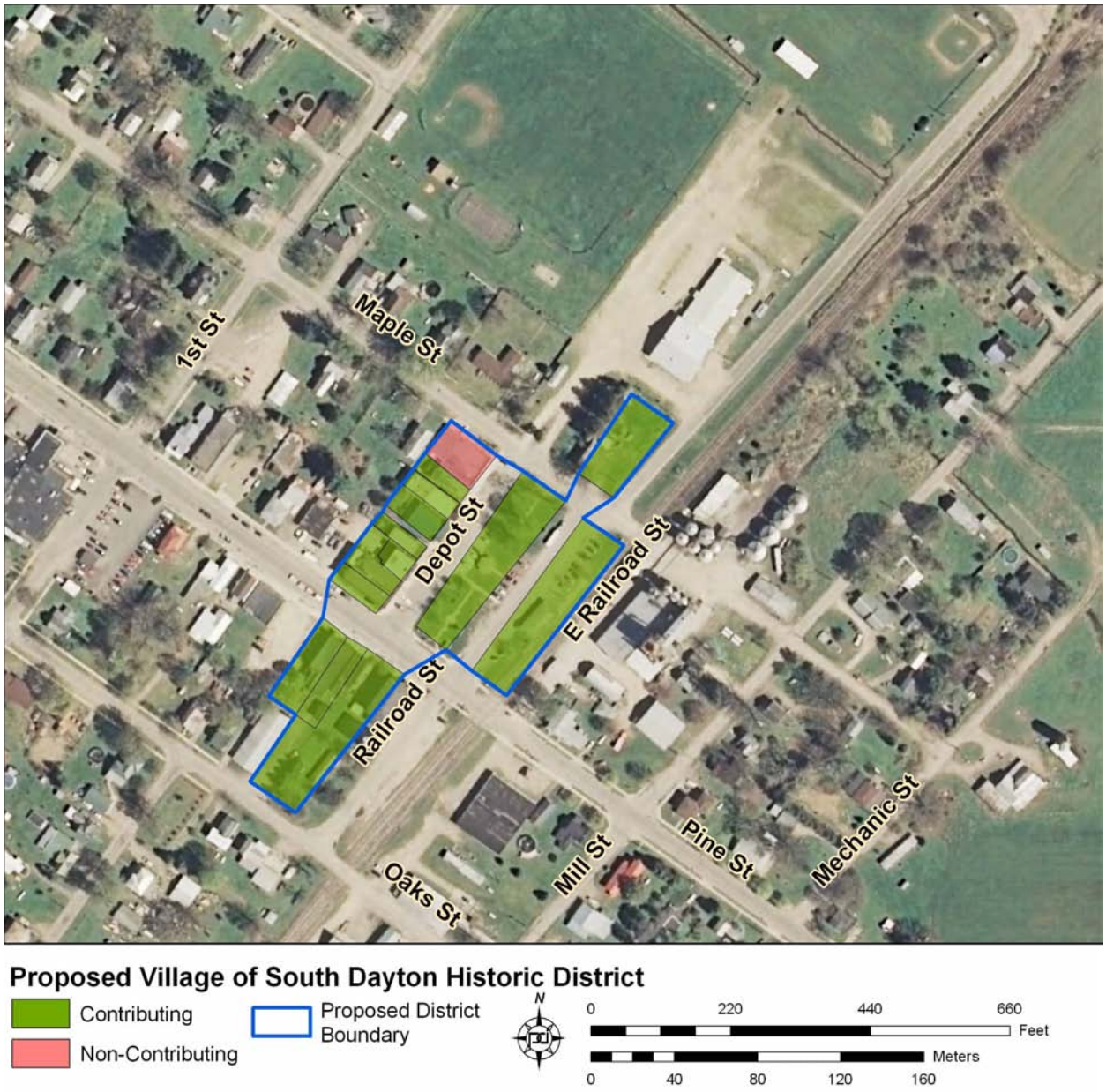


Figure 10.1. Proposed Village of South Dayton Ewing Park Historic District showing Contributing and Non-Contributing properties *(base map NYS GIS Cleainghouse 2007).*

Figure 10.2. Proposed Village of South Dayton Ewing Park Historic District, Town of Dayton, Cattaraugus County, New York on USGS quadrangle map *(base map: USGS quad).*

10.2 PROPOSED VILLAGE OF SOUTH DAYTON EWING PARK HISTORIC DISTRICT OVERVIEW

The proposed Village of South Dayton Ewing Park Historic District is a commercial square centered on Ewing Park. The east side of the district is dominated by the former Erie Railroad (now CSX) tracks and associated depot. Across the square to the west is a cohesive grouping of one- and two-story commercial structures. Maple and Pine streets run to the north and south of the district, these anchor streets house a handful of commercial buildings set on grassy lawns (see Figure 10.1).

Ewing Park is a 0.5-acre (21,203-sq.ft.) rectangular landscaped green space, dotted with hardwood trees and winding pedestrian walkways. The center of the park contains a modern gazebo (Photographs 10.1 and 10.2). The park was historically divided into two sections with an east-west road running through the center (Figure 10.3). The path was removed to form one rectangular village green sometime after 1941 (Sanborn-Perris map Co. 1941).

Maple Street is a largely residential street running parallel with Pine Street. At the eastern end of the road is a single commercial structure, the E.B. Crissey building, 30 Maple Street. The building is on the north side of the street overlooking Ewing Park. An excellent example of a Neo-Classical structure, the building was erected as a bank and later used as the post office (Sanborn 1913, 1924, 1941). At present, the building appears to be vacant (see Photograph 10.1).

Park Street is directly west of Ewing Park. It is a one-block commercial street, running mostly north to south parallel to the railroad tracks. The buildings face east, overlooking the park and the tracks. These commercial buildings are narrowly spaced and abut the sidewalk. They range in age from late nineteenth century to mid-twentieth century. Most of the buildings have two stories with varying building materials, including brick, rusticated concrete block and concrete block. No frame structures are on Park Street (Photograph 10.3).

The major east-west thoroughfare through the village, Pine Street has a mixture of commercial, religious, educational, and residential buildings. The commercial section is located just west of the tracks. Three buildings on this block are included in the proposed historic district. The oldest is the Valley Hotel/South Dayton Hotel, 203 Pine Street. It is a three-story Italianate structure erected in 1877 (Shults 1901). Two intact commercial buildings are to the west of the hotel. These buildings are executed in rusticated concrete block, 205 Pine Street, and hollow tile, 207 Pine Street (Photograph 10.4).

Railroad Street runs parallel to the former Erie Railroad tracks. The only structure on this block is the South Dayton Depot. It is a highly intact Craftsman structure with a low, hipped roof executed in frame and clad in wood shingle. Early photographs of the depot reveal a much different structure (Figure 10.4). The building was extensively remodeled or restored in the early 1980s for its appearance at the beginning of the movie “The Natural.” The station also appeared in the movie “Plains, Trains and Automobiles” several years later (Photographs 10.5 and 10.6; see Photograph 10.2).

Photograph 10.1. Overview of Ewing Park, facing northwest. Note: the E.B. Crissey & Co. building (1903; 30 Maple Street) at right, gazebo at center-right, and Cattaraugus Savings Bank (ca. 1920; 7 Park Street) at left (*Panamerican 2008*).

Photograph 10.2. Streetscape of proposed Ewing Park Historic District, facing northwest, showing the northern portion of the proposed district. Note gazebo at center and depot at right (*Panamerican 2008*).

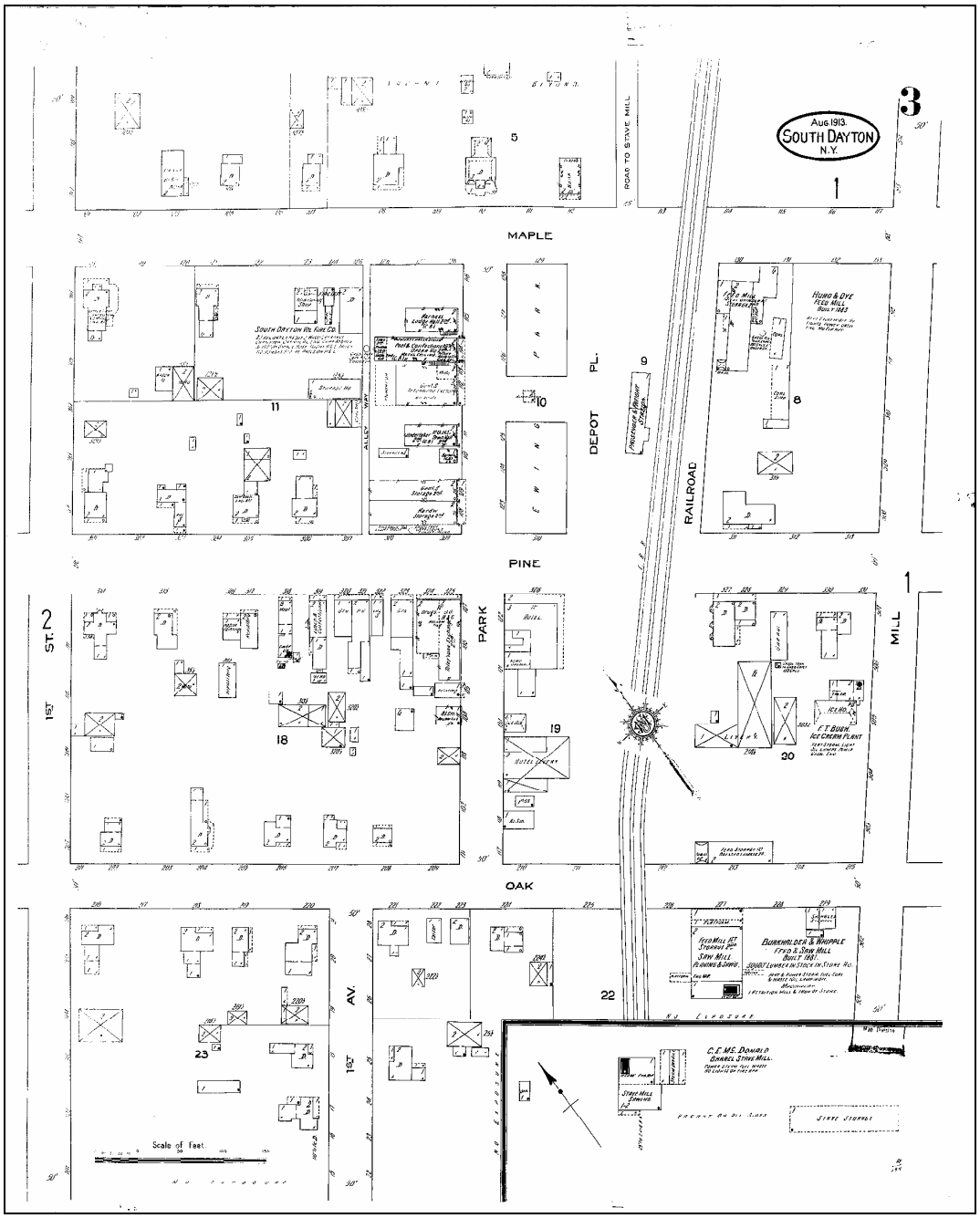


Figure 10.3. The eastern portion of the Village of South Dayton in 1913. The proposed historic district is bounded by Park Street, Maple Street, Depot Street (Railroad Avenue) and Oak (Pine) Street *(Sanborn-Perris Map Co. 1913).*

Photograph 10.3. Streetscape of Park Street, facing southwest, showing the western edge of the proposed district (*Panamerican 2008*).

Photograph 10.4. Streetscape of Pine Street, facing southeast, showing the southern edge of the proposed Ewing Park Historic District (*Panamerican 2008*).

Figure 10.4. South Dayton Depot in 1909 *(Western New York Railroad Archive nd).*

Photograph 10.5. Streetscape of Railroad Street, facing northeast, showing the eastern edge of the proposed district and depot at center (*Panamerican 2008*).

Photograph 10.6. Remaining historic features of the former Erie Railroad (*Panamerican 2008*).

10.3 VILLAGE OF SOUTH DAYTON HISTORICAL OVERVIEW

Part of the western tier of towns in Cattaraugus County, the Town of Dayton was formed from the Town of Perrysburg on February 7, 1835. Its surface is that of a rolling and hilly upland. Conewango Creek is the primary waterway. The heavily forested valley provided the town with its first major industry, lumbering. As the land was deforested and improved, the dairy industry grew in importance (Shults 1901).

The area that encompasses the Village of South Dayton was stagnant for many years. It was sold eight times prior to its development. John Wickham owned two sawmills near Silver Creek, and his business travels took him to the Pine Valley area (present-day South Dayton). Impressed by the fertile valley, Wickham recognized a business opportunity for a profitable

lumber operation. According to local folklore, he was convinced to buy the land after having a vision, which he told to self-proclaimed local prophet, John D. Briggs. Briggs reinforced Wickham's vision, prophesying that the valley would soon be transformed into a profitable village with stores, workshops and industries. With his vision affirmed by the prophesy, Wickham purchased 400 acres in 1855. This land included all of the current village limits of South Dayton (Shults 1901). Wickham developed South Dayton soon after his purchase, erecting a sawmill, general store and several residential dwellings (Figure 10.5). In order to protect his investments he began lobbying for the Buffalo & Jamestown Railroad to run through the village. As an incentive to move the line to South Dayton, Wickham donated six and a half acres of land, worth 1,000 dollars, to the railroad for the right-of-way. He was successful in this venture and the railroad crossed through the village in 1875 (Shults 1901; Western New York Railroad Archive nda). Not financially successful, the line was sold at auction and became the Buffalo & Southwestern Railroad in 1877. The line became part of the Erie system in 1895 (Western New York Railroad Archive nda, ndb).

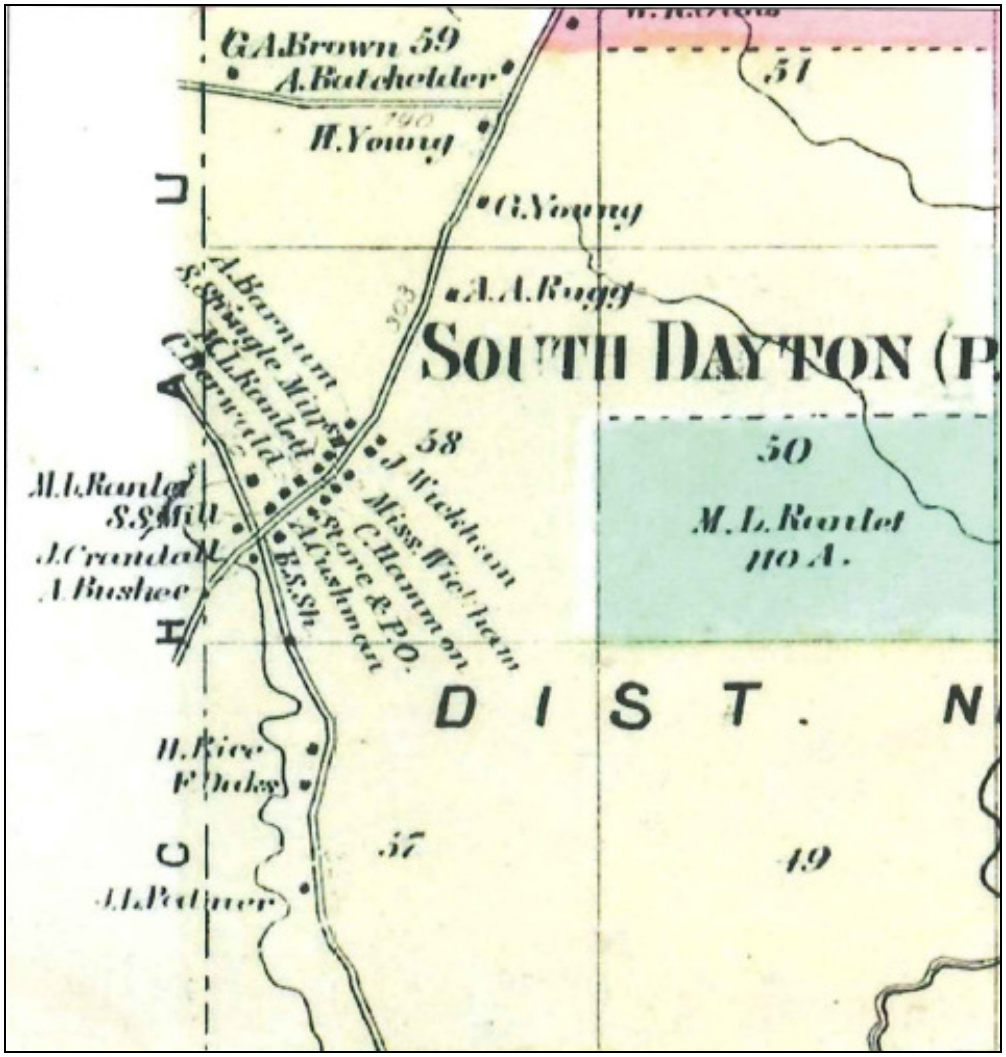


Figure 10.5. Village of South Dayton as shown in 1869 *(Beers et al. 1869).*

Robert Finley Ewing was the second man to shape the look of the village. A man of many vocations—farming, merchandising, lumbering, and milling, Ewing's wealth derived from his involvement with the railroad. He was an engineer for several different companies during his long career, culminating as Chief Engineer of the Erie Railroad system. This position brought him to the Village of South Dayton. In April 1875, Ewing purchased 32 acres at the eastern village limits from Wickham. Soon after his purchase, he laid out his tract into lots with approximately 50 feet of frontage and 150 of depth. He planned wide streets and planted maple trees on both sides of the streets, on the lot lines and midway between them. During the succeeding years he built ten houses, three stores and numerous buildings, such as barns and shops. He financed the construction of local churches and the school. In his later years Ewing served as Road Commissioner, and was instrumental in laying out the highways that radiate from the village (Shults 1901; Town of Dayton 2001).

Another instrumental figure in the landscape of South Dayton was Julius C. Shults. Shults came to South Dayton in 1875. He also purchased a tract of land from Wickham. His tract was located on Oak (Pine) Street between 1st Street and 1st Avenue (Figure 10.6; see Figure 10.3). As a contractor and builder, he erected several stores and a hotel that became the Valley House, 203 Pine Street (Figures 10.7 and 10.8; Shults 1901).

The source of prosperity for the region was the Buffalo & Southwestern Railroad (later, a branch of the Erie Railroad). The line ran through the eastern portion of the village, and several industries grew up along its tracks. In 1913, the village boasted C.E. McDonald Barrel Stave Mill, Hurd & Dye Feed Mill (formed 1883), livery stables, F.T. Bush Ice Cream Plant, and Burkhalder & Wipple Feed & Sawmill (formed 1881) (Sanborn-Perris Map Co. 1913; see Figure 10.3). These early industries supplied wealth and employment to the village. A commercial core soon emerged west of the tracks to support the retail needs of the residents and travelers.

The commercial district was laid out around the village green named Ewing Park after Robert Ewing. Park Street, on the west side of the park, is a cohesive block of commercial structures. The oldest building on the block is located at 1-5 Park Street (see Figure 10.6). The

Figure 10.6. Historical photograph of Pine Street, facing northwest, ca. 1901. At right is 1-5 Park Street *(Shults 1901).*

Figure 10.7. Historical photograph of Pine Street, facing southeast, date unknown. At center is the Valley House, 203 Pine Street *(Shults 1901).*

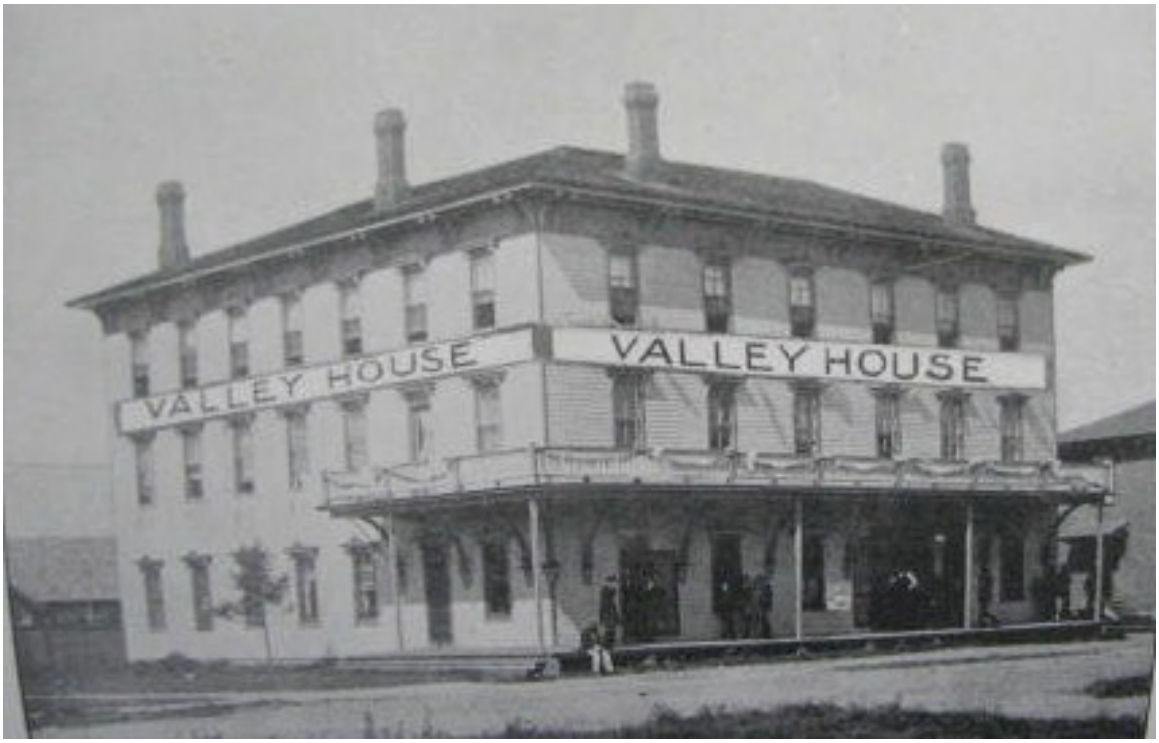


Figure 10.8. Historical etching of the Valley House, date unknown *(Shults 1901).*

Italianate building was erected in 1877 to house the Wilson, Hale & Co. general store (Figure 10.9; Shults 1901). The building remained in use by the company through the early years of the twentieth century, and has been continuously in use as a commercial establishment since that time. One notable structure on the block is the Cattaraugus County Bank Building, 7 Park Street (see Photograph 10.1). This excellent example of a Neo-Classical structure was erected ca. 1920. It has been used as a bank since its construction. Only one commercial building is located on Maple Street, the E.B. Crissey & Co. Building, 30 Maple Street. It is also an excellent example of a Neo-Classical structure. Erected as a bank, it is currently unoccupied.

Along Railroad Street is the South Dayton Station, the focal point of the district (Figure 10.10 and 10.11; see Photographs 10.2 and 10.5; see Figure 10.2). This small Craftsman-style station helped facilitate the growth of the community through its freight and passenger services. Another prominent feature in the landscape of the proposed district is the Valley House (South Dayton Hotel) 203 Pine Street (see Figures 10.7 and 10.8). This three-story Italianate structure was erected in 1877, two years after the completion of the railroad through the village. It was and still remains a staple of the community, currently functioning as a restaurant. While the village has gone through a significant decline, several of the structures have live storefronts.

South Dayton's boom years lasted for nearly fifty years, peaking in the early twentieth century. The collapse of the dairy and lumber industries and the discontinuation of rail service were crushing economic blows to the village. The downtown streetscape has been altered by empty storefronts and some modernization. However, it still maintains a cohesive streetscape and contributes to the historical setting and context of this railroad village.

The proposed historic district is significant for its association as the commercial and industrial hub of the Village of South Dayton. Moreover, this area of the village maintains a good collection of largely intact, late nineteenth-century through early twentieth-century commercial buildings.

Figure 10.9. Historical photograph of 1-5 Park Street, the Wilson, Hale & Co. general store, date unknown (*Shults 1901).*

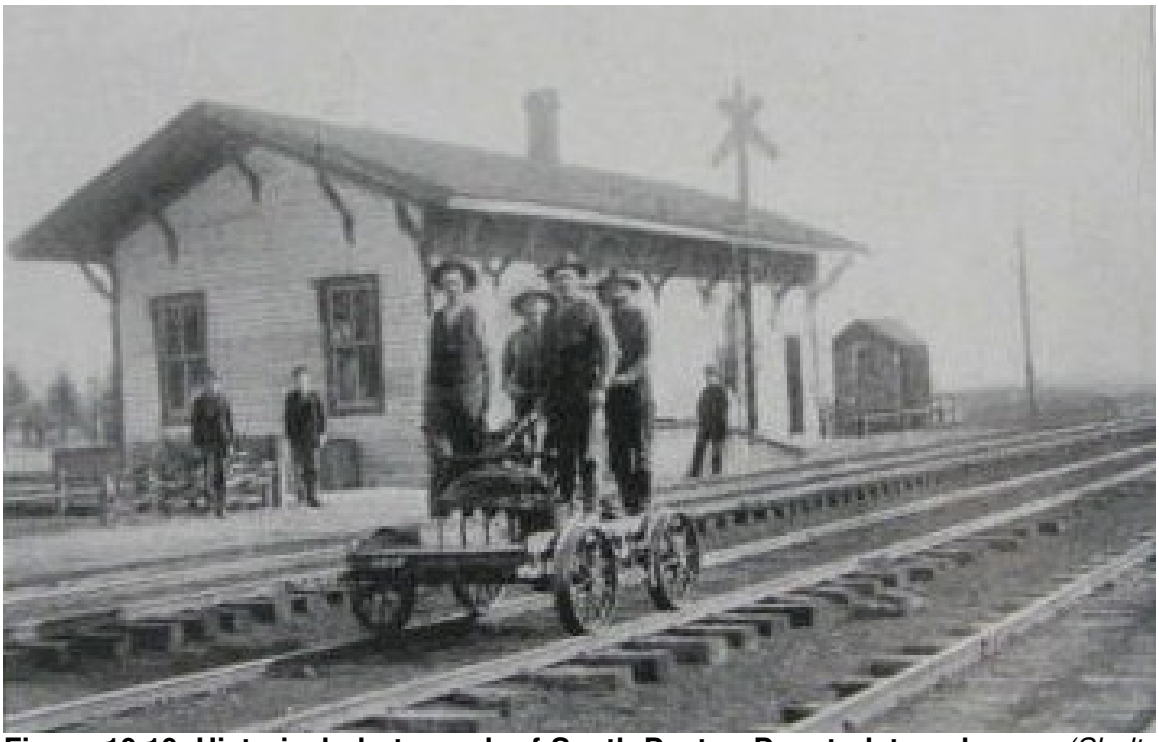


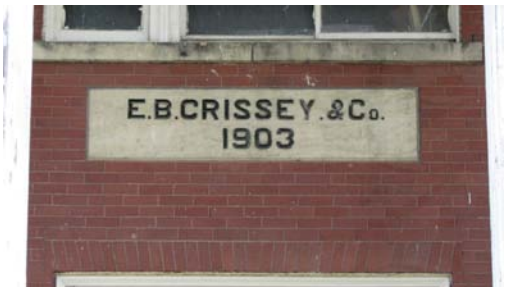
Figure 10.10. Historical photograph of South Dayton Depot, date unknown *(Shults 1901).*

Figure 10.11. South Dayton Depot in 1909 *(Western New York Railroad Archive nd).*

10.4 ANNOTATED LIST OF PROPERTIES FOR THE PROPOSED SOUTH DAYTON EWING PARK HISTORIC DISTRICT

Approximately 14 primary buildings (i.e., principal structures) and other historic resources were documented during this architectural survey of the proposed Village of South Dayton Ewing Park Historic District. There is one National Register-eligible property in the proposed district, the Cattaraugus County Bank, 7 Park Street. Contributing and non-contributing properties are presented in the Annotated List of Properties that follows and correspond to Figures 10.1 and 10. 2 as well as the South Dayton Ewing Park inset map at the end of the report.

For the purpose of clarity and organization of data, the annotated list is arranged in sequential alpha-numerical order by county, town, village or hamlet, and street address. The table includes three columns: 1) a thumbnail-sized photograph of each resource; 2) name, location, date, alterations, map point number, and 3) description.

Cattaraugus County Town: Dayton South Dayton (V)	Proposed Village of South Dayton Ewing Park Historic District **Annotated List of Properties**	
Photograph	**Property Information**	**Description**
 Photo Number: 1	**E.B. Crissey & Co.** 30 Maple Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1903 Map Point: SD1 **Recommend: Contributing to historic district**	Style: Neo-Classical Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Brick Foundation: Concrete block Sash: Other **Details:** An excellent example of a masonry commercial Neo-Classical building located on the South Dayton village square. The structure features; symmetrical massing, fluted Ionic columns supporting a full pediment, cut stone water table, side quoins, and heavy entablature. Previously Inventoried-no det.; USN: 00954.000001
 Photo Number: 2	**E.B. Crissey & Co.** 30 Maple Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1903 Map Point: SD1 **Recommend: Contributing to historic district**	**Details:** Detail of temple front.
 Photo Number: 3	**E.B. Crissey & Co.** 30 Maple Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1903 Map Point: SD1 **Recommend: Contributing to historic district**	**Details:** E.B. Crissy was a prominent businessman in the village. He established his first bank in 1900. Three years later this Neo-Classical edifice was erected to house his banking facility (Shults 1901). By 1941 it was in use as the village Post Office (Sanborn 1941).

Cattaraugus County Town: Dayton South Dayton (V)	Proposed Village of South Dayton Ewing Park Historic District **Annotated List of Properties**	
Photograph	**Property Information**	**Description**
 Photo Number: 5	**Wilson Hale & Co.** 1 Park Street, at intersection with Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1877 Alterations: Altered storefront, new windows Map Point: SD2 **Recommend: Contributing to historic district**	Style: Italianate Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Brick Foundation: Stone Sash: New **Details:** Opened as Wilson and Hale & Co. in 1877. It was the most successful general store in the village; selling dry goods, furniture, boots, shoes, furniture (Shults 1901). By 1913 it was in use as a hardware store (Sanborn 1913).
 Photo Number: 6	**Wilson Hale & Co. (cont'd)** 1-5 Park Street, at intersection with Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Map Point: SD2 **Recommend: Contributing to historic district**	**Details:** Historic Photo (Shults 1901).
 Photo Number: 7	**Wilson Hale & Co./Post Office** 5 Park Street, at intersection with Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1877 Alterations: Altered store front, permastone façade. Map Point: SD3 **Recommend: Contributing to historic district**	Style: Italianate Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Other Foundation: Stone Sash: Other **Details:** Historically part of the Wilson Hale & Co. Building.

Cattaraugus County
Town: Dayton
South Dayton (V)

Proposed Village of South Dayton
Ewing Park Historic District
Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 8	**Cattaraugus County Bank** 7 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1920 Map Point: SD4 **Recommend: Contributing to historic district**	Style: Neo-Classical Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Brick veneer Foundation: Not visible Sash: New **Details:** Previously determined NRE (I); USN: 00954.000001
 Photo Number: 9	**Gypsy Tea Room** 9 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1900 Alterations: Built up roof Map Point: SD5 **Recommend: Contributing to historic district**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Gable front Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: One-over-one **Details:** A largely-intact commercial structure executed in RCB. It served as the Town Hall, Post Office and undertaker in 1913. In later years it was used as a store (Sanborn 1913, 1924, 1941).
 Photo Number: 10	11 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1890 Alterations: New windows, altered storefront. Map Point: SD6 **Recommend: Contributing to historic district**	Style: Vernacular Stories: Two Plan: Rectangular Roof: False-front Ext. Siding: Brick Foundation: Concrete slab Sash: New **Details:** A largely-intact commercial structure. It housed the Telephone Exchange for a good portion of the twentieth century (Sanborn 1913, 1924, 1941).

Cattaraugus County Town: Dayton South Dayton (V)	Proposed Village of South Dayton Ewing Park Historic District **Annotated List of Properties**	
Photograph	**Property Information**	**Description**
 Photo Number: 11	13 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1910 Alterations: New windows, altered storefront. Map Point: SD7 **Recommend: Contributing to historic district**	Style: Vernacular Stories: Two Plan: Rectangular Roof: False-front Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: New **Details:** A largely-intact commercial building. In 1913 it was used as an opera house and later years as a store (Sanborn 1913, 1924, 1941).
 Photo Number: 12	15 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1900 Map Point: SD8 **Recommend: Contributing to historic district**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Rusticated Concrete Block Foundation: Rusticated concrete block Sash: New **Details:** A largely-intact commercial building. The building housed the Harness Lodge Hall, Post Office and Fire Hall (Sanborn 1913, 1924, 1941).
 Photo Number: 13	**Village Hall/Library** 17 Park Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1950 Map Point: SD9 **Recommend: Non-Contributing to historic district**	Style: Modern Stories: One Plan: Rectangular Roof: Flat Ext. Siding: Other Foundation: Concrete block Sash: New **Details:** A ca. 1950's concrete block structure with a late twentieth century façade.

Cattaraugus County
Town: Dayton
South Dayton (V)

Proposed Village of South Dayton
Ewing Park Historic District
Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 14	**Ewing Park** Park, Maple, Railroad and Pine streets Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1880 Map Point: SD10 **Recommend: Contributing to historic district**	**Details:** Is a largely intact green space, historically associated with the commercial district. It was named after village father Robert Ewing. Ewing laid out and developed a good portion of the village (Shults).
 Photo Number: 15	**The Valley House/South Dayton Hotel** 203 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: 1877 Alterations: Vinyl siding, new windows, additions. Map Point: SD11 **Recommend: Contributing to historic district**	Style: Italianate Stories: Three Plan: Rectangular with side ell Roof: Hipped Ext. Siding: Vinyl siding Foundation: Not visible Sash: New **Details:** The Valley house was constructed by Julius C. Shults. It was built in connection with the railroad.
 Photo Number: 16	**The Valley House/South Dayton Hotel (cont'd)** 203 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Map Point: SD11 **Recommend: Contributing to historic district**	**Details:** Historic Photo (Shults 1901).

Cattaraugus County Town: Dayton South Dayton (V)	Proposed Village of South Dayton Ewing Park Historic District **Annotated List of Properties**	
Photograph	**Property Information**	**Description**
 Photo Number: 17	205 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1930 Map Point: SD12 **Recommend: Contributing to historic district**	Style: No style Stories: One Plan: Rectangular Roof: Flat Ext. Siding: Brick veneer Foundation: Concrete slab Sash: New **Details:** Small mid-twentieth century concrete block store.
 Photo Number: 18	207 Pine Street Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1900 Alterations: Altered storefront, new windows Map Point: SD13 **Recommend: Contributing to historic district**	Style: Vernacular Stories: Two Plan: Rectangular Roof: Flat Ext. Siding: Hollow Tile Foundation: Rusticated concrete block Sash: New **Details:** A largely-intact commercial structure. Housed the Telephone Exchange and Drug Store (Sanborn 1914).
 Photo Number: 19	207 Pine Street (cont'd) Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1900 Map Point: SD13 **Recommend: Contributing to historic district**	**Details:** Detail of cornice.

Cattaraugus County
Town: Dayton
South Dayton (V)

Proposed Village of South Dayton
Ewing Park Historic District
Annotated List of Properties

Photograph	Property Information	Description
 Photo Number: 20	**South Dayton Depot** Railroad Street, along west side of tracks Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1875/1910 Map Point: SD14 **Recommend: Contributing to historic district**	Style: Craftsman Stories: One Plan: Rectangular Roof: Hipped Ext. Siding: Wood shingle Foundation: Concrete block Sash: Other **Details:** The Erie Railroad facilitated the growth of the village. This station was integral in transporting freight and people to and from the village.
 Photo Number: 21	**South Dayton Depot (cont'd)** Railroad Street, along west side of tracks Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1875/1910 Map Point: SD14 **Recommend: Contributing to historic district**	**Details:** West façade.
 Photo Number: 23	**South Dayton Depot (cont'd)** Railroad Street, along west side of tracks Town: Dayton South Dayton (V) MCD: 00906 Cattaraugus County Date: ca. 1875/1910 Map Point: SD14 **Recommend: Contributing to historic district**	**Details:** Historic Photo (Shults 1901). It is unclear if the depot was demolished and rebuilt in the Craftsman style or if it was remodeled. It appears that the footprint of the building is consistent in the 1913, 1924 and 1941 Sanborn.

11.0 References

Abler, Thomas S., and Elisabeth Tooker

1978 Seneca. In *Northeast*, edited by Bruce G. Trigger, pp. 505-517. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Adams, William

1893 *Historical Gazetteer and Biographical Memorial of Cattaraugus County, New York.* Lyman, Horton & Company, Ltd, Syracuse.

Allen, Dick

2006 Towns of Cattaraugus County: Dayton. Cattaraugus Co., New York GenWeb page [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nycattar/towns/dayton.htm" [accessed April 23, 2008].

2006 Towns of Cattaraugus County: Perrysburg. Cattaraugus Co., New York GenWeb page [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nycattar/towns/dayton.htm" [accessed April 23, 2008].

Barden, Virginia W. Lois Barris, and Norwood Barris

1997 *A Guide to Chautauqua County Cemeteries & Burial Sites.* Chautauqua County Genealogical Society, Fredonia, NY

Beauchamp, William M.

1900 *Aboriginal Occupation of New York*. New York State Museum Bulletin 7(32). Albany.

Beers, D.G., J.H. Goodhue, and E.F. Sanford

1869 *Atlas of Cattaraugus County, New York*. D.G. Beers & Co., New York.

Beers, Frederick W.

1881 *Illustrated Historical Atlas of the County of Chautauqua, New York*. F.W. Beers, New York.

Chautauqua County Genweb

nd Cattaraugus County Cemetery Links. Cattaraugus County NYGENWEB site, np [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nycattar/cemetery.htm" [accessed July 23, 2008]

Chautauqua County Genweb

nd Cemetery Records by Town. Chautauqua County NYGENWEB site, np [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nychauta/CEMETERY/Town_cem.htm" [accessed July 23, 2008]

Chautauqua County Soil & Water Conservation District

2008 Soil & Water Conservation District: Description, Chautauqua County Soil & Water Conservation District, Jamestown, NY [online www]. Available URL: "http://www.soilwater.org/html/about.htm" [accessed May 28, 2008]

Chautauqua History Company
1904 *The Centennial History of Chautauqua County*. Chautauqua History Company, Jamestown, NY.

Cleland, Charles E.
1982 The Inland Shore Fishery of the Northern Great Lakes: Its Development and Importance in Prehistory. *American Antiquity* 47:761-784.

Concord Grape Belt Heritage Association
nd *Lake Erie Concord Grape Belt.* Concord Grape Belt Heritage Association, Westfield, NY [online www]. Available URL: "http://www.concordgrapebelt.org/" [accessed May 28, 2008]

Crawford, G.W., D.G. Smith, and V.E. Bowyer
1997 Dating the Entry of Corn (*Zea mays*) into the Lower Great Lakes Region. *American Antiquity* 62:112-119.

Cressey, George B.
1966 Land Forms. In *Geography of New York State*, edited by John H. Thompson, pp. 19-53. Syracuse University Press, Syracuse.

Cutter, A.M, Richard William
1912 Genealogical *and Family History of Western New York, a record of achievements of her people in the making of a commonwealth and the building of a nation*. Vol II. Lewis Historical Publishing Co, New York.

Davidson, Dolores
2008 Cemeteries of Chautauqua County. Chautauqua Co., New York GenWeb page [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nychauta//" [accessed May 30, 2008].

de Laubenfels, David J.
1966 Vegetation. In *Geography of New York State*, edited by John H. Thompson, pp. 90-103. Syracuse University Press, Syracuse.

Dent, Richard J.
1991 Archaeology in the Upper Delaware Valley: The Earliest Populations.In *The People of Minisink*, edited by D.G. Orr and D.V. Campana, pp. 117-144.National Park Service, Philadelphia.

Donohue, Ernest F.
1984 *Walnut Creek and there-a-bouts: mills and bams: Hanover and Arkwright 1804-1930.* NP, Silver Creek, NY.

Doty, William J., Charles E. Congdon, and Lewis H. Thornton
1940 *The Historic Annals of Southwestern New York*. 3 vols. Lewis Historical Publishing Co., Inc., New York.

Downs, John P., and Fenwick Y. Hedley, eds
1921a History of Hanover, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American

Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-hanover.htm, [accessed February 14, 2008]

1921b History of Villenova, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-villenova.htm, [accessed February 14, 2008]

1921c History of Arkwright, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-arkwright.htm, [accessed March 13, 2008]

1921d History of Cherry Creek, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-cherrycreek.htm, [accessed March 13, 2008]

1921e History of Sheridan, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-sheriden.htm, [accessed March 13, 2008]

Edson, Obed

1894 *History of Chautauqua County, New York. Ed. Georgia Drew Merrill.* W.A. Ferguson & Co., Boston.

Ellis, David M., James A. Frost, Harold C. Syrett, and Harry J. Carmen

1967 *A History of New York State.* Cornell University Press, Ithaca, NY.

Ellis, Franklin, editor

1879 *History of Cattaraugus County, New York*. L.H. Everts, Philadelphia.

2001[1879] Chapter on the Town of Perrysburg in *History of Cattaraugus County, New York,* transcribed by Mardon Erbland, pp. 239-248. L.H. Everts, Philadelphia. [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nycattar/1879history/perrysburgt.htm," [accessed April 4, 2008]

2002[1879] Leon in *History of Cattaraugus County, New York,* transcribed by Claudia Patterson, pp. 484-495. L.H. Everts, Philadelphia. [online www]. Available URL: "http://www.paintedhills.org/CATTARAUGUS/Leon1879Bios/Leon1879Hist.htm," {accessed March 31, 2008]

2004[1879] Dayton in *History of Cattaraugus County, New York,* transcribed by Linda Albright, pp. 229-239. L.H. Everts, Philadelphia. [online www]. Available URL: "http://www.paintedhills.org/CATTARAUGUS/Dayton1879Bios/Dayton1879Hist.htm," [accessed March 31, 2008]

Emans, Rebecca J.
2007 *Tribalization, Ethnic Formation, and Migration on the Allegheny Plateau of Southwestern New York*. Unpublished Ph.D dissertation, Department of Anthropology, State University of New York at Buffalo.

Engelbrecht, William E.
2003 *Iroquoia: The Development of a Native World.* The Iroquois and Their Neighbors series. Syracuse University Press, NY.

Engelbrecht, William, Eric G. Hansen, James Hartner, Elaine B. Herold, and John D. Holland
1993 *Prehistory of Western New York*. The Archaeological Survey, Department of Anthropology, State University of New York at Buffalo and The Frederick M. Houghton Chapter, New York State Archaeological Association, Buffalo.

Feder, Kenneth L.
1984 Pots, Plants, and People: The Late Woodland Period in Connecticut. *Archaeological Society of Connecticut Bulletin* 47:99-111.

Fink, Daniel
2005 *Barns of the Genesee Country, 1790–1915.* Third printing. James Brunner, Publisher, Geneseo, NY.

Fletcher, Stevenson Whitcomb
1971 *Pennsylvania Agriculture and Country Life, 1640-1840*. Second printing (First printing 1950). Pennsylvania Historical and Museum Commission, Harrisburg.

Fritz, Gayle
1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory* 4:387-435.

Funk, Robert E.
1972 Early Man in the Northeast and the Late Glacial Environment. *Man in the Northeast* 4:7-42.

1978 Post-Pleistocene Adaptations. In *Northeast*, edited by Bruce G. Trigger, pp. 16-27. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1993 *Archaeological Investigations in the Upper Susquehanna Valley, New York State, Volume 1*. Persimmon Press, Buffalo.

Goldman, Mark
1983 *High Hopes; The Rise and Decline of Buffalo, New York*. State University of New York Press, Albany.

Hart, John P.
1999 “Dating Roundtop’s Domesticates: Implications for Northeast Late Prehistory.” In *Current Northeast Paleoethnobotany*, edited by John P. Hart, 47-68. New York State Museum Bulletin 494. State Education Department, Albany.

2000 New Dates from Classic New York Sites: Just How Old are Those Longhouses? *Northeast Anthropology* 60:1-22.

Hart, John P., and Hetty Jo Brumbach
2003 The Death of Owasco. *American Antiquity* 68(4):737-752.

Hart, John P., Robert G. Thompson, and Hetty Jo Brumbach
2003 Phytolith Evidence for Early Maize (*Zea Mays*) in the Northern Finger Lakes Region of New York. *American Antiquity* 68(4):619-640.

Hilchey, Duncan
2008 *A Place at the Table: Explorations in the Heritage Harvest Areas.* The Northeast Regional Center for Rural Development webpage, The Pennsylvania State University, University Park [online www]. Available URL: [accessed May 23, 2008] “http://www.nercrd.psu.edu/entrepreneur_What_Works_Wksp/Abstracts/HilcheyTable25.pdf”

Kraft, Herbert
1986 *The Lenape: Archaeology, History, and Ethnology*. The New Jersey Historical Society, Newark.

Leet, Ernest D.
1980 *History of Chautauqua County New York 1938-1978.* Chautauqua County Historical Society, Westfield, NY.

MacNeish, Richard S.
1952 *Iroquois Pottery Types: A Technique for the Study of Iroquois Prehistory*. National Museum of Canada, Bulletin 124, Anthropological Series No. 31. The Minister of Resources and Development, Ottawa.

Mason, Ronald J.
1981 *Great Lakes Archaeology.* Academic Press, New York.

Munger, William P. (editor)
1941 *Historical Atlas of New York State*. Franke E. Richards, Publisher, Phoenix, NY.

Natural Resources Conservation Service [NRCS]
2004 *Soil Survey Geographic (SSURGO) database for New York State*. U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, TX [online site]. Available URL: “http://SoilDataMart.nrcs.usda.gov/” [access June 2008]

NPS (National Park Service)
2002 *How to Apply the National Register Criteria for Evaluation. National Register Bulletin 15*. National Park Service, National Register, History and Education, U.S. Department of the Interior. Washington, D.C. [online www]. Available URL: “http://www.cr.nps.gov/nr/publications/bulletins/nrb15/” [accessed April 16, 2006]

New York Archaeological Council (NYAC)
1994 *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York State*.New York Archaeological Council, Albany, NY.

NYS GIS Clearinghouse
2007 New York State Interactive Mapping Gateway. New York State Statewide Digital Orthoimagery Program, Albany [online www]. Available URL: "www.nysgis.state.ny.us/gateway/mg/cir.htm" [accessed July 23, 2008].

NYSHPO (New York State Historic Preservation Office)
2006 *Guidelines for Wind Farm Development Cultural Resources Survey Work*. New York State Historic Preservation Office, Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.

nd State Preservation Historical Information Network Exchange (SPHINX) Access Web Page. New York State Office of Parks, Recreation, and Historic Preservation, Peebles Island, Waterford [online www]. Available URL: "http://www.nysparks.com/shpo/resources/index.htm" [accessed February 13, 2008].

Noble, Allen G., and Richard K. Cleek
1995 *The Old Barn Book: A Field Guide to North American Barns and Other Farm Structures.* Rutgers University Press, New Brunswick, NJ.

Parker, Arthur C.
1922 *The Archaeological History of New York*. New York State Museum Bulletin Nos. 235-238. Albany.

Pearson, C.S., J.C. Bryant, W. Secor, S.R. Bacon, C. Lounsbury, W.J. Camp, and C.B. Beadles
1940 *Soil Survey, Cattaraugus County, New York*. U.S. Department of Agriculture, Bureau of Plant Industry, Washington, D.C. in Cooperation with the Cornell University Agricultural Experiment Station.

Prezzano, Susan C.
1988 Spatial Analysis of Post Mold Patterns at the Sackett Site, Ontario County, New York. *Man in the Northeast* 35:27-45.

Puglia, Paul S.
1994 *Soil Survey of Chautauqua County, New York*. United States Department of Agriculture, Soil Conservation Service in cooperation with the Cornell University Agricultural Experiment Station. U.S. Government Printing Office, Washington, D.C.

Ritchie, William A.
1955 The Northern Burial Cult. *Pennsylvania Archaeologist* 25:45-50.

1980 *The Archaeology of New York State*. Revised. Harbor Hill Books, Harrison, NY.

Ritchie, William A., and Robert E. Funk
1973 *Aboriginal Settlement Patterns in the Northeast*. New York State Museum and Science Service Memoir No. 20. Albany.

Sackett, Marcus
1904 Hanover in *The Centennial History of Chautauqua County*, pp. 609-619. Chautauqua History Company, Jamestown, NY.

Salwen, Bert
1975 Post-Glacial Environments and Cultural Change in the Hudson River Basin. *Man in the Northeast* 10:43-70.

Sanborn–Perris Map Co.
1913 *Village of South Dayton, Town of Dayton, Cattaraugus County*. Sanborn – Perris Map Co. Limited Fire Insurance Maps, New York.

1924 *Village of South Dayton, Town of Dayton, Cattaraugus County*. Sanborn – Perris Map Co. Limited Fire Insurance Maps, New York.

1941 *Village of South Dayton, Town of Dayton, Cattaraugus County*. Sanborn – Perris Map Co. Limited Fire Insurance Maps, New York.

Schulenberg, Janet K.
2002 "New Dates for Owasco Pots." In *Northeast Subsistence Settlement Change AD 700-1300*, edited by John P. Hart and Christina Rieth, pp. 153-165. New York State Museum Bulletin 496. State Education Department, Albany.

Sears, William H.
1948 What is the Archaic? *American Antiquity* 14(2):122-124.

Schein, Richard H.
1993 Framing the Frontier: The New Military Tract Survey in Central New York. In *New York History* 74(1), pp. 5-28.

Shults, Charles
1901 *Historical and Biographical History of the Township of Dayton, Cattaraugus County, New York*. Charles Shults, Buffalo, NY.

Smith, Bruce D.
1992 Prehistoric Plant Husbandry in Eastern North America. In *The Origins of Agriculture,* edited by C.W. Cowan and P.J. Watson, pp. 101-119. Smithsonian Institution Press, Washington, D.C.

Smith, Ivan
2008 Timeline of the Seven Years War or Timeline of the French and Indian War. From Nova Scotia's Electric Scrapbook Webpage, Canning, Nova Scotia, Canada [online www]. Available URL: "http://www.ns1763.ca/remem/7yw-timeline-w.html" [accessed February 20, 2008]

Smith, H. Perry (editor)
1884 *History of the City of Buffalo and Erie County*. 2 vols. D. Mason & Co., Syracuse.

Spiegelman, Bob
2007 Sullivan/Clinton Campaign; Then & Now. Sullivan/Clinton Campaign website, New York [online www]. Available URL: "http://sullivanclinton.com," [accessed August 20, 2007].

Springfirth, Kenneth C.
1970 *Grape Belt Trolleys.* Kenneth C. Springworth, Erie, Pennsylvania.

Stevens, Sylvester K., and Donald H. Kent, eds.
2000[1941] The Expedition of Baron de Longueuil. In *The Expedition of Baron de Longueuil*, 2nd & rev. ed for the Erie County Historical Society, Pennsylvania Historical Commission, Harrisburg. Online edition Glenn A. Black Laboratory of Archaeology, Indiana University [online www]. Available URL: "http://www.gbl.indiana.edu/archives/miamis8/M31-45_50a.html" [accessed February 20, 2008]

Stewart, William
1867 *New Topographical Atlas of Chautauqua County, New York*. William Stewart Publisher, Philadelphia.

Sullivan, Lynne P., editor
1996 *Reanalyzing the Ripley Site: Earthworks and Late Prehistory on the Lake Erie Plain*. New York State Bulletin, No. 489. Albany.

Sullivan, James
2004a[1927] Chapter I. The French and Indian Wars—The Struggle for Supremacy (1609-1763). In *The History of New York State*. Book XI, Part VI. Lewis Historical Publishing Company, Inc., New York. Online edition Holice B. Young, Debbie Axtman & Pam Rietsch. USGenNet web page, Rio Vista, CA [online www]. Available: "http://www.usgennet.org/usa/ny/state/his/bk11/ch1/pt6.html" [accessed February 20, 2008].

2004b[1927] Chautauqua County. In *The History of New York State.* Book V, Chapter I. Lewis Historical Publishing Company, Inc., New York. Online edition Holice B. Young, Debbie Axtman & Pam Rietsch. USGenNet web page, Rio Vista, CA [online www]. Available: "http://www.usgennet.org/usa/ny/state/his/bk5/ch1.html" [accessed 13 March 2007].

2004c[1927] Cattaraugus County. In *The History of New York State.* Book V, Chapter II. Lewis Historical Publishing Company, Inc., New York. Online edition Holice B. Young, Debbie Axtman & Pam Rietsch. USGenNet web page, Rio Vista, CA [online www]. Available: "http://www.usgennet.org/usa/ny/state/his/bk5/ch2.html" [accessed 13 March 2007].

Tooker, Elisabeth
1978 The League of the Iroquois: Its History, Politics, and Ritual. In *Northeast*, edited by Bruce G. Trigger, pp. 418-441. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Town of Dayton
2001 Town of Dayton–1835. Cattaraugus County NYGENWEB site, np [online www]. Available URL: "http://www.rootsweb.ancestry.com/~nycattar[/towns/dayton.htm" [accessed July 23, 2008]

Trigger, Bruce G.
1978 Early Iroquois Contacts with Europeans. In *Northeast*, edited by Bruce G. Trigger, pp. 344-356. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Tuck, James A.
1978a Northern Iroquoian Prehistory. In *Northeast*, edited by Bruce G. Trigger, pp. 322-333. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Regional Cultural Development, 3000 to 300 B.C. In *Northeast*, edited by B.G. Trigger, pp. 28-43. Handbook of North American Indians, vol. 15, W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Turner, Orsamus
1974 [1850] *Pioneer History of the Holland Purchase of Western New York*. Geo. H. Derby and Co., Buffalo. Rpt edition: James Brunner, Geneseo, NY.

U.S. Geological Survey
1900 *Cherry Creek, NY. 15 Minute Series Quadrangle Maps*, U.S. Government Printing Office, Washington, D.C. Historic USGS Maps of New England & New York, Documents Department & Data Center, Dimond Library, University of New Hampshire, Durham [online www]. Available URL: "http://docs.unh.edu/nhtopos/CherryCreek.htm" [accessed 13 March 2008]

1938 *Cherry Creek, NY. 15 Minute Series Quadrangle Maps*, U.S. Government Printing Office, Washington, D.C. Historic USGS Maps of New England & New York, Documents Department & Data Center, Dimond Library, University of New Hampshire, Durham [online www]. Available URL: "http://docs.unh.edu/nhtopos/CherryCreek.htm" [accessed 13 March 2008]

1961 *Cassadega, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1961 *Cherry Creek, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1961 *Dunkirk, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1961 *Hamlet, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1961 *North of Dunkirk, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1962 *North Collins, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1962 *Silver Creek, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1963 *Farnham, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1964 *Gowanda, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1964 *New Albion, New York Quadrangle, 7.5 Minute Series (Topographic).* U.S. Geological Survey, Department of the Interior, Washington, D.C.

1980 *Forestville, New York 100k Series Topographic.* U.S. Geological Survey, Department of the Interior, Reston, VA.

1980 *Perrysburg, New York 100k Series Topographic.* U.S. Geological Survey, Department of the Interior, Reston, VA.

1986 *Jamestown, New York 100k Series Topographic.* U.S. Geological Survey, Department of the Interior, Reston, VA.

1986 *Silver Creek, New York 100k Series Topographic.* U.S. Geological Survey, Department of the Interior, Reston, VA.

University of Akron

1996 Historical Note in Erie Lackawanna Railroad Inventory. University of Akron Archival Services, Akron, OH [online www]. Available URL: "http://www3.uakron.edu/archival/ErieLack/erie1.htm," [accessed March 14, 2008].

Van Diver, Bradford B.

1985 *Roadside Geology of New York*. Mountain Press Publishing Company, Missoula, MT.

Van Vlack, Barbara

1996 Rugg-Town (West Perrysburg Cemetery). Cemeteries link at Van Vlack and Van Vleck Designer Genes: Descendants of Marinus Roelofse Van Vleckeren website. Barbara van Vlack, np [online www]. Available URL: "http://www.vanvlack.net/Cemeteries/RuggTown.htm" [accessed May 1, 2008]

Village of Forestville

2008 Historical Photos. Village of Forestville, New York Website [online www]. Available URL: "http://forestvilleny.com/category/historical-pictures/" [Accessed May 29, 2008]

Visser, Thomas Durant

1995 *Field Guide to New England Barns and Farm Buildings.* University Press of New England, Hanover, NH.

Vlach, John Michael

2003 *Barns.* W.W. Norton & Company, New York.

Western New York Railroad Archive

nda Buffalo & Southwestern Railroad. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/railroads/erie/bsw_home.htm," [accessed March 14, 2008]

ndb Erie Railroad. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/railroads/erie/erie_home.htm," [accessed March 14, 2008]

ndc Dayton, New York. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/cities/dayton_home.htm," [accessed March 14, 2008].

ndd South Dayton, New York. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/cities/so_dayton.htm," [accessed July 23, 2008].

Whallon, Robert, Jr.

1968 Investigations of Late Prehistoric Social Organization in New York State. In *New Perspectives in Archaeology,* edited by Sally and Lewis Binford. Aldine Press, Chicago.

White, Marian E.

1960 Niagara Frontier Iroquois Village Movements. *Eastern States Archaeological Federation Bulletin* 19:16.

1961 Iroquois Culture History in the Niagara Frontier Area of New York State. *University of Michigan Museum of Anthropology, Anthropological Papers,* No. 16. Ann Arbor.

1963 Settlement Pattern Change and the Development of Horticulture in the New York-Ontario Area. *Pennsylvania Archaeologist* 33:1-12.

1978a Neutral and Wenro. In *Northeast*, edited by Bruce G. Trigger, pp. 407-411. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Erie. In *Northeast*, edited by Bruce G. Trigger, pp. 412-417. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Young, Andrew W.

1875 *History of Chautauqua County, New York*. Printing House of Mathews & Warren, Buffalo.

APPENDIX A.
VIEWSHED MAPS

Noble Ball Hill Windpark
5-mile APE

Architectural Survey

- Turbine Location
- Turbine ID
- Transmission Line
- Negative Zone of Visual Influence (No Turbines Visible)
- Five Mile Study Area
- Map Inset Area

Possible NRE Structures
(Colors Represent Number of Turbines That Are Visible at Each Structure Within 5-Mile APE)

- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60

0 0.5 1 1.5 2 Miles
0 0.5 1 1.5 2 Kilometers

Mapping Information

Created By: Panamerican Consultants, Inc. Buffalo, NY

Mapping Date: July 2008

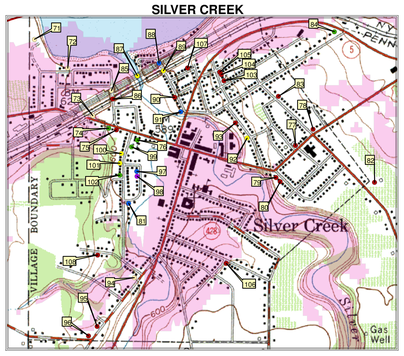
Note: Map Point labels are located on the side of the street of the corresponding structure.

Note 2: Viewshed is only calculated within the 5-mile APE

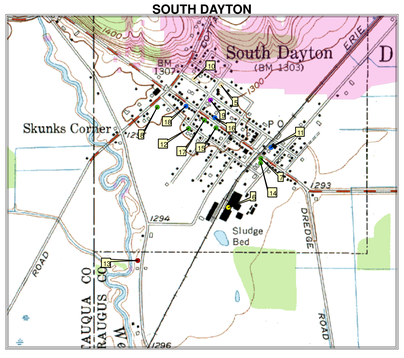
Topographic Sources:

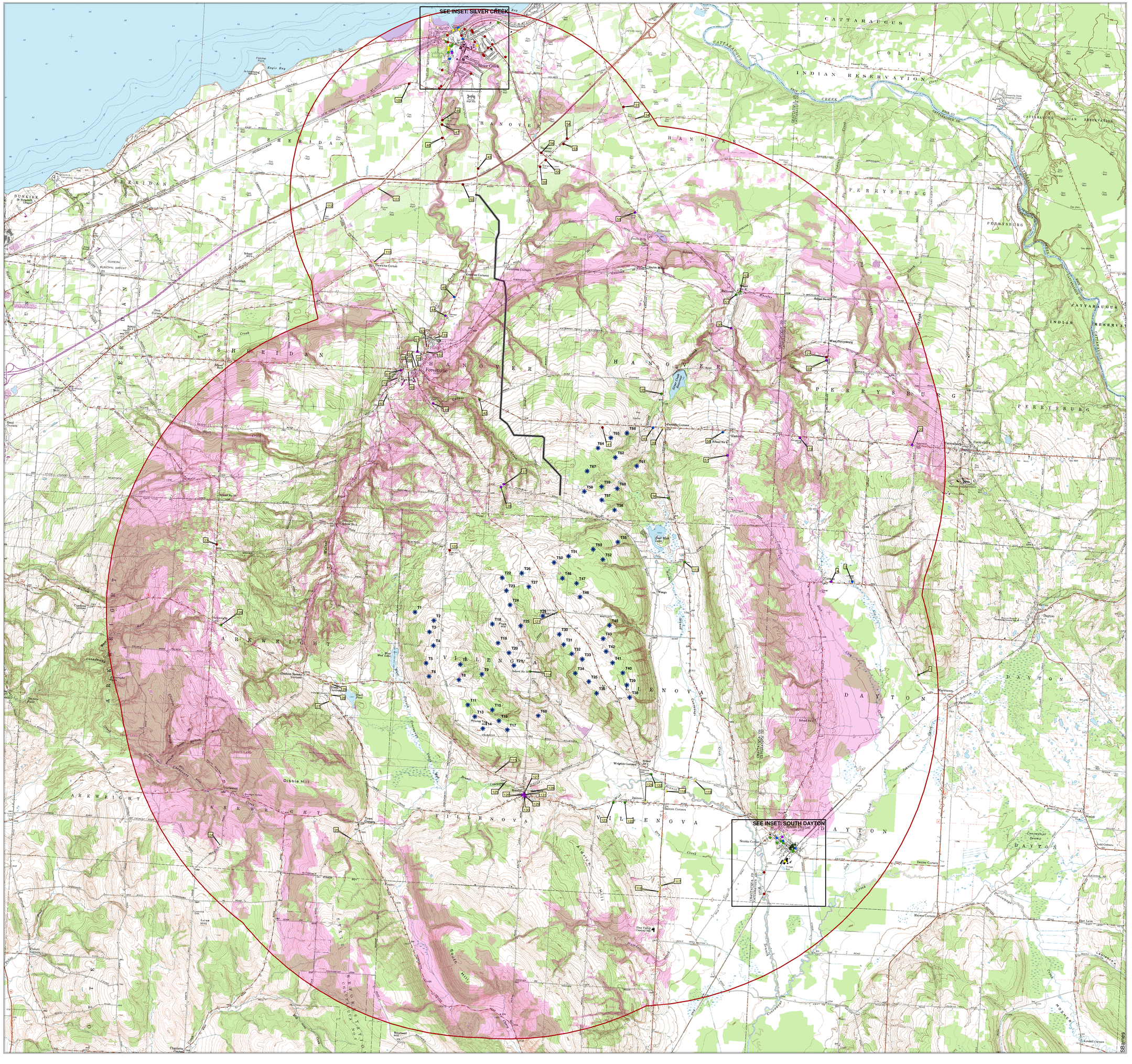
USGS Cassadaga 1961; USGS Cherry Creek 1961; USGS Dunkirk 1961; USGS Farnham 1963; USGS Forestville 1980; USGS Gowanda 1964; USGS Hamlet 1961; USGS New Albion 1964; USGS North Collins 1962; USGS North of Dunkirk 1961; USGS Perrysburg 1980; USGS Silver Creek 1962

SILVER CREEK



SOUTH DAYTON





SBarnes

Proposed Historical Resource Impacts Mitigation Plan

Noble Ball Hill Windpark Project
Proposed Historical Resource Impacts Mitigation Plan (Draft)
September 2008

Background

It is anticipated that the proposed Noble Ball Hill Windpark will have an adverse visual impact on properties eligible for listing on the National Register of Historic Places (NRHP) and historical landscapes within the 5-mile area of potential effect (APE). These National Register Eligible (NRE) properties are located in the host Towns of Villenova and Hanover, which include the Villages of Forestville and Silver Creek and the surrounding Towns of Arkwright and Sheridan, all in Chautauqua County, and in the Towns of Dayton and Perrysburg and the Villages of Perrysburg and South Dayton, all in Cattaraugus County.

Operation of the Project will have a visual effect on a number of properties that are eligible for listing on the NRHP. There are a total of 146 properties that are NRE or possibly NRE located within the visual APE, none of which are currently listed on the National Register. Eight of these properties are considered NRE with the remaining 138 potentially NRE. While some of these properties are generally grouped together within municipalities, along roads, or in associated complexes, such as farmsteads, on the whole, these properties are spread out widely across the area. Therefore, moving tower locations would have little effect on avoiding or minimizing the current impacts.

Determining the actual impact of the Noble facilities on historic properties is difficult for a number of reasons. First, it is possible that modern intrusions, such as telephone poles, electrical distribution lines, water towers, cellular/PCS and/or radio/TV towers and other vertical, modern visual intrusions, may have already compromised some historical settings. In addition, because the Zone of Visual Influence (ZVI), the geographic area within which turbines may be visible, is topography-based and does not include vegetative cover, the ZVI likely overestimates the number of visible turbines and the area from which they can be seen. The actual impacts to these resources will vary with the surrounding topography, distance from the turbines and electrical lines, existing landscaping and vegetation, and surrounding land use.

The data provided by ZVI analysis and mapping suggest that turbines are likely to be visible from many of these properties. A Zoned Relative Visibility Assessment has been performed for the project by Panamerican Consultants, Inc. The study employs a distance–zone concept, based on procedures developed by the United States Forest Service, to assist in evaluating the visual impact of the Project. In this framework, the Project viewshed is divided into zones of relative visibility based on geographical distance: foreground (0 to 0.5 miles); middle ground (0.5 to 3.0 miles); and background (3.0 miles to horizon). Of the 146 identified NRE or potentially NRE structures, 85 are located within the APE of the turbines. The turbines are located in the foreground of seven of these structures where the sense of form, line, color, and textural contrast with

the surrounding landscape is highest. The visual impact is likely to be considered the greatest at a foreground distance. The turbines are located in the middle ground of 30 structures and in the background of 48 structures.

Thus the Project has the potential to change the visible landscape of the region and create a distinct visual aspect. The most significant visual impacts will be on open farming land (i.e., rural agricultural landscapes), historic properties on ridges, cemeteries, historic properties in hamlets and villages, and along roads or in associated complexes, such as farmsteads. On the whole, the properties are found across the study area which typifies dispersed rural settlement and reflects the historic rural development of the region. While there may be some screening afforded by mature trees and other plantings during the growing season, the prominent features of the turbines will be visible or partly visible from the NRE and potentially NRE properties during the periods of dormancy, depending upon how close they are to the turbines. Dormancy period impacts will be more prominent when resources are in close range to the turbines in the foreground. The impacts will diminish as one moves away from the center of the Project into the middle ground and background where the density of trees increase, thereby obscuring the view the farther one moves away from the center.

Due to the size of the wind turbines and the geographical extent of the Windpark, direct mitigation through plantings and screenings is generally not considered viable. Most of the inventoried structures that are determined NRE or potentially NRE are such because they embody the distinct characteristics of a type, period, or method of construction. The structures may also be part of a rural landscape or historic district. It is in these contexts where adverse visual impacts are most likely to occur because, in these cases, the environmental setting provides added significance to these resources. At the same time, these entities have generally large geographic extents which result in even greater difficulty when considering direct mitigation measures. In some cases, direct mitigation measures, such as tree planting and screening, may actually provide a source of negative visual effects. For example, a rural agricultural landscape may be characterized by open space and cultivated fields. The introduction of rows of tall trees may actually be more intrusive than the background visual impact of the Windpark itself.

In summary, based on these conditions, direct mitigation measures are unlikely to successfully mitigate visual impacts from the proposed Project. Moving tower locations will not significantly minimize impacts due to their general placement throughout the landscape. As a result, Noble proposes to undertake “indirect” mitigation measures that can help preserve historical resources in the affected communities and make them accessible to local residents and visitors. The following discusses development of a mitigation plan that will include activities that are appropriate to the state of preservation of historical resources in the host communities.

Project Criteria

Noble has developed the following working criteria for any proposed historical mitigation project or activity associated with any of their Windparks. These criteria provide that the subject of any such project should:

- Be consistent with the guidance of the New York State Historic Preservation Office (SHPO);
- Have historical significance;
- Serve a public historic purpose;
- Be a "good investment"; and
- Be appropriate to the state of preservation of local historical resources.

Consultation with Town Officials

Noble has conducted meetings with Town officials in both Villenova and Hanover to solicit the Towns' views with regard to indirect mitigation measures. The Towns have expressed a strong preference for mitigation projects that would achieve the following objectives:

- Collect and consolidate Town historical documents and records;
- Provide infrastructure to support the work of the Town Historian;
- Provide a community meeting venue; and
- Provide an appropriate space to display historical artifacts such as photos, archaic tools and farm implements, native population artifacts, such as arrowheads and tools.

This preference is consistent with Noble's experience in its three other western New York projects developed to date.

Candidate Projects

Based on the host communities' expression of local needs and interests, Noble has developed the following list of candidate projects located within the defined ZVI and described in the report entitled *Architectural Survey (Five–Mile APE) for the Proposed Noble Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York*.

1. Renovation of a mid-nineteenth century Greek Revival farm house;
2. Renovation of a late nineteenth century schoolhouse. A largely intact cross–gable structure with four-over-four windows;
3. Renovation of a very early twentieth century commercial building; and
4. Renovation of a simple vernacular mid-nineteenth century building located in the town of Hanover.

All of these structures identified as candidate projects are privately owned. Noble has retained the services of a Fredonia, New York-based real estate broker to determine ownership, use, availability, and cost of the subject properties.

Budget

Noble will provide up to $300,000 to fund the execution of the selected project.

Summary

In this Draft Proposed Mitigation Plan, Noble has conceptualized a project for indirect mitigation of adverse visual impact that would consist of the acquisition and period-authentic renovation of an historically relevant building to be used by the host communities as a repository for historic records, documents, photos, artifacts, etc., to provide office and work space for Town Historians, and to provide a venue for community gatherings. Selection of a specific project will take into account guidance from SHPO, the *Architectural Survey of the Five–Mile APE (prepared by Panamerican Inc.)*, and input from Town officials.

Noble has engaged a local real estate broker to assist in acquiring an appropriate property and has proposed a budget of $300,000 for the selected project.

T Archaeological Report

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PHASE I CULTURAL RESOURCES INVESTIGATION FOR THE PROPOSED NOBLE BALL HILL WINDPARK, TOWNS OF VILLENOVA AND HANOVER, CHAUTAUQUA COUNTY, NEW YORK

OPRHP # 08PR01814

Prepared for:

NOBLE BALL HILL WINDPARK, LLC
8 Railroad Avenue, Suite 8
Essex, CT 06426

Prepared by:

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Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227

August 2008

PHASE I CULTURAL RESOURCES INVESTIGATION

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Management Summary

SHPO Project Review Number: OPRHP # 08PR01814

Involved State and Federal Agencies: U.S. Army Corps of Engineers, New York State Department of Environmental Conservation, Public Service Commission

Phase of Survey: Phase IAB

Location Information:

Location: see minor civil division below
Minor Civil Division: Towns of Villenova (MCD 01326) and Hanover (MCD 01314)
County: Chautauqua

Survey Area (Metric & English)

Length and Width: Varies per project component (including interconnects, access roads, turbines, switchyard, lay down areas, operations and management building)

Number of Acres surveyed: 374.61 acres

USGS 7.5-Minute Quadrangle Maps: Silver Creek 1962; Farnham 1963; Forestville 1980; and Perrysburg 1980

Archaeological Survey Overview

Number & Interval of Shovel Tests: 6,200 total:
6,156 at 5-meters; 12 at 10-meters; 16 at 3-meters; 16 at 1-meter
Number & Size of Units: n/a
Width of Plowed Strips: n/a
Surface Survey Transect Interval: n/a

Results of Archaeological Survey

Number & name of prehistoric sites identified: no sites, 2 stray finds
Number & name of historic sites identified: Two sites: PCI/Ball Hill 1 and PCI/Ball Hill 2
Number and name of sites recommended for Phase II/Avoidance: none

Results of Architectural Survey (see separate report)

Longiaru, Christine M., Kelly M. Mahar, Frank J. Schieppati, Donald Smith, Mark A. Steinback, Michael A. Cinquino, Kelly Nolte, and Martin Wachadlo
2008 *Architectural Survey (Five-Mile APE) for the Proposed Noble Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York.* Panamerican Consultants, Inc., Buffalo Branch. Prepared for Noble Ball Hill Windpark, LLC, Essex, CT.

Report Author(s): R. Hanley, M. Steinback, M. Cinquino, D. Smith, R. Emans, and E. Button

Date of Report: August 2008

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1.0 Introduction

1.1 PROJECT DESCRIPTION

Panamerican Consultants, Inc. (Panamerican) was contracted by Noble Environmental Power, LLC, Essex, Connecticut, to conduct a Phase IAB cultural resources investigation for the proposed Ball Hill Windpark, a wind-energy project in the Towns of Villenova and Hanover, Chautauqua County, New York (Figure 1.1). The Project consists of two distinct portions: generation and transmission. The wind-energy generation component will be in Villenova and Hanover. The transmission component will be in Hanover.

The generation portion of the Project consists of the following:

- Installation and operation of 60 wind turbines with a capacity of approximately 90 megawatts (MW) within an approximately 5,500-acre area in the towns of Villenova and Hanover. Of the 60 wind turbines, 49 are proposed for location in Villenova and 11 in Hanover (see Figure 1.1).

- Construction and use of approximately 16 miles (25.7 km) of access roads (a road measures 35 feet [10.6 meters] wide within a 60-ft [18.2-m] construction corridor) that will connect each wind turbine to a town or county roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities. After construction, the same access roads will be scaled back to 16 ft (4.9 m) allowing Noble to use the existing roadway for maintenance and operational purposes.

- Construction and use of an electrical collection system that will allow delivery of electricity to a new substation to be constructed in the Town of Hanover as part of the transmission portion of the Project.

The transmission portion of the Project consists of the following:

- Construction and use of a new substation in the Town of Hanover east of Empire Road and north of Hurlburt Road, that will tie into a new 115-kilovolt (kV) transmission line. The substation footprint will be approximately 200 by 300 ft (60 by 90 m).

- Construction and use of an approximately six-mile (9.7-km) overhead 115-kV transmission line, sited in the Town of Hanover, to transfer the energy to a switchyard near Bennett State Road, which will provide access to the grid (e.g., National Grid's existing 230-kV Dunkirk-Gardenville transmission line north of Forestville). The new switchyard will be built on a footprint measuring 300-x-500 feet (3.4 acres). Electrical transmission lines connecting the Windpark to the switchyard will be carried on poles ranging from 55.5 to 75 ft (16.9 to 20.4 m) tall.

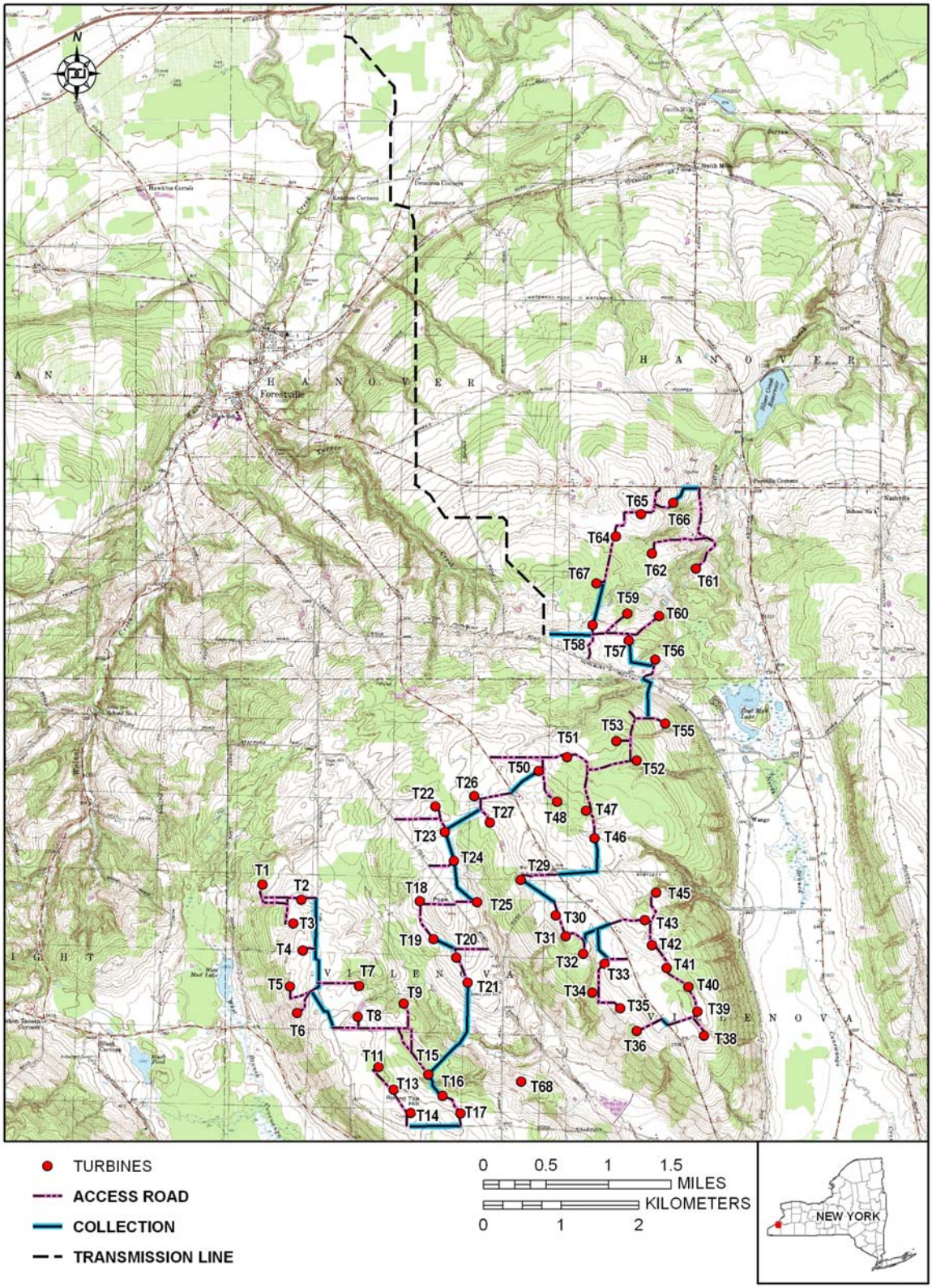


Figure 1.1. Turbine locations of the proposed Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York *(USGS 100-K Topographic, Perrysburg, NY 1980; Forestville, NY 1980).*

The wind turbines that will be installed for the Project will be General Electric (GE) 1.5-MW, Model sle, 80-meter, modular tower system (MTS), T-Flange wind turbine generators[1]. The turbine is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 253 ft (77 m). The nacelle is located at the top of each tower and contains the electrical generating equipment. The turbine rotor and nacelle are mounted on top of a tubular tower, giving a rotor hub height of 263 ft (80 m). The maximum height for the turbine is 389 ft (118.5 m) when a rotor blade is at the top of its rotation. Once installed, each turbine will occupy a round, slightly exposed base approximately 18 ft (5.5 m) in diameter.

The purpose of the Phase I investigation was to determine if any previously recorded or yet unidentified documented cultural resources are present within the project area. The cultural resources investigation included archival, documentary, and historical map research, a site file and literature search, the examination of properties listed in the New York State and National Registers of Historic Places (S/NRHP), an intensive walkover reconnaissance, photographic documentation of conditions, and shovel testing throughout the Area of Potential Effect (APE or impact area) following New York State Historic Preservation Office (NYSHPO) Guidelines for Wind Farm Development (2006). Photographs of the field investigation are presented in Appendix A.

The cultural resources investigation was conducted in compliance with the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), the State Historic Preservation Act (SHPA), the New York State Environmental Quality Review Act (SEQRA), and all relevant state and federal legislation. The investigation was also conducted according to the New York Archaeological Council's Standards for Archaeological Investigations and NYSHPO Guidelines.

The field investigation was conducted in April and May 2008. Mr. Robert J. Hanley, M.A., RPA, served as principal investigator; Mr. Mark A. Steinback, M.A., was project historian. Dr. Rebecca J. Emans, RPA, was project archaeologist/laboratory director, Mr. Edwin Button, M.A. was field director, Mr. Joseph Kline, B.A. and Ms. Jennifer Lapp, M.A., served as crew chiefs assisted by 15 field technicians. Dr. Michael A. Cinquino, RPA, served as the project director, Dr. Frank J. Schieppati, RPA, served as preservation planner, Dr. Donald Smith, RPA, served as GIS supervisor/archaeologist.

An historic building survey of the five-mile APE around the outer project components (three miles around the proposed transmission line) was also conducted by Panamerican and submitted as a separate document (Longiaru et al. 2008). It was conducted in compliance with NYSHPO Guidelines for Wind Farm Development Cultural Resources Survey Work (NYSHPO 2006). The purpose of the architectural survey was to identify National Register Eligible (NRE) properties in the five-mile APE of the proposed Project.

[1] "1.5 MW" refers to the production capacity of the turbine, which is 1.5 megawatts. The nomenclature "sle" is used to designate that the diameter size of the turbine rotor is 253 feet. The "80-meter" refers to the height of the tower. MTS (Modular Tower System) designates the type of tower configuration, and T-Flange designates the type of flange used to connect the tower directly to the foundation.

1.2 ENVIRONMENTAL SETTING

Topography. The project area is situated within the Cattaraugus Hills subsection of the Appalachian Uplands (or the Allegheny Plateau), one of the two physiographic provinces located within Chautauqua County (the Erie-Ontario Lake Plain is the other). This uplands province in general, has a rugged topography with steep valley walls and wide ridgetops, where elevations and slope increase rapidly, especially near primary waterways. This province also contains several flat-bottomed valleys with meandering streams (Cressey 1966:33-34; Puglia 1994:3). Elevations generally increase from north to south in this area, which encompasses two ridges west of the broad floodplain of Conewango Creek and its tributaries. Elevations in the Town of Hanover range from approximately 928 ft (283 m) above mean sea level (amsl) at Forestville to approximately 1,238 ft (378 m) amsl at Parcells Corners, just east of the northernmost turbine location, and 1,550 ft (473 m) amsl at the southernmost turbine location in the town. In the Town of Villenova, elevations reach 1,640 ft (500 m) amsl at Pope Hill, 1,680 ft (512 m) amsl at Round Top Hill, and 1,740 ft (531 m) amsl at Ball Hill (see Figure 1.1).

Geology. In Chautauqua County the various bedrock formations occur in bands that have a general east-west orientation. These bands "also possess very gentle regional dips that have a south-southeast orientation. The oldest rocks in Chautauqua County are largely the black and gray shales that occur along Lake Erie" (Puglia 1994:3). The rocks beneath the county get progressively younger toward the southeast. Bedrock underlying the project area is of the Conneaut Group. The Conneaut Group, sometimes referred to as the Chadakoin Formation, consists of the Dexterville Member (the lower 150 ft [46 m]) and the Ellicott Member (the upper 270 ft [82 m]). The Dexterville Member consists of gray siltstone and the Ellicott Member consists of interbedded gray shale and siltstone (Puglia 1994:4; Cressey 1966:24-25). During the Devonian period, the Ellicott and Dexterville members of the Conneaut Group, as well as the Northeast Member of the Canadaway Group, formed. The Devonian is one of the younger periods of bedrock formation in the county. These members are characterized by an extensive band of gray shales and siltstone.

Drainage. Chautauqua County can be divided into two drainage systems: the Alleghany-Ohio-Mississippi River system for the Alleghany Plateau; and the Lake Erie-St. Lawrence River system. Drainage for the Erie-Ontario Lake Plain is that of the latter. Drainage flows to the north into Lake Erie. The project area lies predominantly, but not entirely, on ridges west of the broad floodplain of Conewango Creek and its tributaries. The creek flows southward through the county and joins the Alleghany River just over the New York-Pennsylvania border. The river system ultimately leads to the Mississippi River. The northwest portion of the project area in areas in proximity to and north of the village of Forestville lies within the Lake Erie-St. Lawrence system.

Soils. The area of proposed turbine placement lies within an acidic soil region of the state, where the soils tend to be deep, moderately drained on glacial till over hilly terrain. These soils typically are derived from shale, sandstone, and slate. Acidity, steep terrain and associated erosion, along with poor drainage, remain the principal limitations to agriculture. Dairy farming accounts for much of the current land use in the plateau area, although areas, especially those along the lake, are part of the extensive viniculture of the county. Portions of the northwestern part of the project area are within limey soils on glacial lake sediments over undulating terrain or within alluvial soils in valley bottoms (de Laubenfels 1966:107-108).

Forest Zone. Chautauqua County contains two primary forest zones: Elm-Red-Maple-Northern Hardwood and Northern Hardwood. The northwestern portion of the county and areas along the Conewango Creek drainage and areas east of Silver Creek are within the Elm-Red Maple-Northern Hardwood zone. This forest zone is characterized by American elm and red maple, and, to a lesser extent, oak and northern hardwoods. This area has been substantially cleared so that oak is greatly reduced. South-facing slopes support more oaks or an oak-hickory mix (due to more sunlight), while north-facing slopes support more northerly-predominant trees, such as elm, red cedar, and hawthorn as well as a variety of evergreens. The remainder of the county, including portions of the project area for the proposed turbine locations is located within the Northern Hardwood zone, which occurs in higher elevations away from the Great Lakes. This zone is not uniform, comprising a variety of species, but dominated by beech, sugar maple, and yellow birch. Though not evenly distributed, various types of evergreens are abundant among the hardwoods in these areas, the most popular of which is hemlock. The project area is a mix of agricultural fields and woods (de Laubenfels 1966:92-95).

Manmade Features and Alterations. The landscape of the project area has primarily been affected by agriculture. Many parts of the region are fields cleared of natural vegetation for use as pasture or planting. Ancillary support features of farms such as access roads, culverts, cisterns, or storage areas are present.

2.0 Historical and Archival Review

2.1 PREHISTORIC PERIOD

The three major cultural periods in western New York State during the prehistoric era were the Paleo-Indian, Archaic, and Woodland. Cultural evolution of the area can be characterized as a gradual increase in social complexity, punctuated by several important cultural and technological innovations (Ritchie 1955, 1980; Engelbrecht 2003; Hart et al. 2003; Tuck 1978a).

Paleo-Indian Period (ca. 11,000-8000 BC). Hunter-gatherer bands of the Paleo-Indian culture were the first humans in New York State after the last glacial retreat approximately 13,000 years ago. At this time, Lake Ontario and the St. Lawrence River were locked in ice, but as the climate gradually became more temperate, forays by Paleo-Indians into the region may have become more extended.

Adapted to the tundra, Paleo-Indians utilized a nomadic settlement system in which their movements followed that of game. The archaeological record suggests that Paleo-Indian subsistence strategies emphasized hunting big game species, many of which are extinct. These species included mastodon, mammoth, great beaver, caribou and moose-elk, along with a variety of smaller game (Funk 1972:11; Ritchie 1980; Salwen 1975). Mastodon remains have been found at several sites throughout Chautauqua County, especially along Lake Erie. In addition, the remains of Pleistocene elk have been identified in the county and prehistoric bison along Cattaraugus Creek (Ritchie 1980:10).

During the seasonal resource peaks, larger populations occupied strategically located base camps; and during periods of scarce resources, the population dispersed, occupying small camps and rockshelters on a temporary basis. A band-level social organization is attributed to Paleo-Indian groups, with each band consisting of 25 or 30 people (Fitting 1968; Funk 1978). Located near the margin of extinct glacial lakes, many Paleo-Indian sites in the Northeast are located on elevated areas “where good drainage, meaning a dry living floor, was an important consideration” (Funk 1978:18). These hills or rises also served as loci for monitoring the migratory patterns of game species. Ritchie and Funk (1973:333) classified Paleo-Indian sites into two main categories: quarry workshops and camps. Chert quarrying and the preliminary stages of tool production were carried out at tool workshops (Gramly and Funk 1990:13).

No Paleo-Indian resources have been recovered within or in proximity to the current project area, although fluted points have been found in southern Chautauqua County along Conewango Creek and south of Chautauqua Lake as well as along Cattaraugus Creek in Erie County (Ritchie 1980). This general Paleo-Indian adaptive pattern overlapped the beginning of the subsequent Archaic period, leading some to refer to the earlier periods of the Archaic as a transitional stage (Mason 1981).

Archaic Period (ca. 8000-1000 BC). The Archaic period is differentiated from the Paleo-Indian period by a functional shift in lithic technology, an apparent increase in population, changes in the subsistence strategy, and a less nomadic settlement system (Funk 1978; Tuck 1978b). These changes reflect an improved climate and a more diversified biome (Funk 1972:10).

Most of what is known about the Early Archaic is based on data from outside the eastern Great Lakes area. Since the lake level during this prehistoric period was much lower than at present, archaeological deposits left by people drawn to the lake margins would have been obliterated by the rising lake level—both by erosion and inundation. Although Early Archaic data is scant, it appears that big-game hunting was no longer central to subsistence and band movement was less erratic. It has been suggested that groups began to settle into territories and that camp movement adjusted to a seasonal round (Snow 1980). Floral resources, fish, and other aquafauna began to play a more significant role in subsistence. In addition to an improved climate and more diversified biome, a few technological changes, such as the production of ground and polished stone tools, serve to identify the Middle Archaic (6000-4000 BC) (Funk 1991; Kraft 1986). Archaeological sites from these periods are rare and poorly understood for the region, important sites from the Early and Middle Archaic have been found in eastern New York as well as western Connecticut, the upper Delaware valley, and the Susquehanna valley (Dent 1991; Funk 1991, 1993; Nicholas 1988).

The Late Archaic (4000-1500 BC) is seen as the flowering of preceramic culture in the Northeast (Snow 1980; Mason 1981). The relatively diverse and abundant biome provided a subsistence base that was much broader than that of previous periods. Food resources consisted of large game (deer and bear), small game, fish, shellfish, waterfowl, birds, insects, vegetables and fruits. This diversity not only allowed for greater procurement efficiency, it also provided a cushion against seasonal failures of any single resource. The general increase in numbers of milling and fishing tools suggests a shift away from red meat as a preferred resource. People began to develop woodworking tools during this period, using coarse-grained stones and river cobbles as raw materials (Kraft 1986). Sites from this period cluster along major rivers and marshy, swampy land as well as lowlands. Hunting, fishing, and gathering remained the principal daily activities, although greater emphasis was placed on deer and small game like birds and turtles, shellfish, nuts and possibly wild cereal grains. Associated with the shift in subsistence strategies was the increase in population densities, and as population increased, camps became larger and more numerous. Bands moved seasonally or when resources dwindled (Ritchie and Funk 1973).

Most sites of the Late Archaic period were seasonal, special purpose habitation sites. These included winter hunting camps, spring fishing stations, fall nut-gathering and processing stations, and shellfish processing. Principal settlements in the area were mostly in the northern part of central New York and the north ends of the Finger Lakes. They were located near major rivers or lakes and were multi-activity spring and summer villages (Ritchie and Funk 1973).

In New York, two contemporaneous Late Archaic cultural traditions predominate: the Narrow Point tradition (recognized as the Lamoka phase), generally restricted to western and central New York, and the Laurentian tradition (represented in this area by the Brewerton phase), evident through all of New York. Brewerton and Lamoka peoples occupied similar environments, and contact between the two groups is evident in central New York. In western New York, however, Lamoka and Brewerton sites are found on all landforms and in all environmental zones, and points of both cultures are recovered from the same sites. However, identified sites of both cultures in western New York tend to be small and contain few artifacts (Engelbrecht et al. 1993:19).

> Small habitation sites such as the Weaver site on Grand Island, small sites along the Niagara River, Rhodes Farm in Clarence, the McKendry site in Hanover [Chautauqua County] and several sites in Leon and Conewango in Cattaraugus County have produced assemblages of

> chipped stone tools that include not only projectile points, but bifaces, knives, scrapers and varying quantities of chert chipping debris. Ground stone tools include milling stones, hammerstones and celts. Some sites were probably utilized as fishing camps or special food collecting camps [as well as q]uarry sites ... [Engelbrecht et al. 1993:20].

Transitional Period (ca. 1500-1000 BC). This period features a continuation of Late Archaic cultural and economic patterns, with only a few innovative traits. Among these are developing burial/ceremonial complex and, toward the end of the period, the introduction of ceramics. The shift to pottery appears to have been preceded by the adoption of steatite or soapstone pots which made cooking and food preparation easier (Ritchie and Funk 1973:87; Funk 1993:198).

Woodland Period (1000 BC-AD 1600). The definitive characteristic of the Woodland period in New York State is the creation and use of pottery, a development that occurred at different times from one location to another (Feder 1984:101-102; Sears 1948; Snow 1980:262). Native groups also became more dependent on domesticated plants—including maize, beans, and squash—during the Woodland in the Northeast, although this change does not seem to have significantly altered subsistence and settlement patterns until the Late Woodland, after AD 1000 (Ritchie and Funk 1973:96). In the meantime, hunting and gathering continued to be important elements of native lifeways for much of the Woodland, and were likely still employed after contact with Europeans. The Woodland period in New York witnessed significant cultural developments, most of which were related to the adoption of agriculture. Among these were: increasingly sedentary village life accompanied by increases in populations and population densities; technological changes, including the refinement of pottery-manufacturing techniques and the adoption of small triangular projectile points; and an intensification of warfare.

The Early Woodland period (1000 BC-AD 1) in western New York is generally thought to have begun with the Meadowood phase about 3,000 years ago. Meadowood sites are found throughout the Northeast, and particularly New York (Engelbrecht et al. 1993:22-23). Meadowood technological innovations included: Vinette I pottery (which made its first appearance during the Transitional period), gorgets, clay and stone tubular smoking pipes, birdstones (which may have served as atlatl weights), and boatstones. Copper was also introduced into New York from the western Great Lakes during this phase. Other typical Meadowood artifacts include thin side-notched projectile points, trianguloid cache blades, bone tools, copper beads, groundstone celts and adzes, and copper adzes (Ritchie and Funk 1973; Engelbrecht et al. 1993:23-25).

In western New York, the Middle Woodland period (AD 1-1000) is poorly understood in comparison to the Early Woodland. The period began when people diversified the techniques they employed to decorate their ceramic vessels. The end of the period occurred when people in western New York adopted the suite of characteristics Ritchie associated with the Late Woodland: primarily agriculture based on maize, beans, and squash; Owasco-style pottery (collarless vessels with elongate bodies, conoidal bases, slightly everted rims, and cord-wrapped-stick impressed exterior decoration confined largely to their necks); and house structures resembling historical Haudenosaunee longhouses (Ritchie 1980). Recent studies, however, have demonstrated that none of these developments occurred at AD 1000, nor did they happen together at any other single time (Hart 1999, 2000; Hart and Brumbach 2003; Hart et al. 2003; Prezzano 1988; Schulenberg 2002). Moreover, this research has altered how events during the Middle Woodland are interpreted. The direct dating of maize using the AMS technique, for example, has demonstrated that people in southern Ontario and central New York

were growing the crop before AD 700 (Crawford et al. 1997:114-115; Hart et al. 2003:634). Meanwhile, Hart et al. (2003:624-625) and Schulenberg (2002:160-164) have obtained AMS dates from charred residue on the interiors of Owasco vessels that indicate people were manufacturing those pots as early as the seventh century AD (see also Hart and Brumbach 2003:743-744). Beyond this, Hart has demonstrated for central New York that people did not construct longhouses before the beginning of the thirteenth century AD and that they did not likely grow beans until an even later date (Hart 1999, 2000).

In western New York, the transition between the Middle and Late Woodland periods (AD 1000-1500) can generally be characterized as a hunting-fishing-collecting economy. Increases in both social complexity and population are evident, leading to the hypothesis that "maize horticulture was already being practiced" (Ritchie and Funk 1973: 356). Once maize horticulture was significantly incorporated into the economy later in the period, it did not seem to drastically alter existing cultural patterns. For most of the Late Woodland period horticulture served simply as an additional procurement system. It was not until European-American disruption of native culture that groups became more fully dependent on horticulture for subsistence. The development of bean and squash horticulture is roughly correlated to a growth in population and village size.

Although, as outlined above, some of the cultural developments Ritchie associated with the Late Woodland did not occur between AD 1000 and 1100, some—particularly those related to the development of an agricultural system based on maize, beans, and squash—did happen in the succeeding years. In fact, several developments appear to cluster around AD 1200 to 1300: the earliest evidence for longhouses and multiple-household villages is from the thirteenth century AD and people added beans to their diets around AD 1300 (Hart and Brumbach 2003:744-746). During this time, the techniques employed to decorate pottery diversified across space, probably reflecting concomitant changes in the ways and frequencies with which people interacted (MacNeish 1952; Whallon 1968). Likely in part because of the large amounts of wood consumed during the construction and maintenance of these settlements, as well as that needed for firewood, inhabitants periodically relocated their villages roughly every 10 to 20 years (Engelbrecht 2003:101-103). In southwestern New York, in particular Chautauqua County, Late Woodland occupations of the region between AD 1250 and 1400 are related to late prehistoric agricultural groups in western Pennsylvania, such as the Monongahela Tradition and Mead Phase. Evidence for year-round settlement of the Allegheny Plateau after AD 1400 is still unresolved (Sullivan 1996; Emans 2007; Guthe 1958).

While the impetus for village movement most often cited is soil exhaustion (Sykes 1980; White 1960, 1961, 1963), other factors such as game depletion, firewood depletion, refuse accumulation, and chronic warfare may also have been contributing factors. Game depletion, in particular, may have been a strong motivation for movement, since deer provided both food and clothing (Gramly 1977; see also Engelbrecht et al. 1993:29-30). Just prior to substantial European contact in the early seventeenth century, groups on both sides of the Niagara River and Lake Ontario coalesced into the Neutral Confederacy. The confederacy stayed intact until decimation by the Seneca in 1650 (Engelbrecht et al. 1993: 32-33).

Contact Period (AD 1500–1650). During the Late Prehistoric and Contact periods, tribal clusters of Iroquoian-speaking peoples were distributed throughout New York State and lower Ontario. Comprising several thousand people in at least one, and usually several, villages in proximity to one another, each tribal cluster was separated from the others by extensive and widespread hunting and fishing areas (Trigger 1978:344; Engelbrecht 2003). Native American groups in western and central New York were profoundly affected by the introduction of the fur

trade, long before the arrival of a permanent European-American population in the area. This period dates the beginning of the end of traditional Native American cultural patterns due to ever-increasing political, military, religious and economic interactions with Europeans.

Prior to the arrival of Europeans into the Niagara Frontier, three Iroquoian peoples primarily occupied the region: the Neutral, the Wenro and the Erie. A fourth Iroquoian group, the Seneca, inhabited areas well east of the Niagara River, but would assert their power in the region's affairs beginning in the seventeenth century (White 1978; Abler and Tooker 1978).

Located in the Niagara peninsula of Ontario and in the western portion of what is now Niagara County, the Neutral earned their name from their location between the Huron to the north and the Iroquois to the east, and their efforts to remain non-aligned during the incessant warfare between those two groups. The Kahquahs (also known as the Neuter or Neutral nation) were reported to have a village at the mouth of Eighteenmile Creek during the middle of the seventeenth century. The Wenro occupied areas in Niagara and Orleans counties, east of the Neutral near Batavia. The Erie, or Nation of the Cat, were located south of the present city of Buffalo along Lake Erie (or *Lac du Chat*, to the French) and utilized areas southeast of the lake that bears their name to Sandusky, Ohio. The traditional homeland of the Seneca was the area between the Genesee River and Seneca Lake (Engelbrecht 2003; White 1978:407-409; Turner 1974 [1850]:69; Parker 1922:493).

After 1600, the sources of animal skins within Seneca territory diminished. Because of this shift in resources, the Seneca expanded the range of their hunting and trading efforts into the traditional areas of other Iroquoian groups. Between 1638 and 1655, the Seneca warred against their rivals in western New York to secure the resources of the Niagara Frontier. The Seneca "dispersed" (e.g., annihilated and assimilated) the Wenro (by 1638), the Huron Confederacy (1649), the Petun (1650), the Neutral Confederacy (1651) and, finally, the Erie Confederacy (1655). By the mid-seventeenth century, the Haudenosaunee or Iroquois Confederacy of New York emerged as a politically, militarily, and economically united confederacy with sole access to both the land and resources surrounding the lower Great Lakes. As a result, the project area remained a sparsely settled hinterland of the Seneca, subject to hunting and resource procurement.

2.2 HISTORIC PERIOD

For almost all of the seventeenth and eighteenth centuries European activities in what is now western New York would consist of limited religious, commercial, and military endeavors. Jesuit missionaries and French traders were the first Europeans to penetrate the valleys of the region. For example, Joseph de la Roche Daillon, a Récollet (Franciscan) missionary, lived among the Neutrals for three months in 1626, and Jesuits St. Jean de Brébeuf and Pierre Joseph Marie Chaumonot visited the Neutrals in 1640. La Roche Daillon is reported to have noted a petroleum pool near what is now Cuba during his travels in July 1627. Although these visits to the region increased in frequency after the 1660s, French explorations did not generally penetrate the dense forests of what are now Chautauqua and Cattaraugus counties. The first recorded visit to the Seneca by the Jesuits was in 1656 by Pierre Joseph Marie Chaumonot. In 1678-1679, as part of general reconnoitering and trade expeditions in western New York, men under the direction of René-Robert Cavelier, Sieur de La Salle constructed a ship called *Le Griffon* along the Niagara River which would be the first sail vessel to ply the waters of Lake Erie and prosecute the Great Lakes fur trade. During their explorations of the interior of what is now

Chautauqua County, La Salle and his party were the first Europeans to see Chautauqua Lake. In general, European activities would be far removed from the area until the mid-eighteenth century (Trigger 1978:347-354; Abler and Tooker 1978:505-506; Edson 1894; Turner 1974 [1850]:116-119).

As the fur trade became an imperial concern for the European powers during the seventeenth and eighteenth centuries, competition among these powers resulted in the erection of fortified trading posts along the frontier, such as the French Fort Conti in 1679 (later, Fort Niagara), and the British fort near the future village of Geneva. Despite consistent failures in establishing permanent trading posts along the Niagara River, French strategists continued to accept the idea that asserting control over the Great Lakes offered strategic advantages for their imperial goals. As early as the 1669 (and perhaps earlier), the French were aware of a portage from Lake Erie to Chautauqua Lake and then via waterways to the Mississippi River. This route was traversed in 1739 by forces under the command of Charles Le Moyne de Longueuil, the second baron de Longueuil, as part of an indecisive effort to reinforce French forces in what is now northern Mississippi, who were engaged in battle with the Chickasaw. The contingent landed near what is now Barcelona, New York, and may have followed two separate paths to Chautauqua Lake, and then along the Chadakoin River to Conewango Creek to the Allegheny River. It was not noted how or when they returned to New France (Stevens and Kent 2000 [1941]).

By the middle of the eighteenth century, the French had created a string of military and trading installations extending from Fort Niagara along Lake Ontario, south to Buffalo Creek, and along the southern shore of Lake Erie to Presque Isle (present-day Erie, Pennsylvania) into the Ohio valley. In the late 1740s, both French traders and British settlers had expanded their efforts west of the Appalachian Mountains to engage Native nations in the Ohio Country. As a result, each kingdom intensified their efforts to deny the other access to the area (Abler and Tooker 1978:506-507; Tooker 1978:431-432: Turner 1974 [1850]: 143-147, 184; Smith 2008).

In 1749, a French expedition under the direction of Captain Pierre-Joseph Céloron de Blainville marched through the Chautauqua County woods in an effort to drive out British-American interlopers during the run up to the French and Indian War and exert the French claim to the Ohio River valley. The detachment followed the Lake Erie shore and landed at the mouth of what is now Chautauqua Creek in present-day Westfield near where de Longueuil landed a decade earlier. Carrying their gear overland along an Indian trail to Chautauqua Lake, the expedition used the established water route to reach the Allegheny River on July 29, 1749. As they went, they buried engraved lead plates that proclaimed French sovereignty of the area, although no plates were buried in Chautauqua County (Sullivan 2004a [1927]; Smith 2008). Four years later, in 1753, an expedition of 200 men under the command of Captain Michel-Jean-Hugues Péan expanded the nine-mile portage trail into the so-called French Portage Road by hacking out a path through the dense forest. The road, which connects present-day Westfield and Mayville, was still evident in 1802 when settlers first moved into the area. They called it the "Old French Road" (which approximated what is now State Road 394) (Preservation League of New York State 2001; Smith 2008).

The ancient rivalry between the British and the French intensified during the course of the eighteenth century, reaching a crescendo during the 1750s, when the two countries engaged in another round of warfare. Much of the action of the conflict occurred elsewhere, including the erection of several French fortifications in what is now northwestern Pennsylvania, including Fort Presque Isle (1753), Fort Le Boeuf (1753), and Fort Machault (1756). The British would

construct Fort Venago (1760) approximately 200 feet from the site of Fort Machault, which the French burned when they left the area in 1759. After a 19-day siege, British troops captured Fort Niagara in July 1759. This crippled the French presence in the region, although skirmishing between Native Americans and the English continued until the closing days of the French and Indian War (Smith 2008; Turner 1974 [1850]:228-233).

During the Revolutionary War, both the British and Americans enlisted the aid of individual Haudenosaunee nations in their battles in the frontier, as several of the nations allied with Great Britain and several with the Americans. Warfare initially remained well east of the region, but Britain's efforts to cripple the frontier economy engendered raids by their Haudenosaunee allies against isolated farming communities, notably in the Mohawk and Delaware valleys. In response, Commander-in-Chief General George Washington ordered a punitive assault into the heart of Haudenosaunee country in 1779 to halt the attacks against American settlers. Under the command of Major General John Sullivan and Brigadier General James Clinton, the American forces destroyed more than 40 villages and hundreds of acres of crops in an area between the eastern Finger Lakes and the Genesee River. Many Haudenosaunee, burned out of their central New York villages, sought refuge at Fort Niagara where they suffered through a difficult winter of hardship and hunger (Spiegelman 2007; Abler and Tooker 1978:507-508; Ellis et al. 1967:116-117).

As part of that campaign, Colonel Daniel Broadhead led a complementary maneuver to drive British-allied nations from the Allegheny valley. The Americans destroyed ten native villages during their march up the Allegheny River between Fort Pitt (present-day Pittsburgh) and Olean Point. Provisioned and armed by the British, groups of Haudenosaunee periodically harassed colonial settlements until the end of the war, but were not a major military threat (Abler and Tooker 508).

The British and their Loyalist allies were expelled from the new United States after the Treaty of Paris (1783) ended the Revolutionary War, although the British did not vacate forts along Lake Ontario or farther west until 1796. The Haudenosaunee, abandoned in the United States by their British allies after the war, were forced to make peace as separate nations with the Americans (Abler and Tooker 1978:507-508; Ellis et al. 1967:115-117). As a result of the Second Fort Stanwix Treaty (1784), the Haudenosaunee relinquished all their land west of the Niagara River. This treaty was disputed by several groups of Haudenosaunee until 1794, when a treaty was signed at Canandaigua between the United States and the Six Nations that defined the boundaries of Seneca lands and the reservations to the other Haudenosaunee nations. Native American title to the land in western New York was largely extinguished with the Treaty of Big Tree (present-day Geneseo, New York) in 1797; although several areas were reserved for the Native Americans to use and live on, including reservations at Allegany, Buffalo Creek, Cattaraugus, and Tonawanda (Figure 2.1; Turner 1974 [1850]:403; Abler and Tooker 1978:509, 512; Hutchins 2004; Goldman 1983:27-31).

European-American settlement of the Niagara Frontier dates from the end of the American Revolution in 1783, although border disputes between New York and Massachusetts, both of which claimed the new territory, frustrated the actual, legal sale of these lands. Under an agreement signed in Hartford, Connecticut in 1786, the land once occupied by the Haudenosaunee came under the jurisdiction of New York State. Nonetheless, the Commonwealth of Massachusetts maintained the right to sell the land west of Seneca Lake once the Native title to it had been extinguished. During the next decade large grants of land in western New York were sold to private investors who attempted to open the land to settlement,

except for a one-mile wide strip of land along the eastern bank of the Niagara River, which New York State reserved for itself (see Figure 2.1; Ellis et al. 1967:152-156; Schein 1993:5-8; Abler and Tooker 1978:507-509; Turner 1974 [1850]:326).

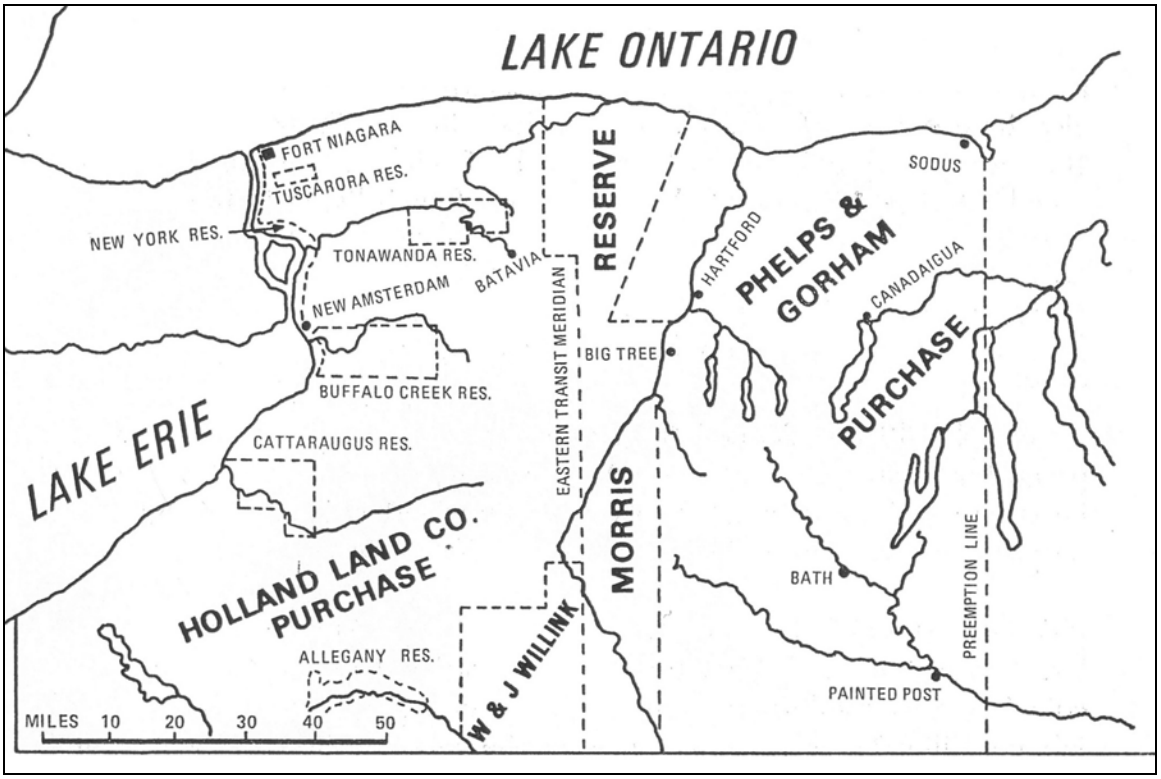


Figure 2.1. Landholdings in Western New York circa 1800 *(Chazanof 1970:23).*

The Commonwealth of Massachusetts sold the preemption rights to the entirety of western New York (more than 6 million acres) to a syndicate of land speculators headed by Oliver Phelps and Nathaniel Gorham. The eponymous Phelps & Gorham purchase became Ontario County in January 1789. Financial troubles soon undermined the syndicate's efforts to sell parcels within their purchase to settlers. These difficulties ultimately led to the group's forfeiture of the western two-thirds of the tract in 1790 in exchange for retention of title to the eastern third. Massachusetts then sold the remaining unsurveyed portion of the area to financier Robert Morris in 1791. Reserving a portion of the land for his own purposes (the so-called "Morris Reserve"), Morris sold the remainder, including all of the present Chautauqua and Cattaraugus counties, to a consortium of Dutch investors called the Holland Land Company in 1792-1793 (see Figure 2.1; Turner 1974 [1850]:396-403; Ellis et al. 1967:154-156).

To facilitate settlement of the area, Theophilus Cazenove, agent for the group, contracted Joseph Ellicott in the autumn of 1797 to survey the company's land in western New York and divide it into townships. All of western New York was at one time part of an über Genesee County, which included all the land west of the Genesee River and a line due south from the junction of the Genesee and Canaseraga Creek (near Big Tree on Figure 2.1). The first Euro-American settler of Chautauqua County may have been Amos Sottle (or Sawtel) who reputedly erected a log house in 1796 or 1797 near what is now the Village of Irving along Cattaraugus Creek (Smith 1884:I:77; Young 1875:70-74). The first Euro-American settlement in what is now Cattaraugus County occurred in 1798 in the Town of South Valley by Joel Swane, Halliday

Jackson and Henry Simmons, who were sent by the Society of Friends of Philadelphia (Quakers) to teach agricultural techniques to the Seneca. It was a short-lived settlement (Adams 1893; Ellis 1879). The first permanent settlement in Cattaraugus County took place in 1804 when Robert Hoops erected a cabin at Olean Point (East Olean) along the Allegheny River. Hoops was an agent for his brother Major Adam Hoops and David Heuston. Major Hoops purchased 20,000 acres in what are now Cattaraugus and Allegany counties in January 1803 on advice from his son, Adam, Jr., who was a surveyor for the Holland Land Company. The settlement at Olean Point was chosen because it was at the head of steamboat navigation on the Allegheny River, which would become a major point of embarkation for pioneers heading to Pittsburgh, Cincinnati, and the Western Reserve in Ohio (Beers et al. 1869:97; Adams 1893:57, 854; Ellis 1879:153-154).

The Town of Chautauqua was formed within Genesee County on April 11, 1804, and comprised all of the present county of Chautauqua except the townships in Range X, the easternmost strip (Doty et al. 1940; Young 1875; Beers 1881:18-19). In 1808, the counties of Chautauqua and Niagara (consisting of what are now Erie and Niagara counties) were created from Genesee County. At that time, Range X was included as part of Chautauqua County, which was divided into two townships—the Town of Pomfret in the east and the Town of Chautauqua in the west. Cattaraugus County was created in 1808 as well, although it was coterminous with the Town of Olean. It would remain so until the Town of Ischua (now Franklinville) was created in 1812 (Beers 1881:18-19; Young 1875:109-110, 466; Chautauqua History Co. 1904:517; Doty et al. 1940:590).

However, at the time of their formation in 1808 neither Chautauqua County nor Cattaraugus County had sufficient population to operate separately. Chautauqua County would act in conjunction with Niagara County until 500 taxable inhabitants (or voters) were living within its boundaries. The population reached 500 in 1810 and the county was fully organized on February 9, 1811. Mayville was selected as the county seat (Beers 1881; Young 1875:110-114; Turner 1974 [1850]:578, 576). Cattaraugus County also worked under the jurisdiction of Niagara County until it attained 500 voters. With its population hovering around 537 residents, Cattaraugus County was officially created on March 26, 1817, although the county courts did not open session in Olean until July 3. As a consequence of a number of factors—poor roads, nothing to sell, no market for goods or services, and general frontier poverty, settlement of Cattaraugus County lagged. Early population centers were at Olean and Ellicottville (Adams 1893:55-59, 854, 857; Beers 1880:15; Doty et al. 1940:590).

The first settlers came from Pennsylvania, Rhode Island, and Vermont, who entered the region during the early 1800s via Lake Erie and the network of streams east of Chautauqua Lake, up from Pennsylvania, or along Cattaraugus Creek. While John and James McMahan and Edward McHenry are regarded as the first permanent settlers of Chautauqua County (in 1802, near what is now Westfield), Amos Sottle (or Sawtel) had erected a log house in 1796 near what is now the Village of Irving along Cattaraugus Creek. An axeman with Ellicott's surveying party, Sottle lived there for a number of years, but left for several years to work with Ellicott surveying the Northwest Territory. Sottle returned by 1804 to live permanently in Chautauqua County. At this early date, settlement in northern Chautauqua County concentrated at what would become the Village of Silver Creek, approximately eight miles north of the project area. Other pioneers included Andrew Straub, David Kincaid, Arthur Bell, Christopher Dull, James Montgomery, Culbertson, George, and John Degeer, and Jeremiah George, all by 1804 (Beers 1881:18; Stewart 1867:7; Young 1875:70-73).

Settlement of what is now the Town of Pomfret began in 1804; the first settlers were Thomas McClintock, David Eason, and Low Miniger. These three eventually sold their land to Hezekial Barker, Zattu Cushing, and other people, and moved to Westfield. Cushing arrived in 1804 and purchased land in Lots 29 and 33 of Township 6, and Lot 16 of Township 5. Other early settlers include Epiphalet Burnham, Philo Orton, Samuel Davis and Samuel Berry (Beers 1881:20-21). Richard Williams and Zattu Cushing built a gristmill on Canadaway Creek in 1807. This mill attracted settlers and as a result the concentration of settlement in the town was in this area, which was then called Canadaway (present-day Fredonia). A road through the village was laid out by 1809. The first bridge over Canadaway Creek was built by Elijah Risley, near Colburn's Mill; and his son Elijah Risley, Jr., opened the first grocery. Next door to the grocery, was the first shoe store, owned by Thomas Kapple, who also had the first tannery. The first school was taught by Samuel Berry in a log house; across the street was a bookstore. The first post office was in the home of Samuel Bellows, and the first tavern was in the home of Hezekiah Barker. Another tavern was established by Richard Williams (Beers 1881:21).

The earliest purchases of land in what is now the Town of Hanover occurred along Cattaraugus Creek in 1804 by Charles Avery and William G. Sydney in the area identified as "Cattaraugus Village." Other landowners included Amos Sottle, Sylvanus Maybee, Able Cleveland, David Dickenson, and John Howard. Cleveland and Dickinson operated the first sawmill and gristmill in the town (at Silver Creek) prior to 1805. Additional settlers before the War of 1812 were Ezekial Lane (an early resident of Buffalo), Artemas Clothier, Norman Spink, Jehial Moore (who built a sawmill near Forestville and later a gristmill), Guy Webster, and Joseph Brownell (Young 1875:73-74; Downs and Hedley 1921a).

On June 12, 1812, the Town of Hanover was formed from the Town of Pomfret and included what is now the Town of Villenova, which was formed on January 24, 1823. The Town of Hanover attained its present size in 1827, with the creation of the Town of Sheridan (Beers 1881:18-19; Young 1875:466; Chautauqua History Company 1904:517; Doty et al. 1940:590). The commercial center of Hanover was initially located in the north part of the town near the junction of Cattaraugus Creek and Lake Erie where Cattaraugus Village (now Irving) developed and what is now Silver Creek (then Fayette). Away from the lake, settlement clustered at Forestville and Nashville (at that time Webster Settlement). Settlement of what is now Forestville commenced ca. 1805 with early settlers including Ezra Puffer, Samuel Johnson, John Mack, Rufus Washburn, Walter Lull and Martin B. Tubbs, Jehial Moore (who in 1809 erected the first sawmill below the falls and in 1810 the first gristmill), and Daniel Holbrook (Downs and Hedley 1921a).

The initial, formal land purchases in what is now the Town of Villenova began in late 1809, when Ezra Puffer, John Kent, and Daniel Whipple purchased lots in Township 5, Range 10 of the Holland purchase. Other purchasers before the War of 1812 included John Kent, Jr., Reuben Wright, Jr., John Arnold, Benjamin Sweet, and Charles Mather. Initial settlers, beginning with John Kent in 1809, included Daniel Whipple, John and Eli Arnold, William and Benjamin Barrows, Roderick Wells, Charles Mather, Captain Sweet, Nathaniel Bowen (who was killed at the Battle of Buffalo in 1813), Ezra Puffer, Villeroy Balcom, Ezra and Eldad Corbett, and William Pierce, who all arrived before 1816 (Downs and Hedley 1921b).

The Hamlet of Villenova developed at a crossroads and was originally referred to as Wright's Corners. Grover & Norris kept the first store here in 1828 and Villeroy Balcom operated a tavern in 1829. Auren G. and Nathaniel Smith built a sawmill in 1819 at what is now the hamlet of Hamlet. Long the leading business center in the town during the nineteenth century,

Hamlet was at one time known as Orton's Mill and as Omar in the 1850s. George Wilson, a wagon maker, was an early resident of Hamlet and Benjamin Vincent was an early Villenova blacksmith. James Brown constructed the first carding and cloth-dressing mill at Hamlet, which later housed a gristmill (Downs and Hedley 1921b). Other industries included an early gristmill in the Town of Villenova constructed by Stephen Landers and Crowell & Shepard; Kent's mill on the Conewango River; and Nathan Worden's sawmill less than two miles from Hamlet. An iron foundry was constructed along the Conewango by Hickey & Howard ca. 1860 and remained in operation through a number of owners during the middle of the century. Martin Crowell ran a planing mill from the same source for a number of years (Downs and Hedley 1921b).

Growth in Chautauqua County, especially along the lakeshore, was stunted by the War of 1812. During the war, western New York was a primary theater of activity, ravaged by attacks and counterattacks between American and British forces. Most of the fighting was north and west of Chautauqua County, but along Lake Erie, the *Queen Charlotte*, a British vessel, prowled the waters, sending marauders ashore to forage food (Ellis et al. 1967:141; Goldman 1983:21-24; Turner 1974 [1850]:603; Beers 1881:15, 18-19). Settlement resumed after the cessation of hostilities, but the conflict delayed the development in the county.

In 1811, the road between Ellicottville and Mayville had been constructed through the central part of the county, and the Sinclairville and Cassadaga Creek Road was begun shortly thereafter and later extended along the Ellery-Gerry town line to Jamestown (Beers 1881:18; Edson 1894:860, 863, 881-883; Young 1875:396-397). Early roads (ca. 1812) also connected Kent's mill in Villenova through the Town of Cherry Creek to Kennedyville as well as from the mill to Sinclairville (Downs and Hedley 1921b). After the war ended, bridges and other improvements were completed. Circa 1820, a stage road had been completed between Canadaway (Fredonia), Jamestown, and Warren, Pennsylvania (Chautauqua History Company 1904:518; Young 1974 [1875]:327). By 1815, Canadaway had grown to such an extent that the village included a meat market, tailor, distilleries, brewery, blacksmith, ashery, and many other stores. On May 2, 1829, Canadaway was incorporated as a village, and renamed Fredonia (Beers 1881:21). Early religious societies in the towns of Hanover and Villenova included the Methodists (initially itinerant), Methodist Episcopal began with circuit preachers and later had a church at Hamlet, Wesleyan, and Freewill Baptist (Downs and Hedley 1921b).

Before they could sow crops settlers first had to clear their lots of trees. As a result, lumbering and timber by-products—potash, pearl ash and charcoal—were an important early industry and a source of needed income for local pioneers. Once cut and dried, the timber was burned and processed by asheries into either a white powder called "pearl ash" or potash, sometimes called "black salts." The sale of wood ashes was the only cash-producing crop for many early settlers during their first years in western New York (Chautauqua History Company 1904:521; Young 1875:332). Pearl ash sold for between $200 and $300 in 1805, and some farmers derived enough income from these products to offset the cost of opening new areas to cultivation (Fletcher 1971:329). Resulting from the burning of wood, potash could be used to make soap or glass, scour wool, and bleach and dye cloth. Demand for potash and pearl ash subsided in the mid-1850s, when potassium deposits in Germany began to be exploited. In its highly concentrated form, pearl ash could be transported more readily to distant markets from isolated farmsteads.

The production of charcoal and tanbark were other profitable timber-related industries for early settlers prior to the 1840s (Fletcher 1971: 329). Charcoal was essential in smelting iron ore, one of the leading industries in Western New York in the nineteenth and twentieth

centuries. Another by-product of clearing new ground, tanbark was created when bark from oak and hemlock trees was peeled off in the early summer and dried in four-foot long cylinders. The curled green bark was used by local tanneries in processing animal skins while the barkless trees were cut into boards and shingles (Fletcher 1971:329).

Circa 1830, commercial activity increased in the county as new entrepreneurs established stores and inns in the area's villages. In Silver Creek, Oliver Lee opened a store that attracted customers from throughout the county. Other storekeepers in Silver Creek included Stephen Clark, John E. Howard, Manning Case, C.C. Swift, John M. Cummings, Ammi Merchant, and Daniel Rumsey. At what would become the Village of Irving, the federal government erected piers and developed the harbor area where Cattaraugus Creek enters the lake. As a result, the developing freight-shipping business took root in this area, especially the shipping of lumber and timber products (Downs and Hedley 1921a). What is now the Village of Forestville became an economic center after the erection of a sawmill and a gristmill (ca. 1810) and the emergence of a vigorous trade in potash and pearl ash. Further, after the Holland company sponsored the cutting of a road from Fredonia south through Forestville and Nashville, taverns developed in support of the cattle-driving trade. Forestville was incorporated in 1848 and its leading citizens prior to the Civil War included William Colville, Jr., John Hurlburt, Nathan Mixer, Daniel and Harvey Holbrook, Albert Camp, Dr. Amos Avery, Adolphus and Orrin Morrison, and L.J. Pierce, among others (Downs and Hedley 1921a).

In 1851, the Village of Dunkirk became a terminal on the New York & Erie Railroad. The Buffalo & Erie Railroad company established the Buffalo & State Line Railroad from Dunkirk to the New York-Pennsylvania state line in 1852. This company later purchased the Erie & North East Railroad. In 1869, it was consolidated with the Lake Shore & Michigan Southern Railroad. The lakeshore railroads drew commerce away from the interior of the towns, which resulted in the closing of numerous hotels and taverns. After construction of the railroad, Forestville and Silver Creek saw a rise in manufacturing operations, whose success resulted in increasing population. A disastrous fire in Forestville in 1870 destroyed much of the business district and the village did not recoup its early commercial success (Beers 1881; Doty et al. 1940; Downs and Hedley 1921a, 1921b).

By the late nineteenth century in northern Cattaraugus County, the most valuable timber had been removed and farming and dairying replaced lumbering. Much of the remaining trees were removed and used for destructive-distillation wood products. The trees that remained were mostly secondary and tertiary growth trees (Ellis 1879:160-161). With the completion of the New York & Erie Railroad from Hornellsville to Dunkirk in 1851, agriculture became an important commodity. The first product of Cattaraugus fields was grain, especially wheat and spring grains, as well as sheep grazing; later dairying and mixed farming became preeminent. By 1855 county farmers were growing wheat, corn, oats, hops, and potatoes, and successfully exported maple sugar, honey and beeswax, in addition to butter, milk and cheese (Ellis 1879:159, 377; Beers et al. 1869:97; Adams 1893:60, 81-83).

After 1852, the Buffalo & Erie Railroad (the Allegheny Branch of the Erie Railroad in 1900) ran through the southern part of the Town of Hanover with a station at Forestville, Sheridan (Town of Sheridan) and Perrysburg (Cattaraugus County). No railroad lines traversed Villenova, although the Buffalo & Southwestern (later a part of the Erie system) ran just southeast of the town, with stations at Cherry Creek and South Dayton (USGS 1900). In 1960, the Erie Railroad merged with the Delaware, Lackawanna & Western (DL&W) to form the Erie-Lackawanna. The line was absorbed into Conrail in 1976 (University of Akron 1996).

The Buffalo & Jamestown Railroad was organized in March 1872 and completed to Jamestown three years later. Running generally south from Buffalo, this line passed through Erie County before crossing Cattaraugus Creek at Gowanda and then turning southwesterly through the Village of Dayton, where the line tunneled under that of the Erie Railroad. As a result of the economic dislocations caused by "the Panic of 1877," the Buffalo & Jamestown was reorganized as the Buffalo & Southwestern Railroad, and later leased to the New York, Lake Erie & Western (NYLE&W) Railroad (ca. 1880). In 1895 the route was consolidated into the Erie Railroad. In the twentieth century, the line was known as the Buffalo Southern and later as the Erie-Lackawanna (Smith 1884:I:318; Western New York Railroad Archive nda, ndb). At present, a small freight line called the New York & Lake Erie Railroad (NY&LE) runs trains through the tunnel at Dayton between South Dayton and its headquarters in Gowanda (Western New York Railroad Archive ndc).

After the Civil War, agricultural activities in Chautauqua County consisted mainly of grain growing (primarily wheat and corn), raising potatoes, dairying, butter and cheese making, and haying. Fruit trees (especially apple) helped supplement incomes. Closer to the lake, grapes were successfully cultivated. Livestock included pigs, horses and cows. A Farmers' Club of Hanover was founded in 1877. Industry included timbering operations and the manufacture of grape baskets (Stewart 1867:7; Downs and Hedley 1921a).

The towns of Hanover and Villenova had divergent population histories during the nineteenth century. The population of Hanover increased from 3,520 in 1835 to 4,101 in 1855 to 4,279 in 1880 and to 4,778 in 1900 (Beers 1881; Sullivan 2004 [1927b]). The population of Villenova vacillated during the nineteenth century, rising from 1,453 in 1835 to 1,531 in 1845 before declining to 1,413 in 1855. The number of residents increased to 1,505 in 1865 before falling to 1,446 in 1880 and 1,206 in 1900 (Beers 1881; Sullivan 2004 [1927b]). By 1920, the population of Hanover had risen to 5,977, while that of Villenova had fallen to 961 (Sullivan 2004 [1927b]).

Although tanning and lumbering remained the principal industries of Cattaraugus County throughout the nineteenth century, the discovery of oil in northern Pennsylvania in 1859, and later in southwestern New York state, spurred a dramatic building boom and the county's prosperity after the Civil War. The first oil well in the county was dug in 1864. By 1878, there were 250 wells producing a high-grade paraffin-based oil (Pearson et al. 1940:4-5). Additional industries include furniture manufacture, tanning, glue making, cutlery manufacture, weaving, canning, and milk processing.

After years of effort, the Buffalo & Lake Erie Traction Company became the largest inter-urban trolley line in the Lake Erie Shore Region between Erie, Pennsylvania and Buffalo, New York on January 1, 1909 (Springfirth 1970:2, 40-53). The line connected Buffalo to the summer resort coast of Lake Erie between the Lackawanna Steel Plant and Dunkirk, passing through the grape belt of Chautauqua County. With the emergence of the automobile in the 1920s, trolley service declined and in 1932 service was discontinued between Buffalo and Angola and between Erie and the state line. All service on the Erie to Buffalo line ceased on January 28, 1933 (Springfirth 1970:71).

By the 1920s, the Town of Villenova contained four villages or hamlets: Balcomb, Hamlet, Villenova (Wrights Corners), and Wango. The leading economic endeavor was agricultural, predominantly dairying. Businesses in the Town of Hanover in the early 1920s included Hasesot Canneries Co. and W.F. Miller fruit basket factory (both in Forestville). Silver Creek supported

"The Columbia Postal Supply Company (who made postal canceling machines); Fredonia Preserving Co.; The S. Howes Company; Huntley Manufacturing Company (manufacturers of canning-factory machinery); Invincible Grain Cleaner Co.; H.J. Montgomery Manufacturing Co.; Silver Creek Parlor Frame Co.; Silver Creek Upholstery Co.; and the Stewart Underwear Co. (Downs and Hedley 1921a).

In the twentieth century, urban and industrial growth in Chautauqua County centered on the villages of Dunkirk and Fredonia, and the City of Jamestown, while the rest of Chautauqua County were predominantly rural farming communities. Primary crops on the county's farms remained corn and wheat, supplemented by dairying (Edson 1894:881; Beauchamp 1900:46-47). Grape growing and wine production became important commodities. In 1982, Chautauqua County had the most farms of any county in New York State (2,134) (Puglia 1994:1).

Contributing to the growth in the county was the development of Chautauqua Lake and the Chautauqua Institution as part of a resort/tourism industry beginning in the 1880s (Munger 1941:36). Providing an important economic corridor in the northern part of the county, the construction of Route 5 and the New York State Thruway in the late-1950s linked the area to Buffalo as well as to points east and west (Leet 1980:216-218). The extension of Route 17 (the Southern Tier Expressway) and the improvement of state and county highways facilitated access to the county as well as its economic development. The region's rolling hills provide opportune getaways for tourists attracted by fall foliage, the area's wineries, golfing, skiing, and the enticements of Chautauqua Lake and the Southern Tier. In 2000, the populations of the towns of Hanover and Villenova were 7,638 and 1,121, respectively.

2.3 DOCUMENTARY RESEARCH

2.3.1 Historical Map Analysis. Three historical maps—Stewart (1867), Beers (1881), and USGS (1900)—were consulted for the Ball Hill project area (Figures 2.2 through 2.6). The project area is in a rural area at the northeastern portion of Chautauqua County. The map review found 25 MDS locations within or near (<100 m) the APE. None of the map documented structures are at or near the 66 proposed Turbine locations. Thirteen MDSs are at or near locations proposed for Access Roads, ten MDSs are near Collection Lines, and two MDSs are near the proposed Transmission Line (see Section 4.0).

2.3.2 Site File and Archival Review. A review of archaeological site files at the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) and the New York State Museum (NYSM) identified 18 sites within five miles of the project area (Table 2.1). None of these sites is reported within or immediately adjacent to the project area. The closest site—UB 2217 (Villenova 3)—is an unidentified prehistoric site comprising four chert flakes and two chert chunks, located about 614 ft (187 m) south-southwest of the proposed location of a wind turbine. The remaining sites are more than 1,975 ft (602 m) from the project area. Of the 18 previously recorded sites, eight are historic Euro-American sites, five are prehistoric, and five are unidentified, but are likely prehistoric.

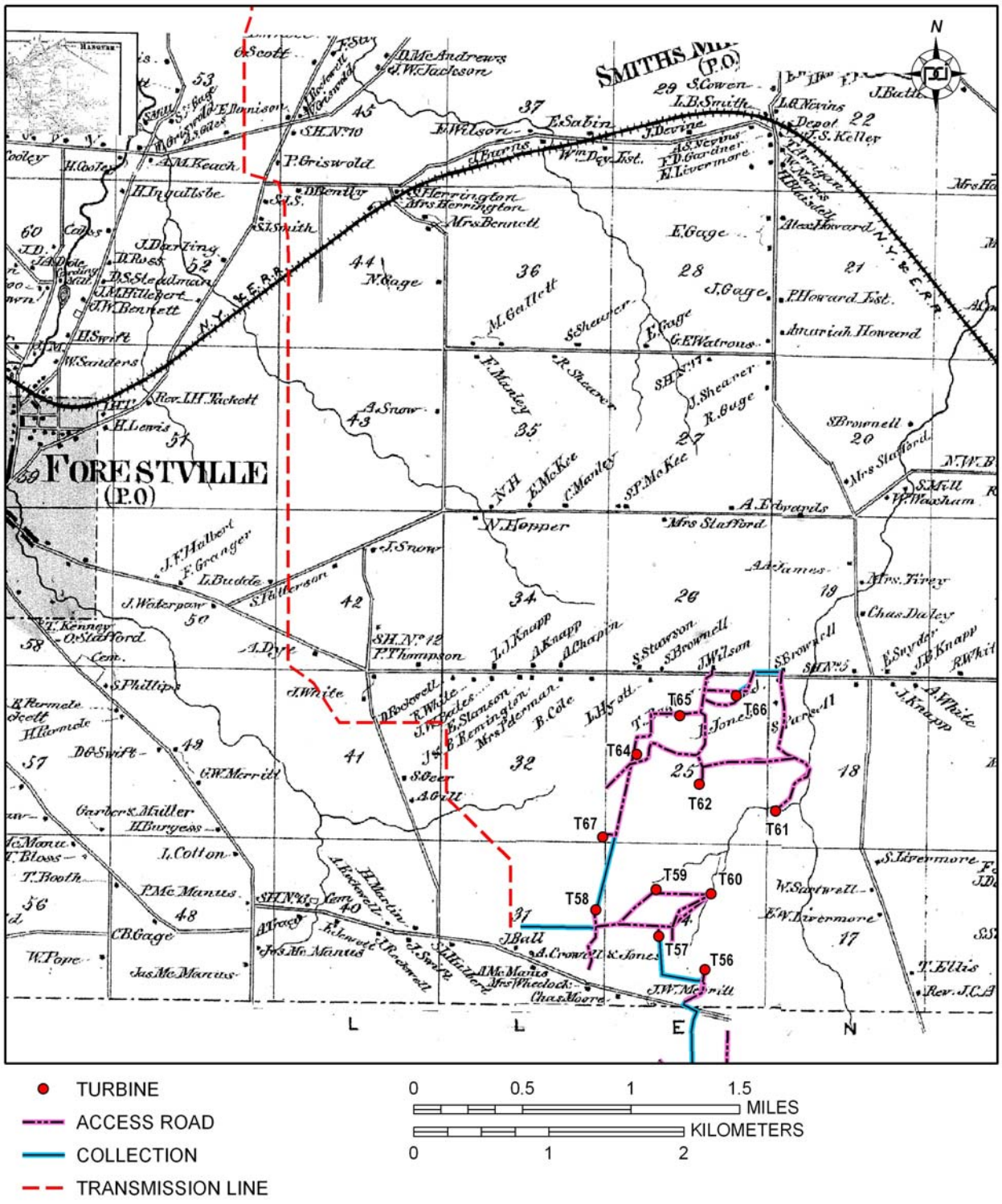


Figure 2.2. The project area in the Town of Hanover in 1867 *(Stone & Stewart 1867).*

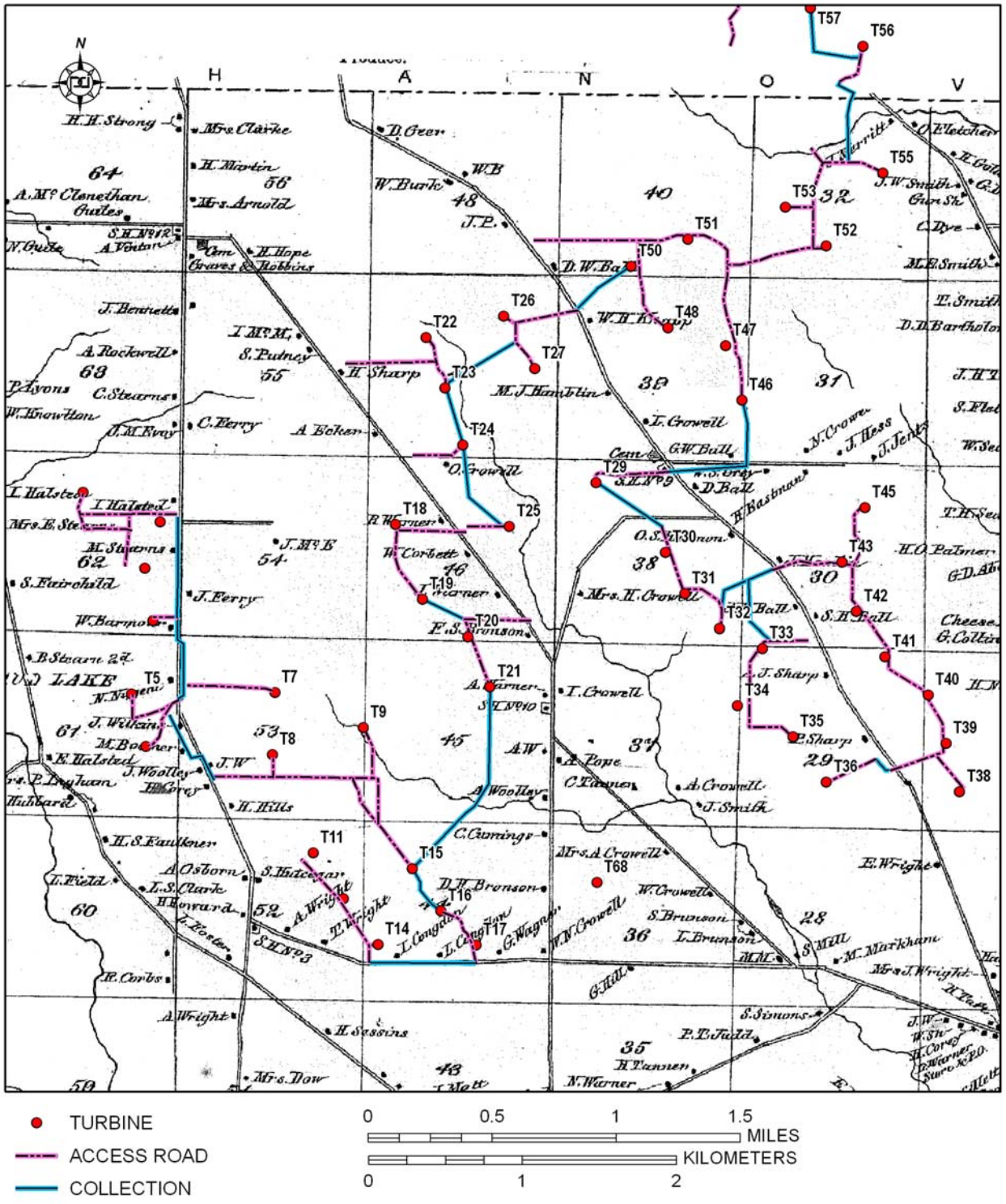


Figure 2.3. The project area in the Town of Villanova in 1867 *(Stone & Stewart 1867).*

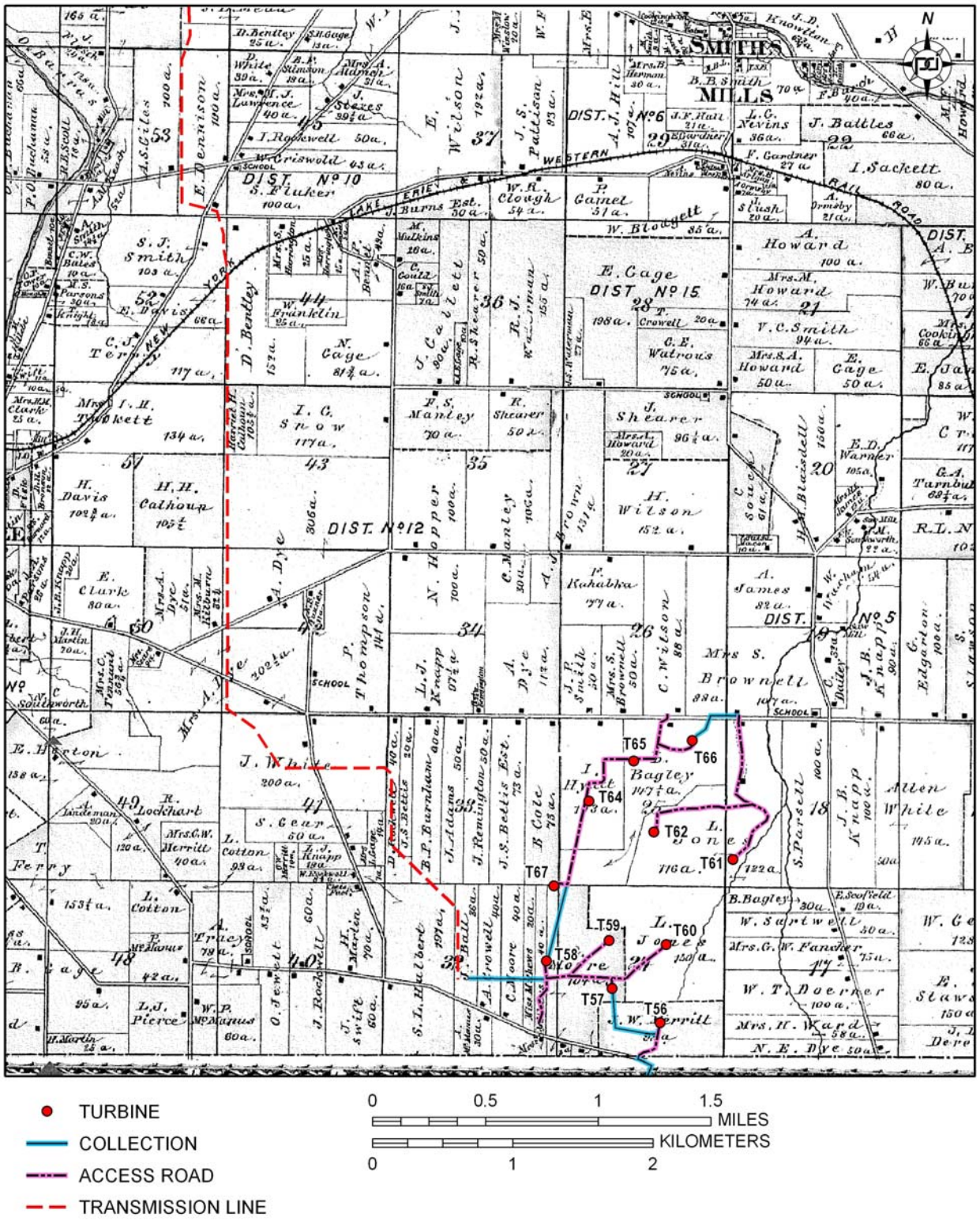


Figure 2.4. The project area in the Town of Hanover in 1881 *(Beers 1881).*

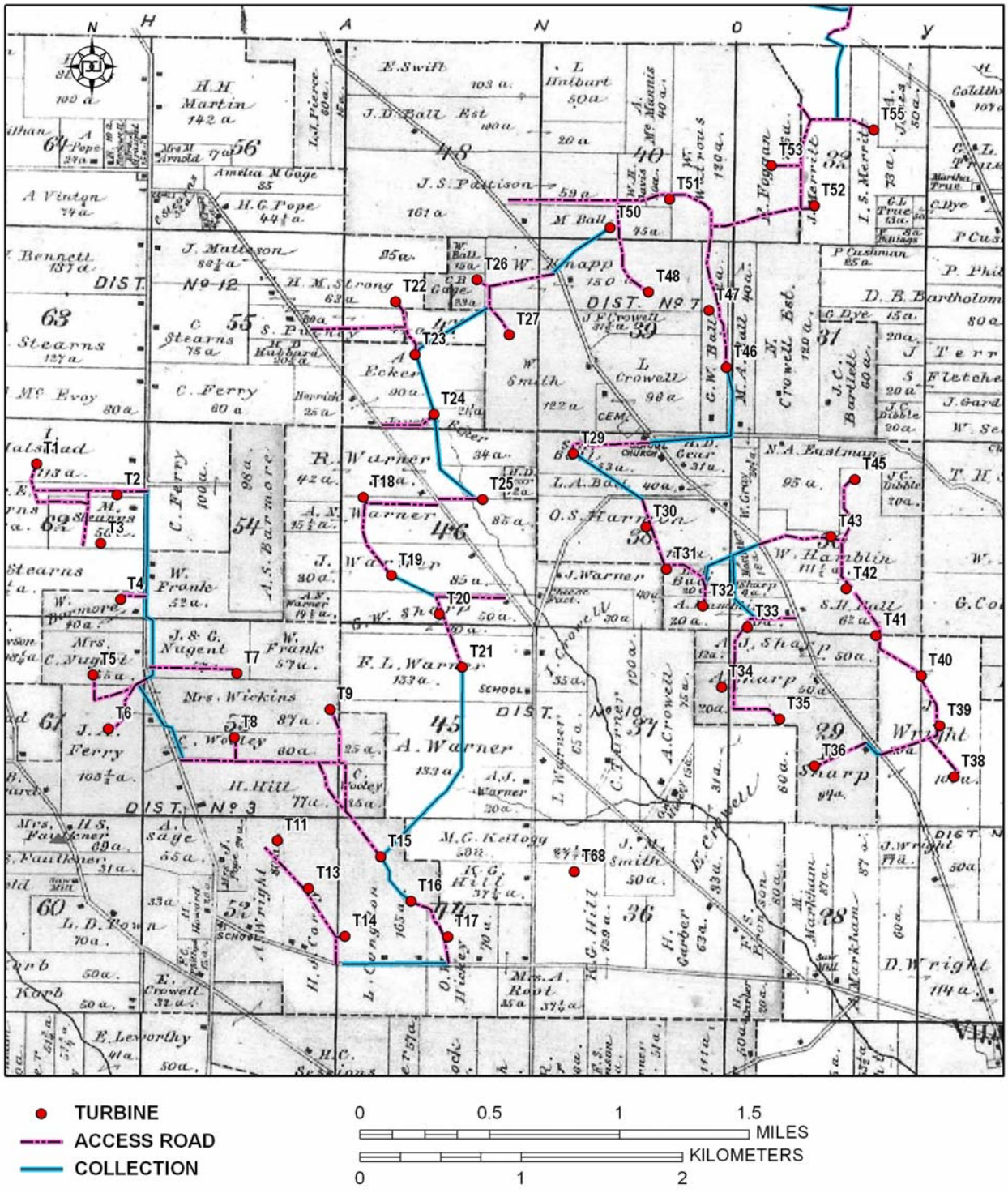


Figure 2.5. The project area in the Town of Villanova in 1881 *(Beers 1881).*

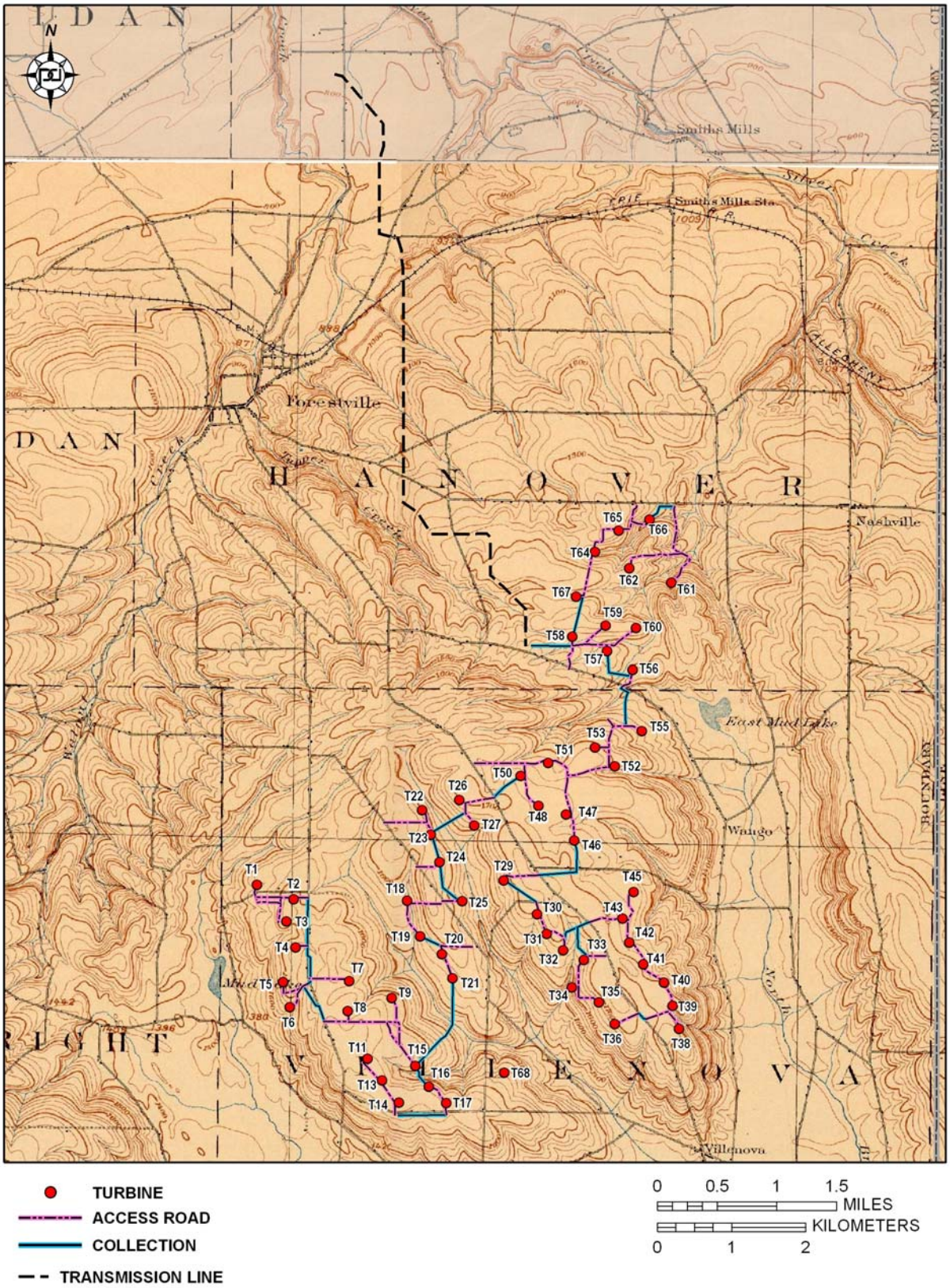


Figure 2.6. The project area in 1900 *(USGS Cherry Creek, NY 1900).*

Table 2.1. Archaeological sites within five miles of the project area

NYSOPRHP Site #	Additional Site Name	Distance to APE m (ft)	Period	Site Type
01352.000086	Colville Site (UB 3011)	5,046 (16,555)	Pre-1867	No Info
01352.000085	Hulbert Blacksmith Site	5,069 (16,631)	Historic	No Info
	NYSM 1903; Hubbard #1 (CCR 1-1)	602 (1,975)	No Info	Cemetery
	NYSM 1904; Hubbard #2 (CCR 2-1)	661 (2,169)	No Info	Mound
	NYSM 2957; ACP CTQA-14	7,543 (24,747)	No Info	Earthwork: Burials
01326.000047	Bolt Site (UB 3025); NYSM 10776	1,274 (4,180)	Ca. 1860-1900	No Info
01326.000046	Hotel Site (UB 3026); NYSM 10775	1,306 (4,285)	Pre-1867	No Info
01326.000045	Hamlet Site (UB 2999); NYSM 10774	1,385 (4,544)	c. 1825-1900	No Info
01326.000006	Cushman Site (SUBi 1461)	2,689 (8,822)	1867+	Complete Structure
01326.000004	UB 2231 (Villenova 5)	1,211 (3,973)	Unidentified Prehistoric	Camp? Workshop?
01326.000002	UB 2216 (Villenova 2)	2,897 (9,505)	Unknown Prehistoric	Camp, Workshop?
01326.000003	UB 2215 (Villenova 1)	3,445 (11,302)	Unidentified Prehistoric	Camp? Workshop?
01326.000302	Decker Cheese Factory Site (SUBi 1460)	6,689 (21,946)	Late 19th Century	Foundation
01326.000001	UB 2217 (Villenova 3)	187 (614)	Unidentified Prehistoric	Camp, Workshop?
	NYSM 2140; Maple Camp #1 (COR 4-4 RMSC)	2,343 (7,687)	No Info	No Info
	NYSM 10162; Cushman (SUBi 1461)	2,901 (9,518)	Historic European	No Info
	NYSM 7865; ACP CATT 7A	2,982 (9,783)	Prehistoric: Historic Native?	Fortifications: Burial Mounds: Burial Sites
	NYSM 5428; ACP CTQA No #	3,464 (11,365)	No Info	Earthwork: Caches? Pits?

2.3.3 Previous Research. The archaeological files at the New York State OPRHP contained 18 reports of cultural resources investigations for areas within five miles of the project area. Three of these investigations were conducted within or in proximity to a proposed turbine location (Geo-Marine Inc. 2002; Clune & Johnson 1987; Hartner and Nelson 1985).

3.0 Methodology

3.1 RESEARCH DESIGN

The testing strategy presented below follows the cultural resource investigation testing strategy for windpower projects designed by the New York State Historic Preservation Office (NYSHPO 2006). The field investigation includes an intensive surface and subsurface examination (e.g., shovel testing) of samples of the project area (i.e., APE) predetermined and presented in a testing plan. The plan was submitted to and approved by NYSHPO in April 2008. The project design changed since that submittal and the differences are discussed below.

3.1.1 Definition of the Area of Potential Effect (APE). The total APE originally included 411.71 acres, including all presently known components including turbines, access roads, electric connection lines, lay-down area, switchyard and an operations and management (O&M) building, as well as the APE of a proposed transmission line (Table 3.1: black text). During fieldwork the project design changed resulting in a reduction of the APE to a total of 374.61 acres (see Table 3.1: blue text). Therefore, the survey of 374.61 acres is addressed in this report. Due to project redesign since completion of fieldwork, the total APE has increased to 400.61 acres (see Table 3.1: red text). Fieldwork for this additional APE acreage will be conducted and the results will be submitted as an addendum to this report.

The APE dimensions for proposed turbine locations are 300 by 300 ft (91.5 by 91.5 m), which is 2.07-acres per turbine. A total of 60 turbines are now proposed which total 124.2 acres. The APE width of electric collection lines is 50 ft (15 m) for a total length of approximately 7.9 miles (48.2 acres). Although the total length of collection lines in the project design is 8.5 miles, only 7.9 miles are considered part of the APE that does not overlap with the APE of other components (e.g., turbines). The current APE for access roads is 60 ft (18.3 m) wide by a total of approximately 16.3 (118.6 acres). However, the total length considered during field investigation was 13.6 miles (106.59 acres). The APE of the proposed transmission line is 100 ft (30 m) wide by approximately 6 miles (72.12 acres). However, the total length considered during field investigation was 5.7 miles (70.6 acres). The projected APE-acreages for the additional components were as follows during the field investigation: substation (5 acres); switchyard (5 acres; lay-down area (10 acres); and O&M building (5 acres). These subtotals have since changed as the project design has been revised and finalized: substation (1.3 acres); switchyard (3.3 acres; and four lay-down areas totaling 27.9 acres. The calculated number of shovel tests that would be required to test the current APE at a standard 15-m (50-ft) interval is 6,410 (shown at the bottom of the table). A list of all project components for the Noble Ball Hill Windpark is presented in Table 3.1. The percentages of the APE per local habitat area (LHA) are discussed below and are also present in Table 3.1. Also shown are the relative number of shovel tests needed to proportionately survey the project area.

3.1.2 Environmental Zones and Local Habitat Areas. Per New York SHPO wind farm guidelines, Environmental Zones and Local Habitat Areas were assessed following Robert E. Funk's 1993 work, *Archaeological Investigations in the Upper Susquehanna Valley, New York State.* The project area is located in the western part of the Allegany Plateau and is referred to as the Cattaraugus Hills of the Appalachian Uplands (Cressey 1966: Figure 9). The Cattaraugus Hills are relatively flat-topped upland with deep intervening valleys (Cressey 1966:33). Elevations within the project area range between 800 ft (244 m) and 1,683 ft (513 m) AMSL. In *Roadside Geology of New York State,* the region is labeled the dissected *Allegheny Plateau*

Table 3.1. Project components within Local Habitat Areas.

Project Components	Total Component Acreage	Local Habitat Area					
		1 Summit knolls and ridges 9%[1] 9%[1]	**2 Uplands between Summits and knolls** 72%[1] 69%[1]	**3 Near streams and stream headwaters** 1%[1] 2%[1]	**4 Near bogs, swamps, ponds** 1%[1] 1%[1]	**5 Upland Margin** 13%[1] 14%[1]	**6 Lake Plain** 4%[1] 5%[1]
Turbines (2.07 acres each; 300 by 300 ft)	66 turbines x 2.07-acres =136.62 60 turbines x 2.07 acres =124.2	**n=6 (12.42 acres)** Turbines 11, 22, 31, 39, 40, and 41 n=7 (14.49 acres) Also T13	**n=58 (120.06 acres)** Turbines 1-10, 12-21, 23-30, 32-38, 42-62, 64 and 65 **n=49 (101.43 acres)** Excluding T13, T25 and T52. T10, T12, T37, T44, T49 and T54 removed from project	**n=0** **n=2** (4.14 acres) T25, T52	**n=0** No change	**n=2 (4.14 acres)** Turbines 63 and 66 n=2 (4.14 acres) AlsoT67. T63 removed from project	**n=0** No change
Access Roads 60 by 71, 786 ft 60 by 86,117 ft	133.15 106.59 118.6	10.93 10.19	113.31 89.62	0.85 0	0.70 0.46	7.36 6.32	0 no change
Transmission Line 100 by 30,036 ft 100 by 31,416 ft	70.89 70.63 72.12	5.59 5.72	6.16 6.94	1.19 1.94	1.94 1.67	38.73 36.51	17.21 17.82
Collection Lines 50 by 41,703 ft[3]	46.05 48.19	5.39 0.87	38.65 44.57	0.88 no change	0 no change	1.13 1.87	0 no change
Substation	5 1.3	Previously undetermined	Previously undetermined 1.3	Previously undetermined	Previously undetermined	Previously undetermined	Previously undetermined
Switchyard	5 3.3	Previously undetermined	Previously undetermined	Previously undetermined	Previously undetermined	Previously undetermined	Previously undetermined 3.3
Laydown Area(s)	10 27.9	Previously undetermined Area 3 (9.5)	Previously undetermined Area 2 (8.3) Area 4 (6.8)	Previously undetermined	Previously undetermined	Previously undetermined Area 1 (3.3)	Previously undetermined
O&M Building	5	Location undetermined	Location undetermined	Location undetermined	Location undetermined	Location undetermined	Location undetermined
Total Acreage	411.71 (386.71[1]) 374.61 (349.61[1]) 400.61	34.33[1] 31.27[1]	278.18[1] 242.56[1]	2.92[1] 6.96[1]	2.64[1] 2.13[1]	51.36[1] 48.84[1]	17.21[1] 17.82[1]
Shovel Tests per Local Habitat Area	6,587 STPs 5,994 STPs 6,410 STPs	593[2] STPs 539[2] STPs	4,743[2] STPs 4,136[2] STPs	66[2] STPs 120[2] STPs	66[2] STPs 60[2] STPs	856[2] STPs 839[2] STPs	263[2] STPs 300[2] STPs

Black text reflects the original APE. Blue text reflects the revised APE. Red text reflects the revised APE post fieldwork

[1] = Excluding the acreage of the substation, lay-down area(s), and O&M Building due to previously undetermined locations.

[2] = Adjusted for percentage of total acreage

[3] = Although the total length of collection lines in the project design is 8.5 miles (13.6 km), only 7.9 miles (12.7 km) are considered part of the APE that does not overlap with the APE of other components (e.g., turbines).

(Van Diver 1985:viii and 13). The study area, as discussed by Funk (1993:65), is within a dissected plateau (Allegheny Plateau). There are three environmental zones discussed by Funk including: valley floor, valley walls, and interfluves (uplands). The project area is most comparable to the interfluves environmental zone but it is incised with deep gullies that have similar characteristics to those of the valley walls zone. The proposed transmission line also crosses the margin of the uplands down to the lake plain. Therefore, these two additional landform categories are included.

As best as can be determined, the APE crosses six local habitat areas including: (1) summit knolls and ridges; (2) uplands between summits and knolls; (3) near streams or stream headwaters; (4) near bogs, swamps, ponds; (5) upland margin; and, (6) lake plain. The term "near" is used as defined by Funk, as anything less than 100 meters (328 ft) from the feature discussed (1993:70). Other local habitats associated with the interfluves zone including "rockshelters" and "near springs on saddles between knolls and ridges" do not appear applicable for the project area. The geography of the region is not generally sensitive for rockshelters. No springs are shown within or in proximity to the APE on the current or historic USGS Quadrangles. Row 1 of Table 3.1 shows the percentage of APE components (and acreage) within each local habitat area.

Spatial modeling. ESRI ArcGIS v.9 running with the Spatial Analyst extension was used to calculate the percentage of the project area present in each of the landforms/Local Habitat Areas (shown in Table 3.1). The landform features were derived from data available on the internet: the theme used for streams was created by the New York State Department of Environmental Conservation (NYSDEC) and is available for download from the Cornell University Geospatial Information Repository (CUGIR at http://cugir.mannlib.cornell.edu); the layer used for wetlands is the result of the union of data from the NYSDEC (available from CUGIR) and the U.S. Fish & Wildlife Service's National Wetlands Inventory (from http://wetlandsfws.er.usgs.gov/NWI/download.html); and the theme used for delineating summits is based on DEM (Digital Elevation Model) data created by USGS and also available from CUGIR. To quantify areas *near* rivers and wetlands, the themes for each were buffered to a distance of 100 m (328 ft) and the results were stored as polygon layers. Summits were delineated arbitrarily on contour maps created from the DEM datasets; the results were also stored as a polygon layer. Data of turbine locations, access roads and electrical connectors (i.e., linear components) supplied by the client were spatially overlaid onto these three data layers. Because of their small footprints, turbine locations were considered as homogeneous spatial entities, where the landform in which a turbine's center was located was extended to its entire area. The landform categories to which the turbines were assigned were the same as those for the linear components.

The locations of some project components, such as laydown areas, were not established in the project design (i.e., available for use) during the formulation of the model. Their total APE includes 25 acres (seven percent of the project area) which were figured into the survey strategy above by distributing shovel tests among the LHAs using relative percentages determined from the known locations of components as shown below:

Percentage of APE per Local Habitat Area:

9 percent (539 STPs)	= 1	Summit knolls and ridges
69 percent (4,136 STPs)	= 2	Uplands between summits and knolls
2 percent (120 STPs)	= 3	Near streams or stream headwaters
1 percent (60 STPs)	= 4	Near bogs, swamps, ponds
14 percent (839 STPs)	= 5	Upland margin
5 percent (300 STPs)	= 6	Lake Plain

3.1.3 Archaeological Sensitivity and Reported Sites. A review of the New York State Register and National Register of Historic Places recorded in the files of the New York State OPRHP does not show any National Register-listed archaeological sites, structures or districts within the APE. The review of known archaeological sites for the project area also included examination of the site files at the New York State Office of Parks, Recreation and Historic Preservation (OPRHP), the New York State Museum (NYSM), and early archaeological surveys (Beauchamp 1900; Parker 1922) and more recent works (Ritchie 1980; Ritchie and Funk 1973). No archaeological sites were identified within the Area of Potential Effect (APE) as currently designed. Three prehistoric sites have been found within one mile of the APE. One of these sites (OPRHP 01326.000001 [UB2217: Villanova 3]) was previously found near (approximately 200 meters southwest of) Turbines 31 and 32. It is on top of a ridge overlooking a steep cliff and described as a camp or workshop. The other two are near the West Branch of Conewongo Creek within a small valley approximately one-half mile southwest of the APE. These include a cemetery (NYSM 1903 [Hubbard #1/CCR 1-1]) and a mound (NYSM 1904 [Hubbard #2/CCR 2-1]). One previous archaeological survey (OPRHP Chautauqua County Report 278) was conducted in the area of Turbines 3 through 6 in the southwestern part of the project area but no sites were found. Another previous archaeological survey (OPRHP Chautauqua County Report 53) was conducted adjacent to Turbines 11, 13 and 14, but no sites were found.

***3.1.4 General Prehistoric Archaeological Sensitivity*.** This area is generally sensitive for small seasonal camps and processing stations. Habitation of this area was likely influenced by seasonality as discussed by Funk, “During winter months, when major lakes and streams were frozen over, it seems likely that at least a few hunting groups moved into the uplands in search of deer and other game active at that time of year” (1993:74). The previous identification of sites in the region supports this interpretation for the uplands. One prehistoric site (NYSM 5428 [ACP CTQA]) that includes an earthwork with potential caches and pits was previously found on the upland margin just over one mile east of the transmission line corridor.

***3.1.5 General Historic Archaeological Sensitivity*.** The project area and its surroundings are and have been historically used for agriculture. The proposed turbine locations are generally set in agricultural fields (e.g., pasture, crop) well behind locations of existing and map-documented farmsteads. Sensitivity for historic middens is moderate to low. Access roads and interconnect lines will likely cross or follow roads, which raises the likelihood that some cross or closely pass historic farmsteads. Areas considered sensitive for historic sites are in proximity to Map-Documented Structure (MDS) locations. Portions of the APE at or in proximity to MDS locations or reported historic sites are tested at the predetermined 5-m interval. A review of three historic maps (Stewart 1867, Beers 1881, and USGS 1900) found 25 MDS locations within or near (<100 m) the originally proposed APE. Modifications were made to the project layout, which reduced the number of MDSs to 19 within or in proximity to the APE (Table 3.2). None of the MDSs are at or near the proposed Turbine locations.

***3.1.6 Distribution of Survey Coverage*.** A square grid of 324 shovel tests at 5-m intervals was originally proposed for each of 16 turbine locations (with some exceptions discussed below). A typical grid is comprised of 18 transects of 18 shovel tests. The number of shovel tests dug was different than 324 at two turbine locations (T41 and T65) due to allotment limits of the local habitat area formula. Table 3.3 lists the number of turbines surveyed relative to the local habitat areas they are within. Portions of 21 linear components were surveyed by two transects at 5-meter (16-ft) intervals. Nineteen of these locations were selected due to proximity of MDSs and two locations were selected to account for the relative acreage of *Local Habitat Areas* (see Tables 3.2 and 3.3).

3.1.7 Alterations to the Project Design after the Submittal of the Testing Strategy to the SHPO. The design of the proposed windpark was modified during the field investigation due to engineering requirements, landowner requests, and other related logistical issues. The APE was reduced from 411.7 acres to 374.6 acres. This difference is primarily due to the removal of six turbines and associated access roads and interconnects from the project design. The final quantity of shovel tests dug per local habitat area varies slightly from the testing plan due to project redesign concurrent with fieldwork and property access limitations. Testing discrepancies were largest in Local Habitat Areas comprising the smallest percentage of the APE. Therefore, negative effects to the research design are considered minimal. As discussed in Section 3.1.1, the total APE now includes 400.61 acres (see Table 3.1: red text) due to additional project redesign since completion of fieldwork. Therefore, nearly 20 acres of APE need to be surveyed. The excavation of an additional 314 shovel tests will account for this difference in APE. As discussed, the results of the additional fieldwork will be submitted as an addendum to this report.

Table 3.2. Linear Survey Locations including Map-Documented Structure (MDS) locations at or in proximity to the APE.

MDS	Historic Map	Property Owner	Project Component	Nearest Road and/or Turbine	Local Habitat Area					
					1	2	3	4	5	6
1	Now Avoided by Project Redesign – Not Surveyed									
2	Now Avoided by Project Redesign – Not Surveyed									
3	Stewart 1867 Beers 1881 USGS 1900	T. Bayley E. Bagley Unnamed	Access Road	Route 39 (T66)		X				
4	Stewart 1867 Beers 1881 USGS 1900	L. Jones L. Jones Unnamed	Access Road	Route 39 (T66)		X				
5	Now Avoided by Project Redesign – Not Surveyed									
6	Stewart 1867	H. Sharp	Access Road	Pope Hill Road (T22)		X				
7	Stewart 1867 Beers 1881	O. Crowill B. Warner	Collection line	Pope Hill Road (T24)		X				
8	Stewart 1867 Beers 1881	M. Stearns M. Stearns	Collection Line	Round Top Road (T2)		X				
9	Stewart 1867 USGS 1900	R. Werner Unnamed	Access Road	Pope Hill Road (T26)		X				
10	Stewart 1867 USGS 1900	W. Eamons Unnamed	Access Road	Round Top Road (T4)		X				
11	Stewart1867 Beers 1881	JW C. Wooley	Collection Line	Round Top Road (T8)	X					
12	Now Avoided by Project Redesign – Not Surveyed									
13	Stewart 1867 Beers 1881 USGS 1900	L. Congdon L. Congdon Unnamed	Collection Line	Villanova Road (T14)		X				
14	Stewart 1867 Beers 1881 USGS 1900	L. Congdon L. Congdon Unnamed	Collection Line	Villanova Road (T17)		X				
15	Stewart 1867	J. Hamliin	Access Road	Prospect Road (T43)		X				
16	Beers 1881 USGS 1900	L. Jones Unnamed	Access Road	Route 39 (T66)		X				
17	Beers 1881	W. Frank	Collection Line	Round Top Road (T4)		X				
18	Beers 1881	W. Frank	Collection Line	Round Top Road (T4)		X				
19	Beers 1881	F.L. Warner	Access Road	Pope Hill Road (T20)		X				
20	Now Avoided by Project Redesign – Not Surveyed									
21	Beers 1881	M.A. Ball	Access Road	Bartlett Road (T46)		X				
22	Beers 1881	A. Hamlin	Access Road	Prospect Road (T33)		X				
23	Stewart 1867 USGS 1900	J. Wilkins Unnamed	Collection Line	Round Top Road (T6)		X				
24	Now Avoided by Project Redesign – Not Surveyed									
25	Now Avoided by Project Redesign – Not Surveyed									
26	USGS 1900	Unnamed	Transmission	Overhiser						X
27	Now Avoided by Project Redesign – Not Surveyed									
28 and 28A	Beers 1881	R. Sharp	Access Road & Collection Line	Prospect Rd (T36)		X				
29	No MDS – Linear Survey for Local Habitat Area		Transmission Line	Hopper Rd and Route 39					X	
30	No MDS – Linear Survey for Local Habitat Area		Access Road	Prospect Rd (T36)				X		

Table 3.3. Shovel tests allocated per Local Habitat Area.

Project Components	Total STPs Per Component	Local Habitat Area					
		1 Summit knolls and ridges	**2 Uplands between Summits and knolls**	**3 Near streams and stream headwaters**	**4 Near bogs, swamps, ponds**	**5 Upland Margin**	**6 Lake Plain**
Turbines	16 turbine locations **4,740 STPs**	**n=2** **473 STPs** T31 (324 STPs) T41 (149 STPs)	**n=13** **3,943 STPs** T2, T4, T6, T8, T17, T18, T32, T42, T43, T46, T50, T57 (324 STPs each) T65 (55 STPs)	**---**	**---**	**n=1** **324 STPs** T66 (324 STPs)	**---**
Access Roads	11 MDS locations 440 STPs +134 STPs **574 STPs**	---	MDSs 3, 4, 6, 9, 10, 15, 16, 19, 21, 22 and 28 11 MDSs x 40 STPs each 440 STPs	Access Road from West Lake Road Towards T1 eliminated from project design	Linear 30 (134 STPs between T39 and T40)	---	---
Transmission Line	1 MDS location 40 STPs +382 STPs **422 STPs**	---	---	---	---	Linear 29 382 STPs	MDS 26 (40 STPs) [MDSs 1 and 2 avoided by redesign]
Collection Lines	10 MDS locations **360 STPs**	MDS 11 (40 STPs) [MDSs 12 and 20 avoided by redesign]	MDS 7, 8, 13, 14, 17, 18, 23 and 28a 8 MDSs x 40 STPs each 320 STPs	---	---	---	---
Total STPs per Local Habitat Area	6, 096[1]	513[1]	4,703[1]	0 [1]	134[1]	706[1]	40[1]

[1] = see Section 3.1.7 for a discussion regarding discrepancies between the testing plan and the quantity of shovel tests dug per local habitat area

3.2 FIELD METHODOLOGY

Shovel test pits (STPs) are excavated at 5-m (15-ft) intervals in areas of natural soils at the designated turbine locations and linear surveys and adjacent to map documented structures and standing structures (see locations presented above). Exceptions from the 5-m (15-ft) interval due to disturbance (e.g., manmade ponds, standing water, push-piles, gravel concentrations, and road) are recorded on field maps. Shovel tests average a minimum of 40 cm (16 in) in diameter and are excavated to at least 10 cm (4 in) below potentially artifact-bearing soils. All soils are matched to Munsell® color charts and sieved through ¼-inch hardware screens. Tests are terminated if water is encountered in the test pit, indicating poorly drained soils. Additional shovel tests are excavated around positive shovel tests to define preliminary site boundaries, artifact concentrations, or to determine that the find spot is an isolated occurrence. Close-interval shovel testing is implemented when surface features (e.g., a foundation, depression, or the presence of map documented structures) are identified. Areas of severe disturbance, standing water, and slope greater than 15 percent are documented but not shovel tested. All shovel tests are backfilled to natural contour upon completion. All shovel tests are recorded on project maps and included in the report. Inspection of the ground surface was also conducted where possible but did not preclude the shovel testing strategy.

Artifacts found in context during the survey are collected and placed in plastic bags and labeled with provenience information. Modern materials, such as plastic and container glass, are noted on field forms but not collected. Modern materials, such as coal, red brick fragments, and miscellaneous nail fragments also are noted but not collected unless they are clearly identified as historic or found in association with historic period artifacts. All pertinent information collected during shovel testing is recorded on shovel test forms, including the location, pertinent stratigraphic data, soil types, natural or man-made disturbances in the area, and the presence or absence of cultural materials. The field director maintained a daily log and took photographs pertinent to manmade disturbances and environmental conditions.

3.3 LABORATORY ANALYSIS

Recovered cultural materials are stored at Panamerican's Buffalo Office for processing and analysis. Processing of recovered artifacts follows guidelines elaborated in 36 CFR Part 79 (Curation of Federally-Owned and Administered Archaeological Collections) and in the New York Archaeological Council's Standards and Curation of Archaeological Collections document (NYAC 1994). Standard archaeological procedures of cleaning and storage are also followed, with provenience information kept with artifacts at all times. Standard archaeological procedures of cleaning and storage are also followed, with provenience information kept with artifacts at all times. Permanent curation of artifacts is arranged with landowner consent.

Historic Artifacts. Historic artifact analysis typically entails the categorization of artifacts by broad material class (e.g. ceramic, glass, metal), with further subdivision into artifact types based on manufacturing characteristics, form, and function. These identifications are based on the New York State Museum artifact catalog (NYSM 2004), published guides such as Miller (2000), Munsey (1970), Noël Hume (1969), and South (1977), and well established web sites (e.g., Stelle 2001). The data is recorded in an artifact catalog, which includes provenience, material class, artifact type, count, secondary type (e.g. color of decoration on ceramics), description (e.g., portion of vessel if a fragment, description of maker's mark), and the beginning and ending dates of manufacture. The initial purpose of the classification is to identify the

general time period to which the assemblage dates. With larger assemblages, artifacts are also classified by functional category, which typically include household/kitchen, structural/ architectural, industrial, and personal. Functional categories enable archaeologists to characterize site use and the human activities which formed the archaeological assemblage at the site.

Prehstoric Artifacts. Lithic tools and tool manufacturing byproducts (debitage) are closely inspected with the aid of an illuminated magnifying lens (175 percent [1.75x] magnification). Projectile point morphological descriptions used in this investigation conform to those presented by Ritchie (1989:10-11). These diagnostic attributes are used to infer age or "cultural complex" affiliations established in the projectile point typology discussed by Ritchie (1989). Other tool types are described using standard terminology (e.g., end scraper, side scraper) used for lithic technology (see Crabtree 1972 Part II:31-98). General definitions of the following terms for lithic debitage (by-products of stone tool manufacturing) used in this report are presented below and generally correspond with those presented by Ritchie and Funk (1973:30):

- *Primary reduction flake:* These flakes are debitage produced during the creation a biface preform from a blank (a usable piece of lithic material selected for making a tool [Crabtree 1972:42]). They may actually serve as a blank for less elaborate tools. These flakes often have cortex (the original bedrock matrix or a weathered patina) or other impurities (e.g., crystalline inclusions, fossils) that were intentionally removed from the preform. Percussion is the main method used at this stage of tool manufacture. Striking platforms are typically large and well defined.

- *Secondary reduction flake:* These flakes are debitage resulting from thinning a preform. They rarely have cortex, they often exhibit broad dorsal scarring, and typically have large striking platforms and bulbs of percussion.

- *Tertiary reduction flake:* Tertiary reduction flakes are produced during tool finishing and maintenance. They are typically small and thin with small striking or pressure flaking platforms.

- *Shatter:* This is a fragment of debitage without a striking platform, bulb of percussion or uniform flake scars. Shatter is typically created during early stages of reduction such as removing blanks from a core. The force of percussion may separate these irregular fragments along cracks, imperfections, or other points of weakness in the material. Shatter lithics are easily confused with natural lithics due to their fragmentary nature.

- *Flake fragments and broken flakes:* A flake fragment is a portion of a broken flake missing proximal features such as the striking platform. A broken flake still has a platform but is otherwise incomplete (missing medial and distal or distal portions). The differentiation between flake fragments and broken flakes can be useful to consider assemblage size in relation to post-depositional damage (i.e., plow damage causing higher artifact counts).

These types of debitage and reflected stages of bifacial stone tool manufacturing are comparable to those presented by Callahan (1979:9) in the following ways: primary reduction flakes are created during Stage 2 and Stage 3 "initial edging and primary thinning" of lithic biface manufacture; secondary reduction flakes are the result of Stage 4 "secondary thinning"; and tertiary reduction flakes are made during Stage 5 "shaping." It is also important to consider

bifacial lithic tool manufacturing as a continuum that is divided into these somewhat arbitrary stages (Waldorf 1993:20). As a result, some artifacts exhibit characteristics of two stages. For example, the presence of cortex is a characteristic most often found on primary reduction flakes, but cortex can be found, although rarely, on finished tools. Also, factors including material quality (i.e., type, impurities) and size and shape of the parent material affect the choices available to the toolmaker. These factors are variables, as is the ability of the toolmaker, which affect the ultimate shape of the debitage and tools in an assemblage.

The purpose for this method of description is to help distinguish tool manufacture and tool maintenance activities (i.e., ascertain if the assemblage represents a workshop or a camp) in an effort to characterize site use and settlement patterns. Although these descriptive terms are most applicable to biface production, they are helpful to differentiate all debitage through morphological characteristics (e.g., size of flake, size of platform, dorsal scarring, cortex). Therefore, it is important to note that this system of artifact classification is not being used exclusively for debitage resulting from biface production, and acknowledge that debitage also results from other tool manufacturing techniques (e.g., forms of blade production such as bi-polar technique).

4.0 Field Investigation

A total of 6,096 shovel test pits (STPs) at 5-meter (16.4 ft) intervals were dug within 16 of the 60 proposed turbine locations, ten 100-m (328-ft) long segments of proposed Collection Line, ten 100-m (328-ft) long segments of proposed Access Road/Buried Interconnect, and a 455-m (1,492-ft) long portion of Transmission Line. As discussed in Section 3.1, a sample of the APE was investigated relative to designated Local Habitat Areas (LHAs) to comply with NYSHPO Wind Power project Guidelines (NYSHPO 2006). For analytical purposes, tested turbine locations and linear surveys conducted during the Phase IB field investigation are discussed according to LHA. Turbine and linear surveys are presented in numerical order within each habitat grouping. Due to the large number of shovel tests, all pertinent shovel test data are included in Adobe pdf format on a CD attached to the back cover of this report.

Figure 4.1 presents the locations of the turbines and portions of linear components selected for subsurface (i.e., shovel testing) investigation. Figures 4.2 through 4.6 show the linear survey locations relative to historic maps (shown by date) to illustrate the MDSs within or in proximity to the APE. Note that the superimposed illustrations of the APE (i.e., project area) over the historic maps are not reliably accurate due to potential discrepancies with scale, proportion, or position inherent to early cartography.

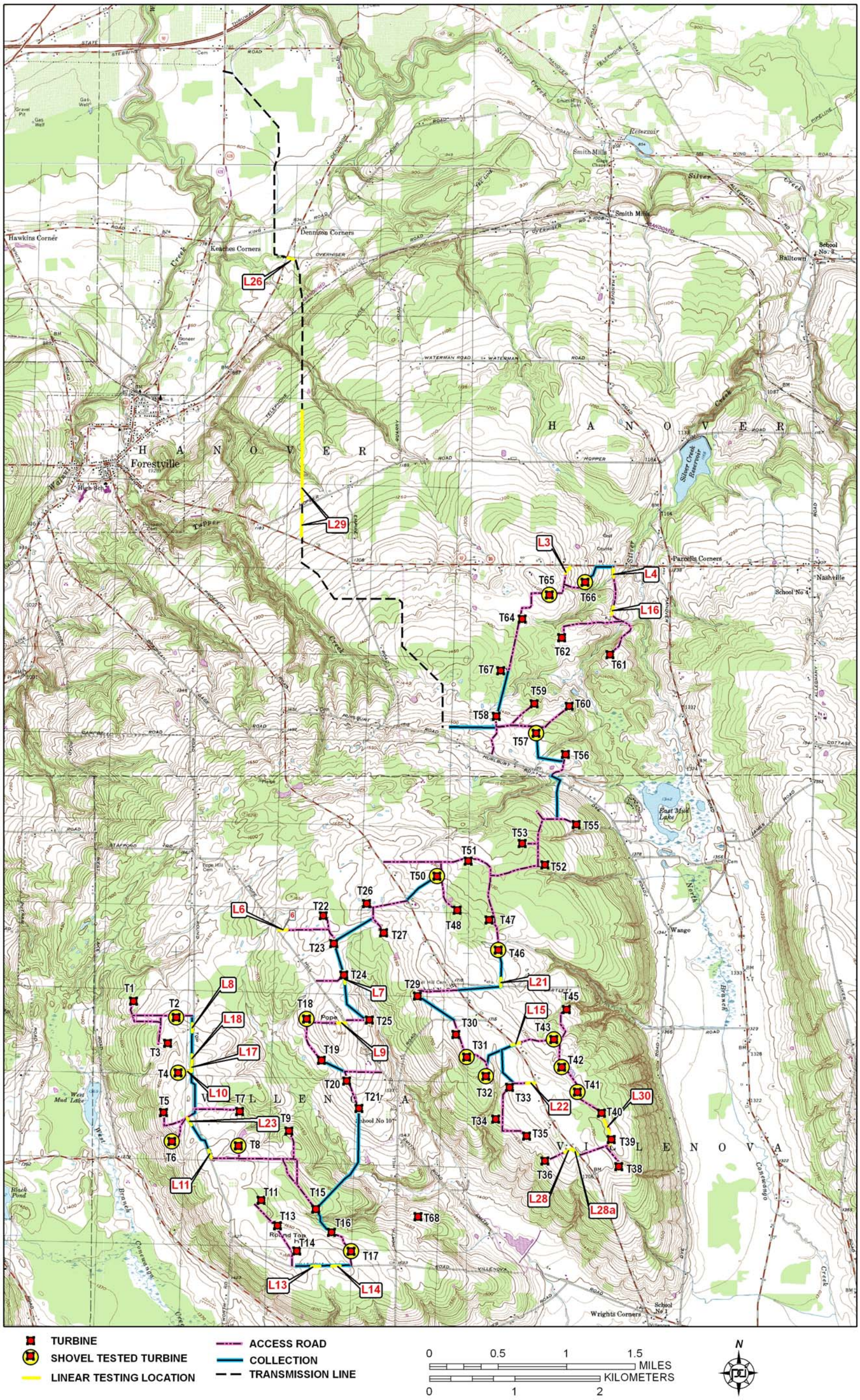


Figure 4.1. The Ball Hill Windpark project area, showing turbine locations, access roads, substation, switchyard, and linear survey areas *(USGS Perrysburg, NY 1980; Forestville, NY 1980).*

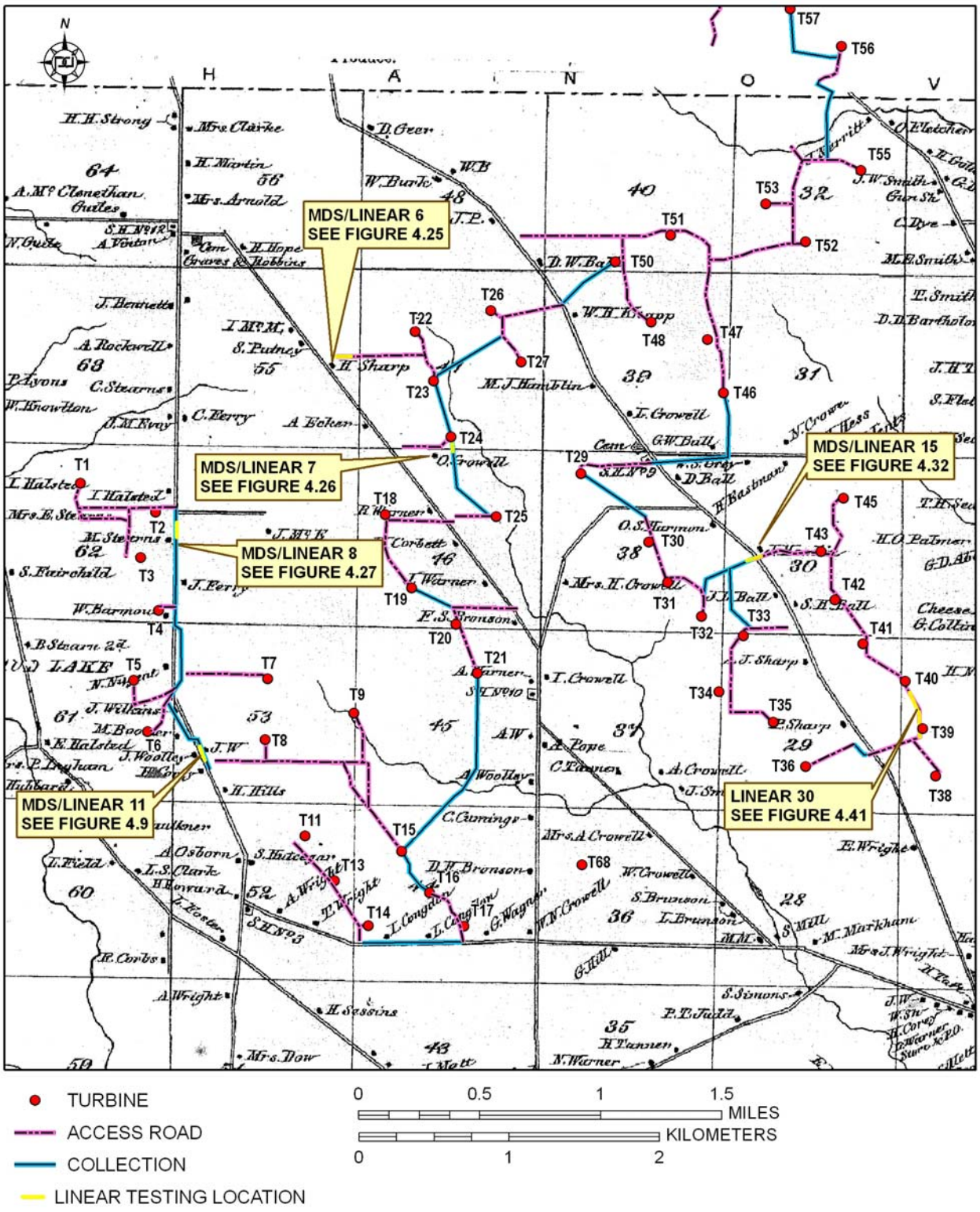


Figure 4.2. Linears 6, 7, 8, 11, 15 and 30, and MDS locations on historic map *(Stone & Stewart 1867).*

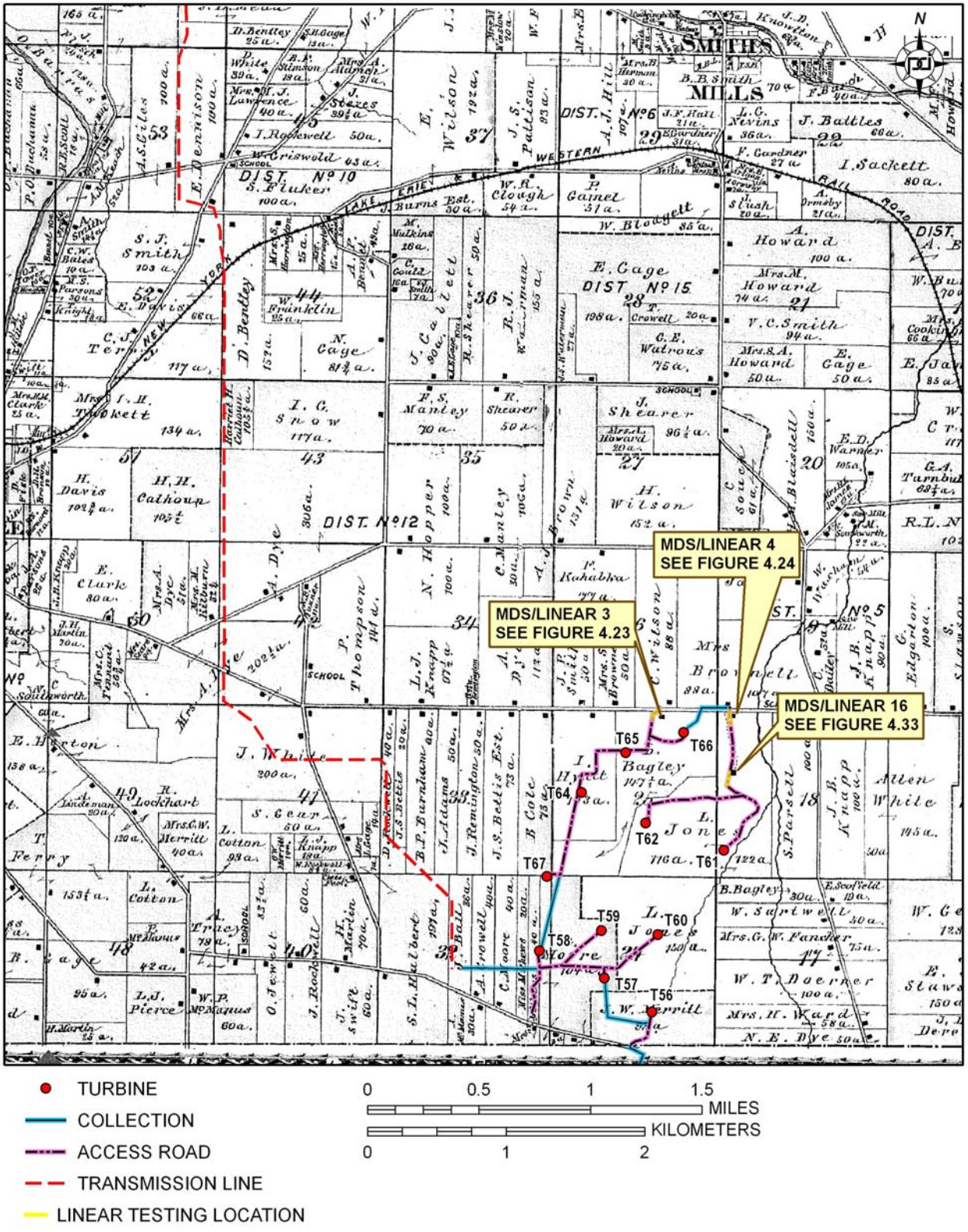


Figure 4.3. Linears 3, 4 and 16 and MDS locations on historic map *(Beers 1881).*

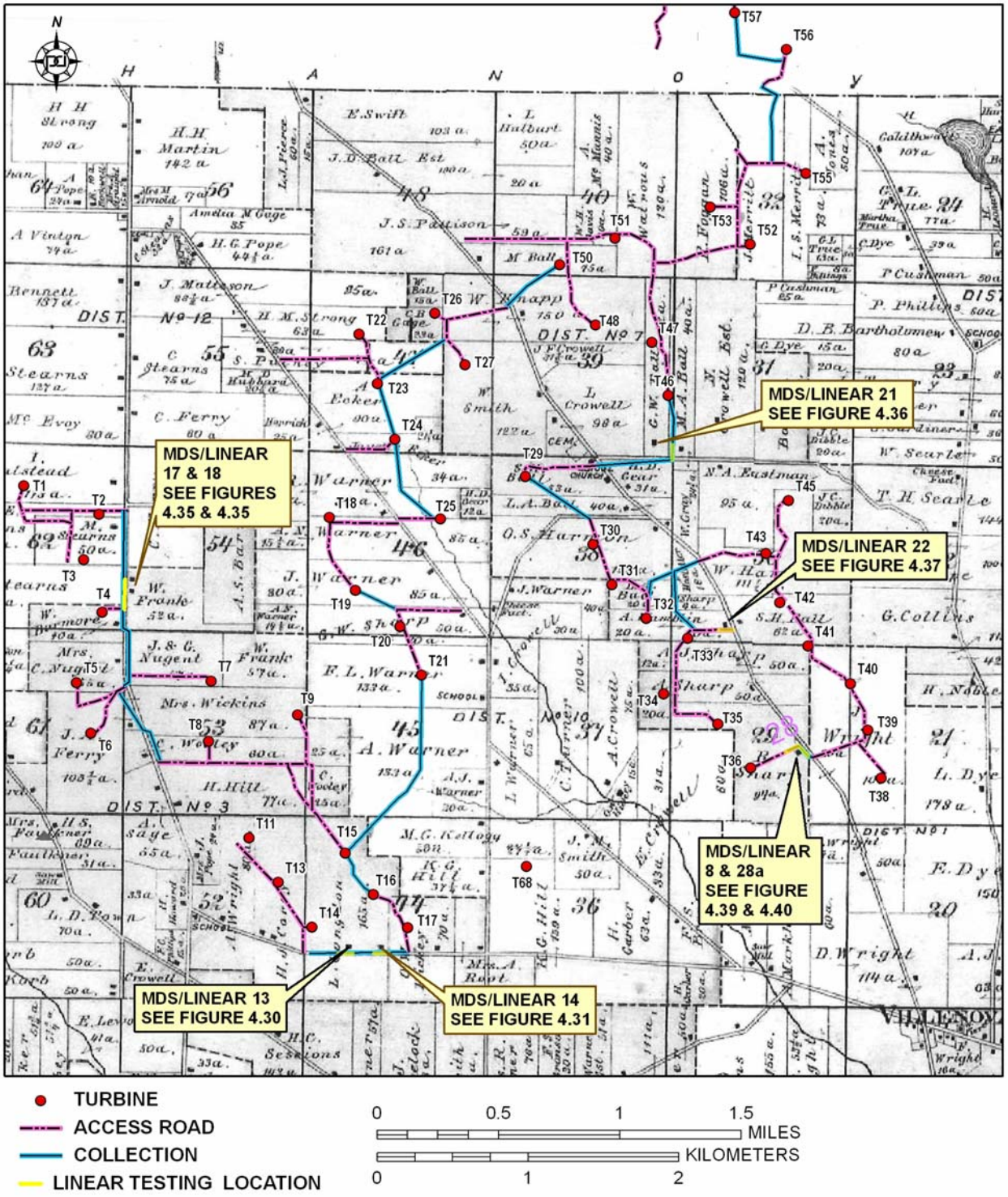


Figure 4.4. Linears 13, 14, 17, 18, 21, 22, 28 and 28a and MDS locations on historic topographical map *(Beers 1881).*

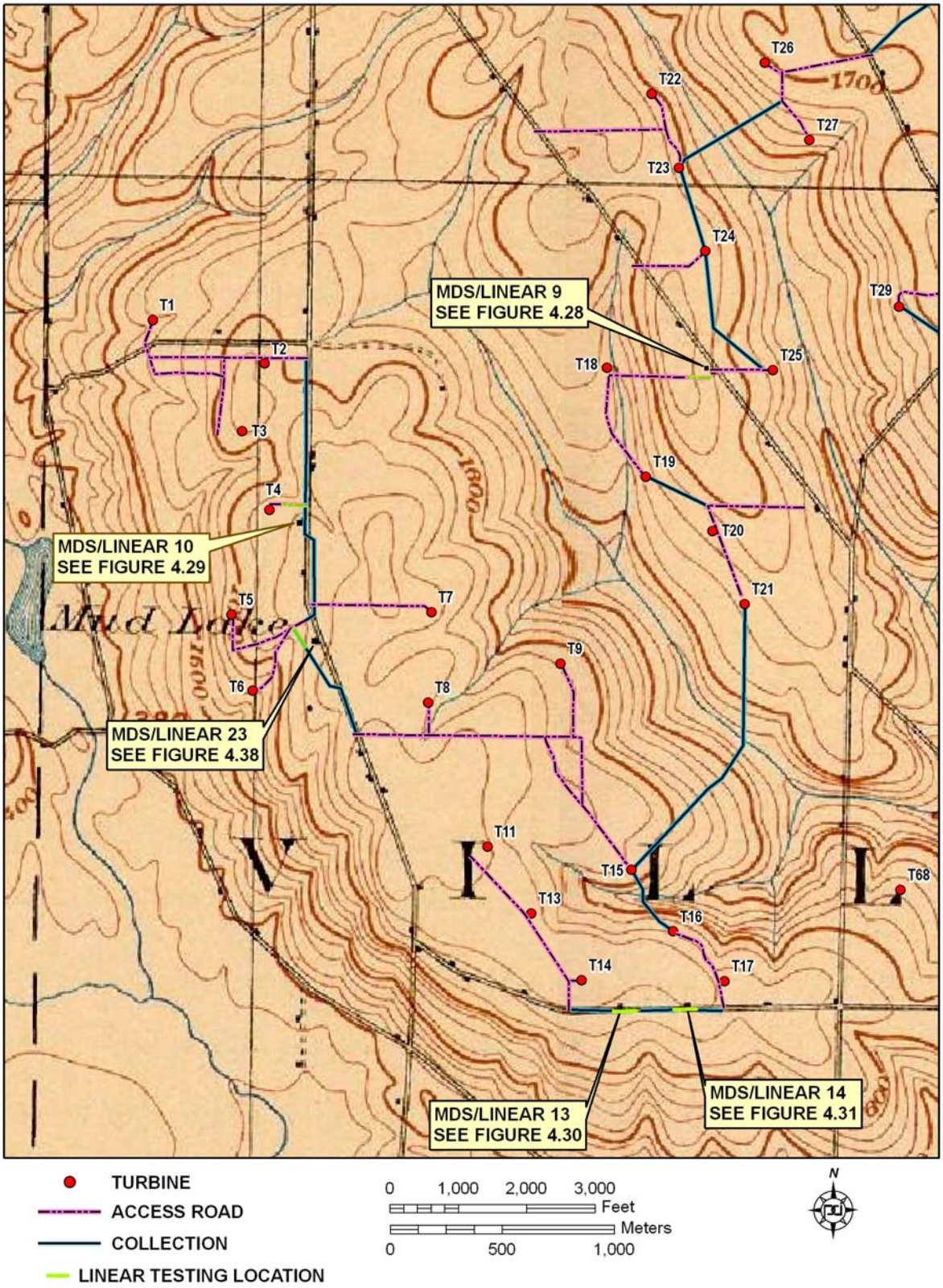


Figure 4.5. Linears 9, 10, 13, 14 and 23 and MDS locations on historic topographic map *(USGS Cherry Creek, NY 1900).*

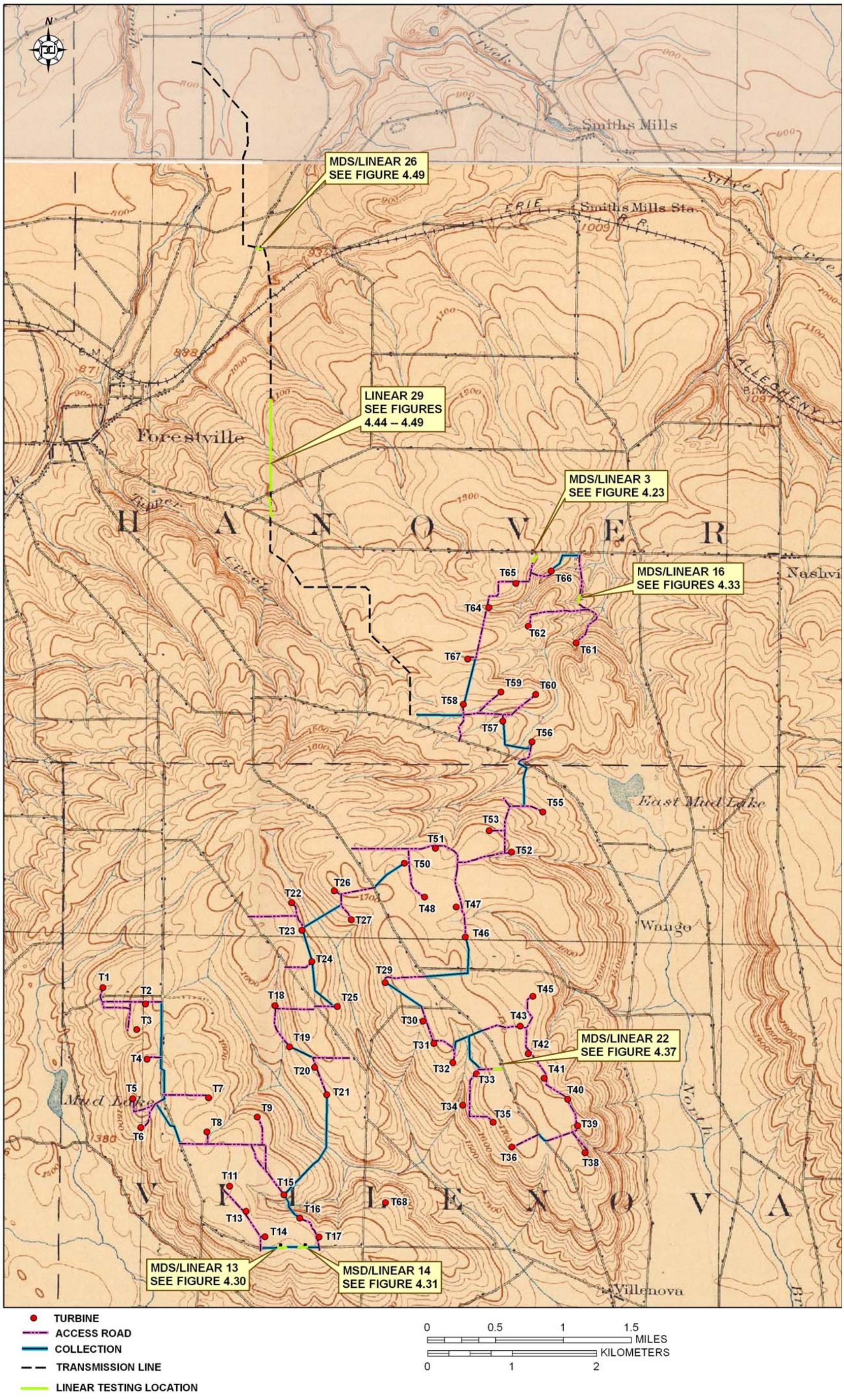


Figure 4.6. Linears 3, 13, 14, 16, 22, 26 and 29, and MDS locations on historic topographic map *(USGS Cherry Creek, NY 1900, Silver Creek, NY 1900).*

4.1 LOCAL HABITAT AREA 1

Local Habitat Area 1 consists of topographical features identified as *summit knolls and ridges*. The following turbines and linear sections within LHA-1 environs were shovel tested during the Phase IB investigation and are described below:

Turbine Surveys: T31, T41
Linear Surveys: L/MDS-11

Turbine Surveys within Local Habitat Area 1

Turbine 31. This turbine is located on a summit ridge between North Hill Road and Route 87 (Prospect Road) at an elevation of 1,730 ft (527 m) amsl (see Figure 4.1). The APE is situated on two adjacent agricultural fields. The north portion of the APE is covered in alfalfa (Appendix A: Photograph 1); the south portion is covered with remnants of harvested corn. The fields are divided by a tree line and a fence located between shovel test numbers 14 and 15. Slope is towards the southwest.

A total of 324 shovel tests were dug within Turbine 31 (Figure 4.7). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, averaging 28 cm (11 in) deep. Stratum 2 was typically yellowish brown clayey loam, dug to an average terminal depth of 39 cm (15 in). Two shovel tests were terminated due to rock impasses. A glass marble was found on the surface near STP 5.6. No cultural materials were found and no evidence of historic or prehistoric features was identified.

Turbine 41. This turbine is located on a summit ridge east of Route 87 at an elevation of about 1,710 ft (521 m) amsl (see Figure 4.1). The eastern half of the APE is wooded. The western half is located in pasture (Appendix A: Photograph 2). A hedgerow is along the northwestern portion of the APE.

A total of 149 shovel tests were dug at Turbine 41 (Figure 4.8). Two soil strata were identified. Stratum 1 consisted of brown silty loam, averaging 27 cm (11 in) deep. Stratum 2 was typically yellowish brown with varying soil textures from sandy silt to silty loam, dug to an average terminal depth of 38 cm (15 in). Two shovel tests were terminated due to rock impasse. Water filled the pit in one shovel test.

A broken tertiary reduction flake was found in STP 3.14, Stratum 1. Eight radial shovel tests were dug at 1-m and 3-m (3.3-ft and 9.8-ft) intervals in cardinal directions centered on the positive shovel test. No additional cultural materials were found in the close-interval tests. No evidence of historic or prehistoric features was found at this location. Although this artifact is considered a stray/isolated find, an OPRHP site form has been completed (see Appendix D) to document the location in that database.

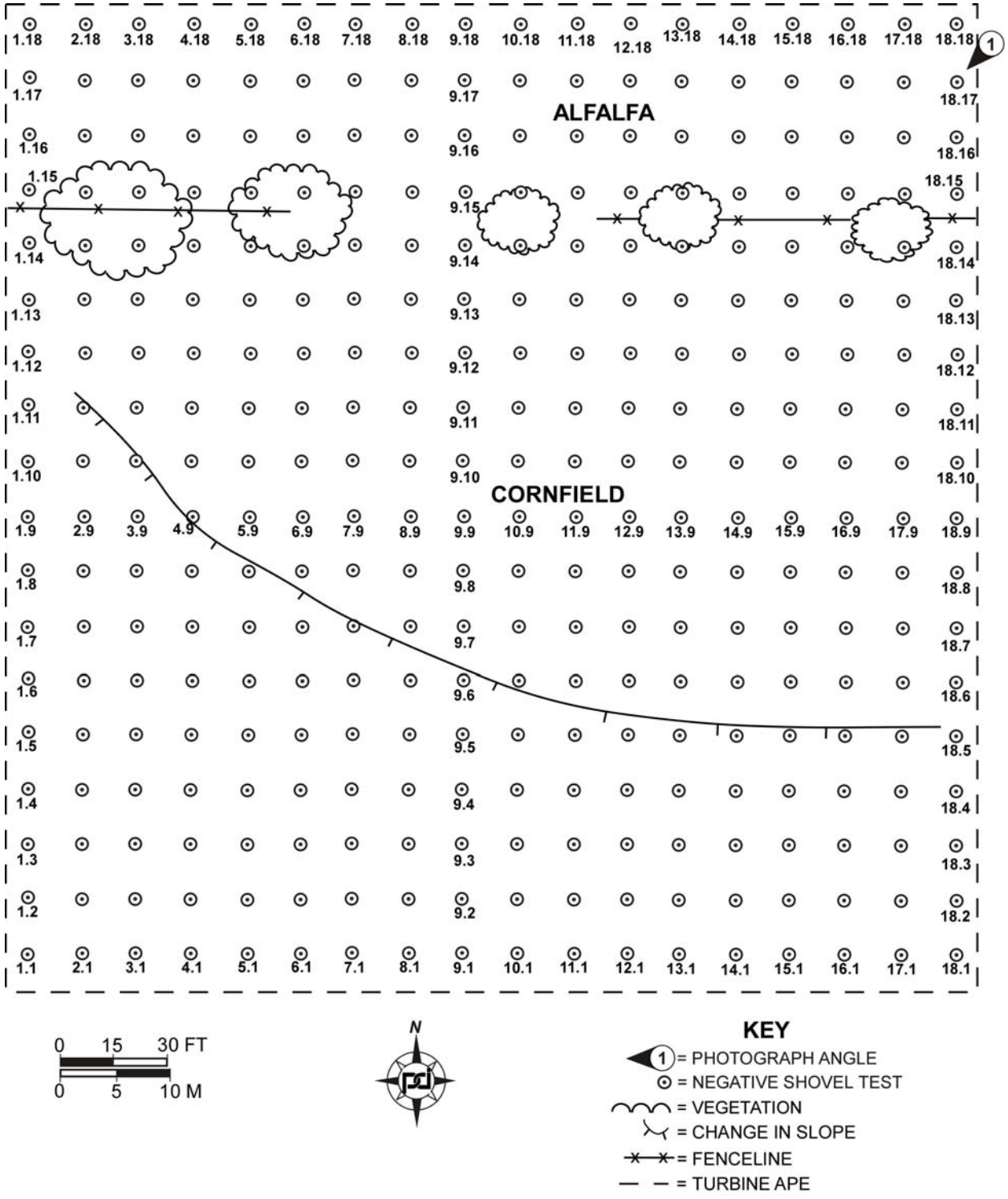


Figure 4.7. Turbine 31 shovel test transect locations.

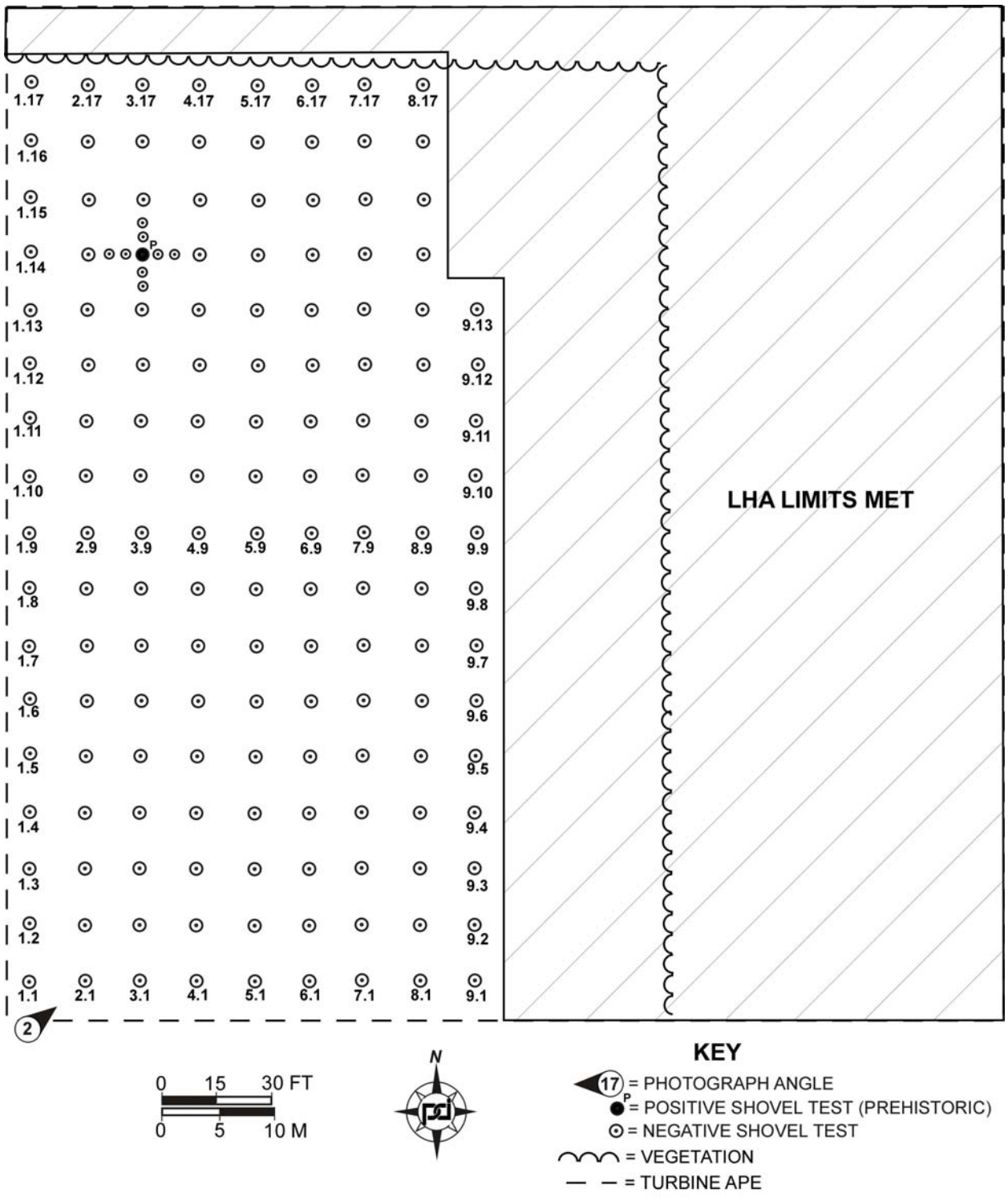


Figure 4.8. Turbine 41 shovel test transect locations.

Linear Surveys within Local Habitat Area 1

Linear 11. This linear survey tested a portion of the proposed collection line located on the east side of Round Top Road (see Figure 4.1). The centerline of the APE is situated within a cornfield, set back approximately 50 ft (15 m) from the edge of the road. The APE has an increased archaeological sensitivity due to a map-documented structure (MDS 11) shown on the Stewart map from 1867 (labeled as JW) (see Figure 4.2) and the Beers map from 1881 (labeled C. Wooley), located adjacent to the APE on the east side of Round Top Road. A cluster of trees is all that is visible in the approximate location of MDS 11 (see Appendix A: Photograph 3). A pile of broken concrete slabs was found adjacent to the road (along the APE) between STPs 1.8 and 1.13. These appear to have been recently deposited, which the plow has avoided. One isolated modern whiteware sherd was found on the ground surface.

A total of 40 shovel tests were dug along two transects at Linear 11 (Figure 4.9). Typically two strata were identified. Stratum 1 was silty loam, averaging 30 cm (12 in) deep. Stratum 2 was typically yellowish brown sandy loam or sandy silt, dug to an average terminal depth of 41 cm (16 in). No cultural materials were found in the shovel tests of Linear 11.

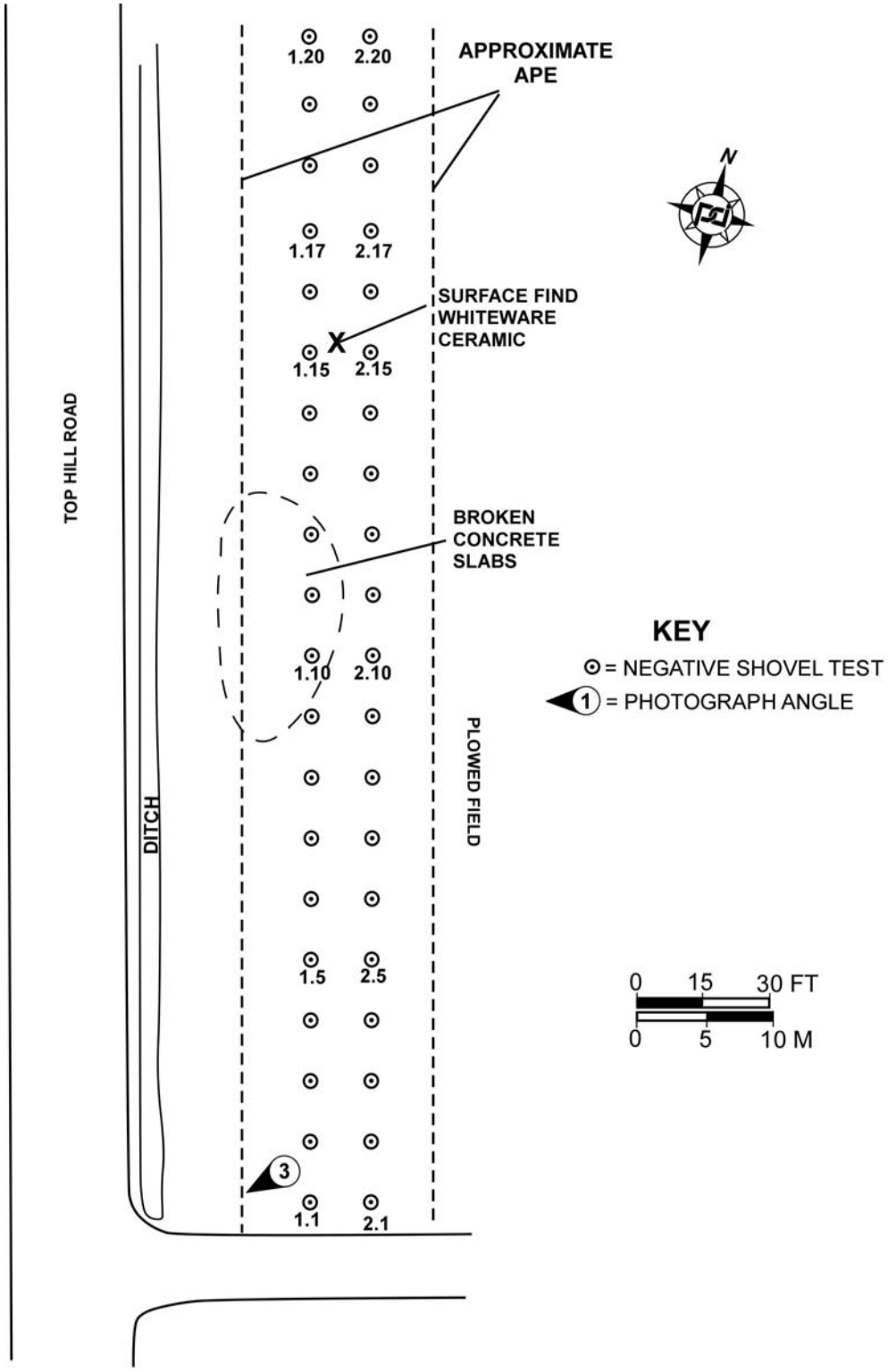


Figure 4.9. Shovel testing at Linear 11.

4.2 LOCAL HABITAT AREA 2

Local Habitat Area 2 consists of topographical features identified as *uplands between summits and knolls*. The following turbines and linear sections within LHA-2 environs were shovel tested during the Phase IB investigation and are described below:

Turbine Surveys: T2, T4, T6, T8, T17, T18, T32, T42, T43, T46, T50, T57, T65

Linear Surveys: L/MDS-3, L/MDS-4, L/MDS-6, L/MDS-7, L/MDS-8, L/MDS-9, L/MDS-10, L/MDS-13, L/MDS-14, L/MDS-15, L/MDS-16, L/MDS-17, LMDS-18, L/MDS-21, L/MDS-22, L/MDS-23, L/MDS-28

Turbine Surveys within Local Habitat Area 2

Turbine 2. This turbine is located west of Round Top Road, at an elevation of 1,610 ft (491 m) amsl (see Figure 4.1). The APE is located within a hay field on a slope between 6 and 8 percent. A tree line is along the north portion of the APE. A utility line crosses the southern portion of the APE (Appendix A: Photograph 4).

A total of 324 shovel tests were dug at Turbine 2 (Figure 4.10). Typically, two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, averaging 26 cm (10 in) deep. Stratum 2 was typically yellowish brown silty loam, dug to an average depth of 38 cm (15 in). A third stratum was found in STPs 14.11 and 14.12 consisting of yellowish brown silty loam, dug to an average terminal depth of 44 cm (17 in). Water seepage occurred in 28 shovel tests. No cultural materials were found.

Turbine 4. This turbine is located west of Round Top Road, at an elevation of 1,610 ft (491 m) amsl (see Figure 4.1). The APE is located within a fallow, level agricultural field (Appendix A: Photograph 5). Surface runoff is to the west and northwest, where pools of standing water were present near Transects 1 through 5. A brush line is along the north boundary of the APE.

A total of 324 shovel tests were dug within Turbine 4 (Figure 4.11). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, averaging 27 cm (11 in) deep. Stratum 2 was typically yellowish brown sandy or silty loam, dug to an average terminal depth of 39 cm (15 in). Water seepage occurred in 116 shovel tests. No cultural materials were found.

Turbine 6. This turbine is located west of Round Top Road, at an elevation of 1,600 ft (488 m) amsl (see Figure 4.1). The APE is located within a fenced cow pasture on a slope between ten and fifteen percent. Trees are along the northern portion. Unpaved access roads are across the northern third and western half of the APE, intersecting in the northwestern portion. Fences parallel the roads and along the eastern portion of the APE between Transects 16 and 18. A shallow drainage ditch with pockets of standing water follows the eastern fence line between Transects 17 and 18 (Appendix A: Photograph 15).

A total of 324 shovel tests were dug within Turbine 6 (Figure 4.12). Two soil strata were identified. Stratum 1 consisted of brown silty loam, with an average depth of 22 cm (8.5 in). Stratum 2 was typically yellowish brown sandy loam, reaching an average terminal depth of 34 cm (13 in). Compact gravel impasses were found in STPs 1.12, 2.11, 2.12, 3.12, 4.10, 5.8, 5.9, 6.7, 6.8, 7.7 and 8.5 (n=11) dug in proximity to, or on, field access roads. No cultural materials were found in the shovel tests of Turbine 6.

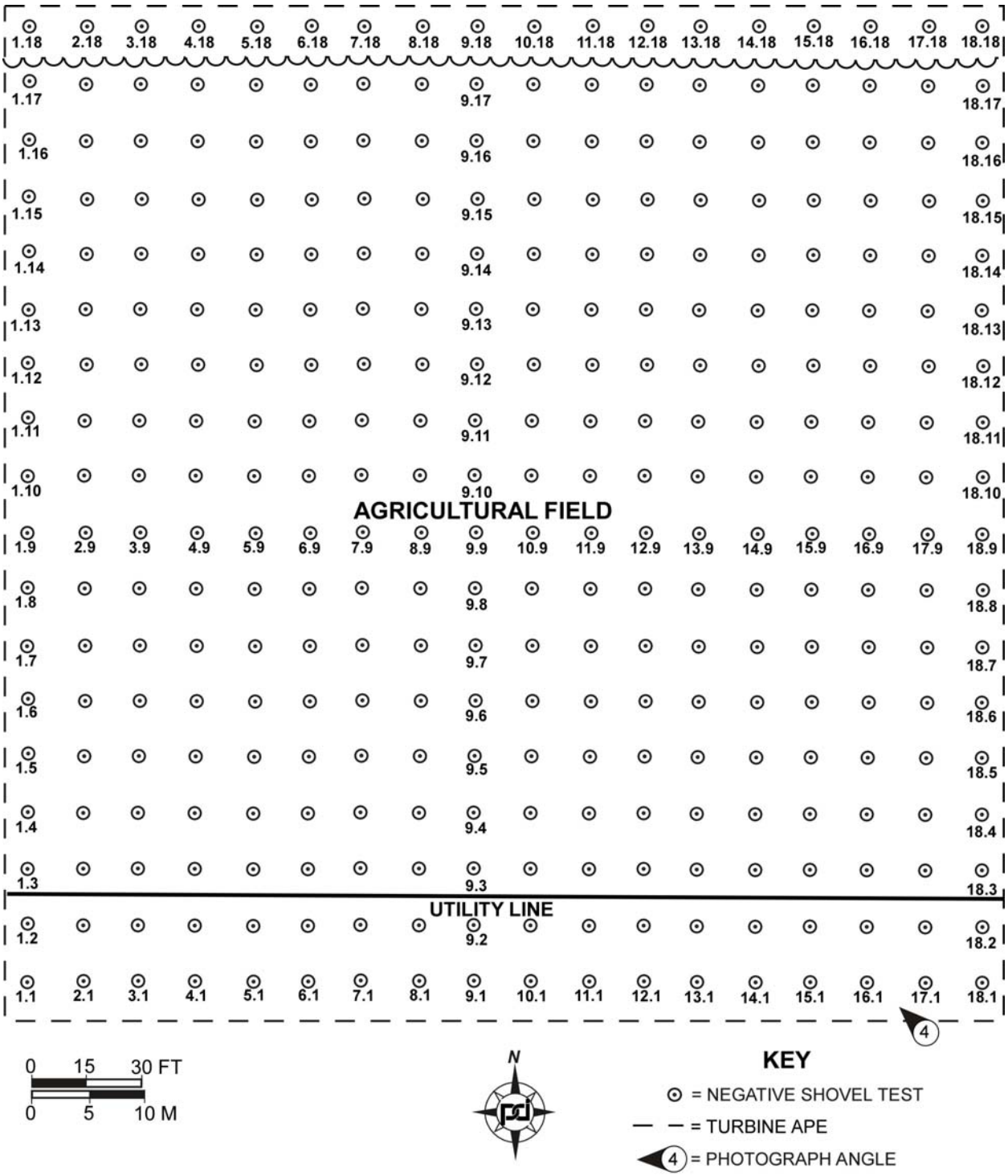


Figure 4.10. Turbine 2 shovel test transect locations.

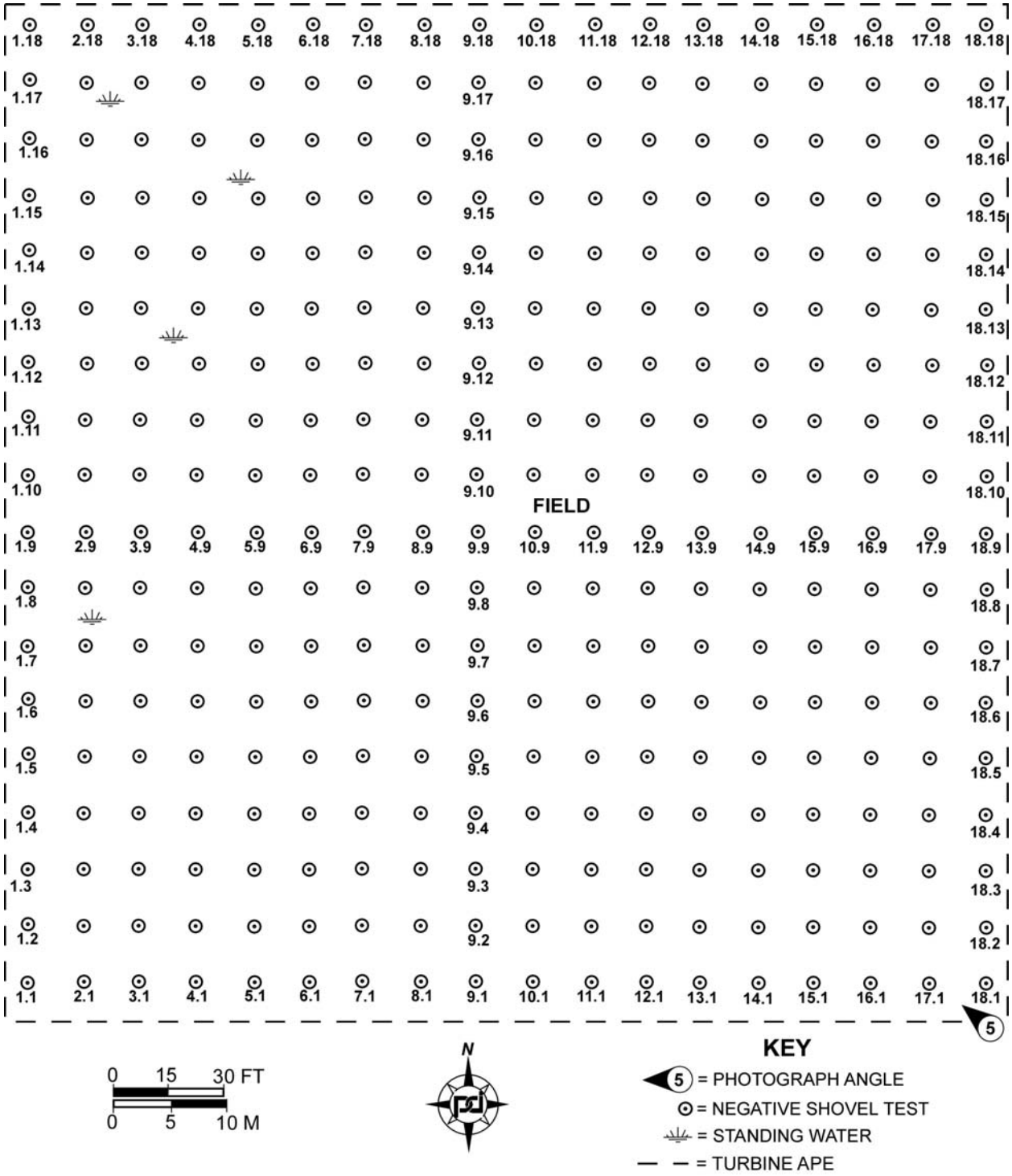


Figure 4.11. Turbine 4 shovel test transect locations.

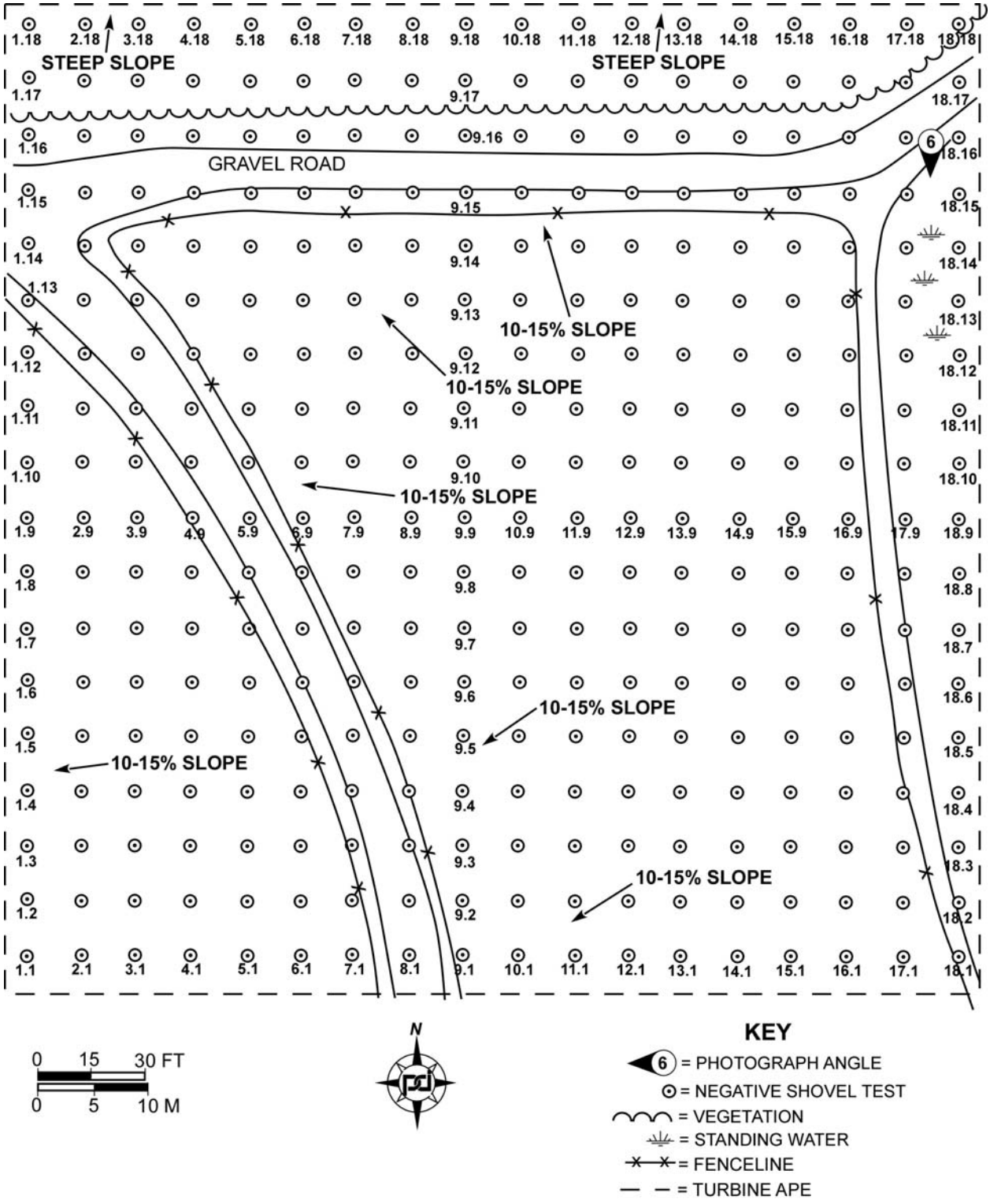


Figure 4.12. Turbine 6 shovel test transect locations.

Turbine 8. This turbine is located east of Round Top Road, at an elevation of 1,670 ft (509 m) amsl (see Figure 4.1). The APE is within a harvested cornfield, with remnants of corn dispersed in rows. The APE is a crest of a hill, with slope towards the east and west at about five percent. A tree line is along the north boundary of the APE.

A total of 324 shovel tests were dug within Turbine 8 (Figure 4.13). Two soil strata were encountered. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 was typically yellowish brown silty or clayey loam, reaching an average terminal depth of 41 cm (16 in). Water seepage occurred in three shovel tests. STP 16.7 contained a piece of modern window glass which was noted and discarded. No additional cultural materials were found at this location.

Turbine 17. This turbine is located north of Villenova Road, at an approximate elevation of 1,640 ft (500 m) amsl (see Figure 4.1). The APE is located within a level field of alfalfa. A shallow drainage channel crosses the southwestern portion of the APE, at a northwest to southeast angle, from STP 1.16 to STP 7.1.

A total of 324 shovel tests were dug within Turbine 17 (Figure 4.14). Two soil strata were encountered. Stratum 1 consisted of dark grayish brown silty loam, averaging 30 cm (12 in) deep. Stratum 2 was typically yellowish brown silty loam, dug to an average terminal depth of 41 cm (16 in). Five shovel tests were terminated due to rock impasses. Seven shovel tests exhibited disturbed soils dug near the shallow drainage channel. No cultural materials were found in the shovel tests of Turbine 17.

Turbine 18. This turbine is located west of Pope Hill Road, at an approximate elevation of 1,610 ft (491 m) amsl (see Figure 4.1). The APE is situated at the juncture of two adjacent agricultural fields. Alfalfa covers the field in the north portion of the APE; rows of cut corn stalks cover the field in the south. The two fields are divided by a fence line with clusters of small trees. There is a slight westward slope. A non-linear unpaved access road crosses the southeastern portion of the APE, from STP 12.1 to STP 18.5.

A total of 324 shovel tests were dug within Turbine 18 (Figure 4.15). Two soil strata were encountered. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 30 cm (12 in). Stratum 2 was typically mottled yellowish brown and light grayish brown clayey loam, dug to an average terminal depth of 41 cm (16 in). Eight shovel tests dug near the unpaved access road exhibit disturbed stratigraphy, including mixed strata and gravel (see Appendix B: Shovel Test Log). Three shovel tests were terminated due to rock impasses. Water seepage occurred in one shovel test.

One modern machine-made glass marble was found on the surface of STP 5.6. One ironstone ceramic fragment was found in STP 6.12 (Stratum 1). No other cultural materials were found in the shovel tests of Turbine 18.

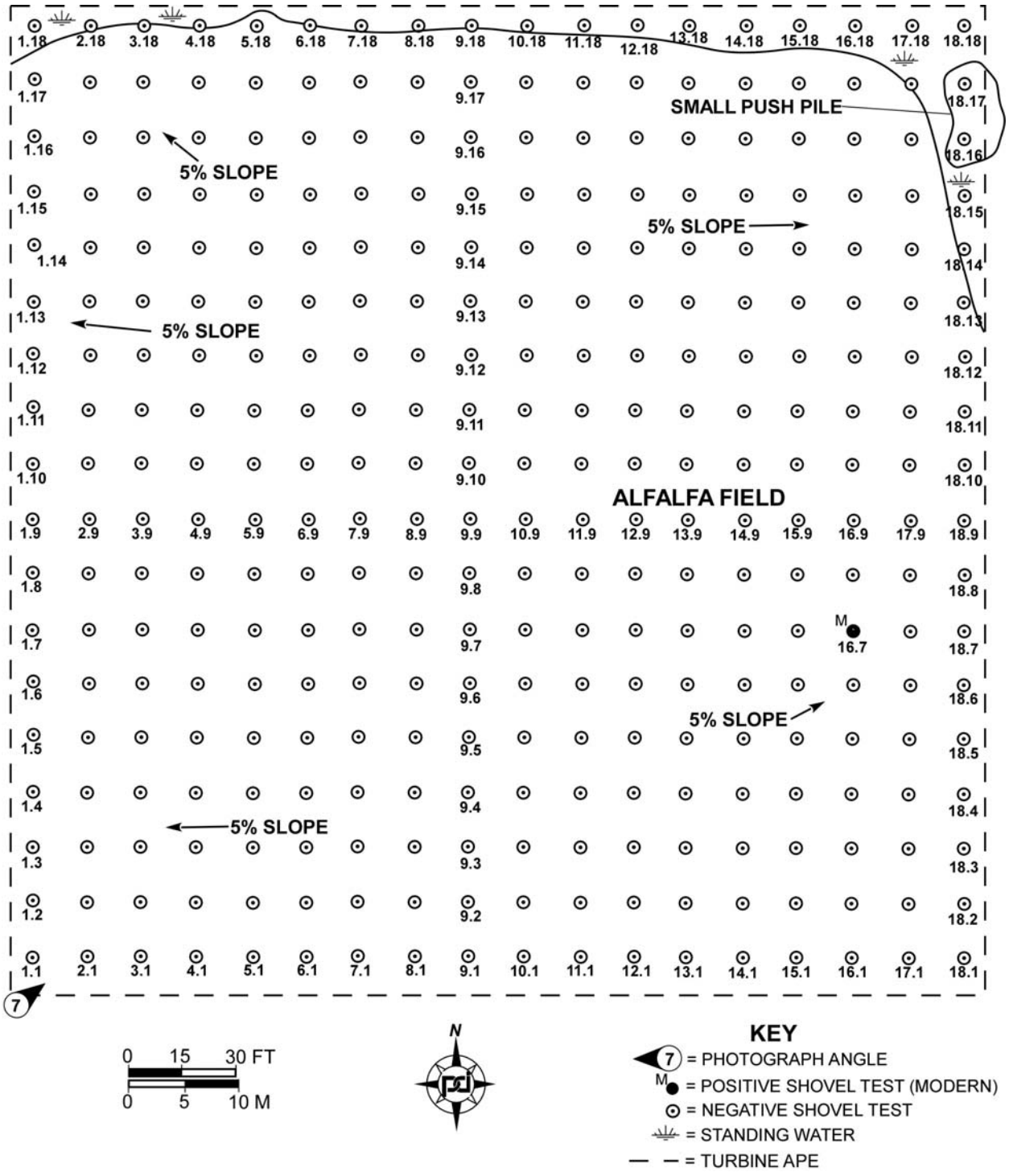


Figure 4.13. Turbine 8 shovel test transect locations.

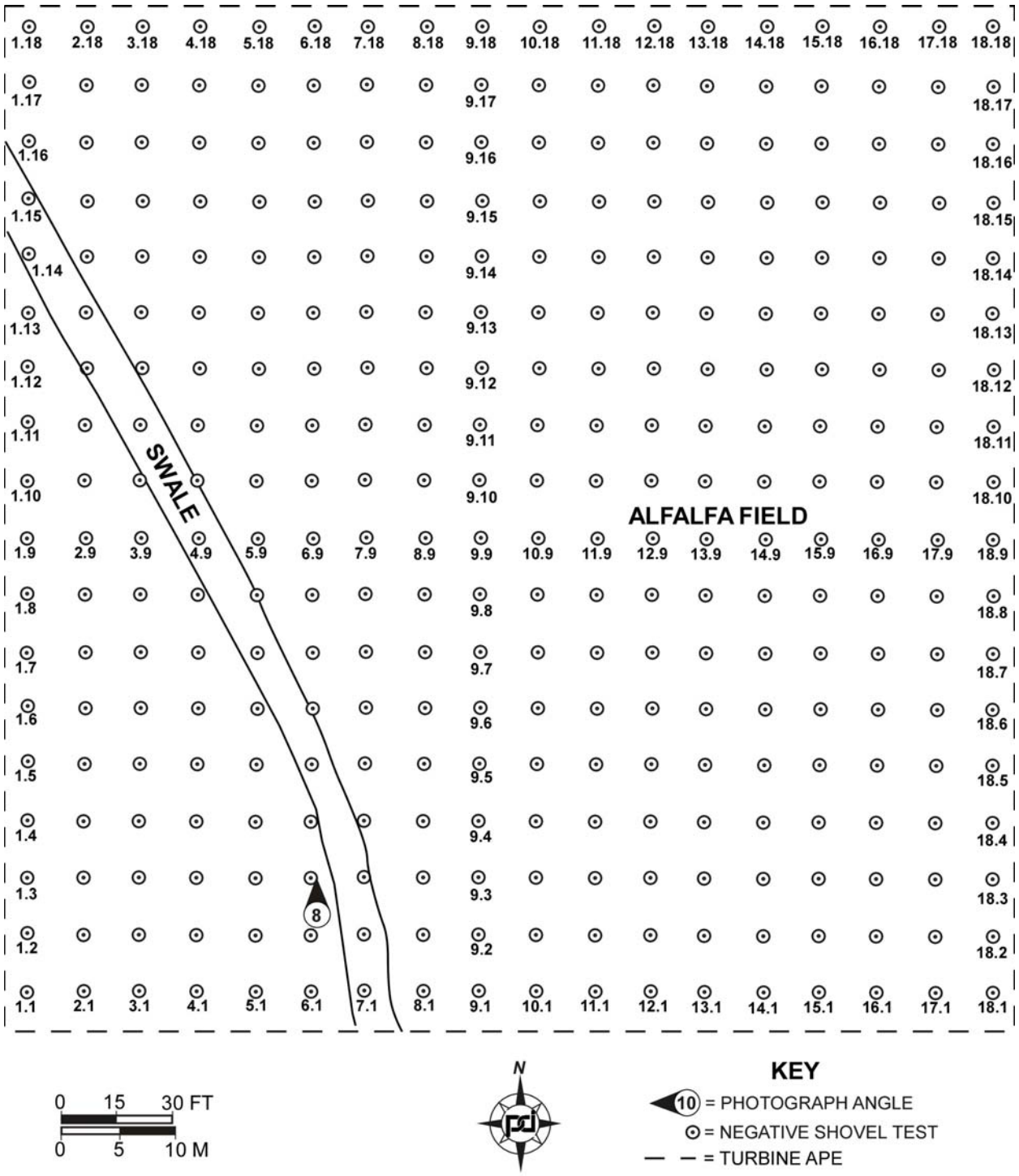


Figure 4.14. Turbine 17 shovel test transect locations.

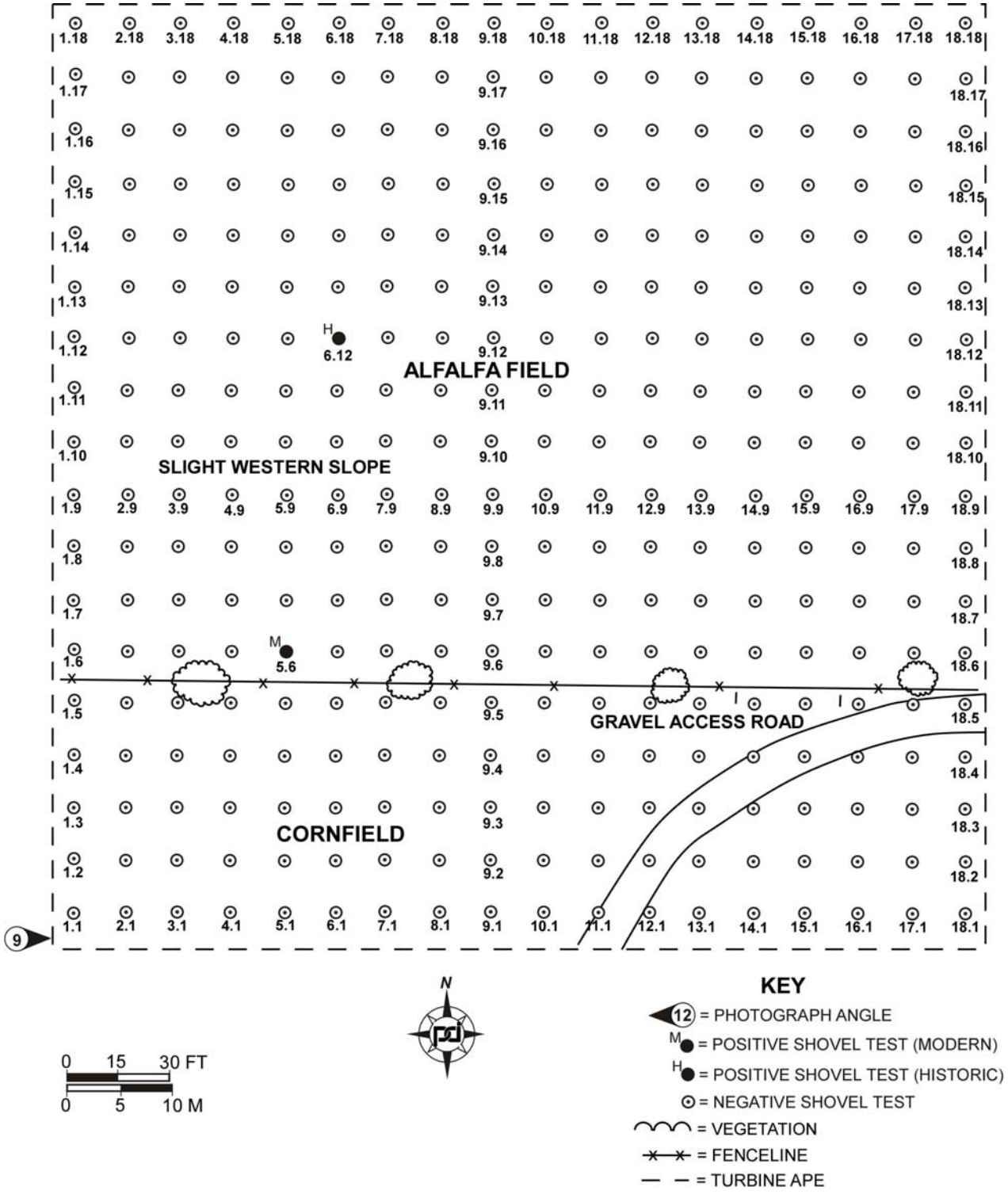


Figure 4.15. Turbine 18 shovel test transect locations.

Turbine 32. This turbine is located roughly 2,000 ft (600 m) south of the intersection of Route 87 (Prospect Road) and North Hill Road, at an approximate elevation of 1,700 ft (518 m) amsl (see Figure 4.1). Vegetation of the APE includes a wooded area in the western portion, with the remainder in a fallow, fairly level agricultural field

A total of 324 shovel tests were dug within Turbine 32 (Figure 4.16). Two soil strata were identified. Stratum 1 consisted of varied colors ranging from dark grayish brown to yellowish brown and brown silty loam, reaching an average depth of 26 cm (10 in). Stratum 2 was typically yellowish brown silty or sandy loam, reaching an average terminal depth of 38 cm (15 in). Twenty-one shovel tests contained cobbles or gravel. One shovel test (STP 1.11) was terminated in Stratum 1 due to a rock impasse. One isolated ironstone fragment was found in STP 6.12. No other cultural materials were found and no evidence of historic or prehistoric features was identified.

Turbine 42. This turbine is located on the eastern side of Route 87 (Prospect Road) and south of Bartlett Hill Road, at an approximate elevation of 1,710 ft (521 m) amsl (see Figure 4.1). The APE is located in an active cornfield. The west portion of the APE has a general 5 to10 percent northeastward slope that levels out in the eastern part of the APE. Adjacent to the eastern extent are three ponds with partial artificial banks (Appendix A: Photograph 10).

A total of 324 shovel tests and 8 radials were dug within Turbine 42 (Figure 4.17). Three soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, averaging 29 cm (11 in) deep. Stratum 2 was typically yellowish brown silty clay, dug to an average terminal depth of 40 cm (16 in). Stratum 3 occurred in one shovel test (STP 3.18), consisting of a mottled pale brown and grayish brown sandy silt, dug to 40 cm (16 in). Eight shovel tests contained gravel. Seven shovel tests were terminated at Stratum 1 due to water filling the pit; seepage was recorded in four additional tests (see Appendix B: Shovel Test Log).

A prehistoric tertiary reduction flake made from Onondaga Chert was found in STP 6.18, Stratum 1. Eight radial shovel tests were dug at 1-m and 3-m (3.3-ft and 9.8-ft) intervals in cardinal directions centered on the positive shovel test. No additional cultural materials were found in the close-interval tests. No evidence of historic or prehistoric features was found at this location.

Turbine 43. This turbine is located on the east side of Route 87 (Prospect Road) and south of Bartlett Hill Road, at an approximate elevation of 1,680 ft (512 m) amsl (see Figure 4.1). The APE is located in a fairly level grass-covered alfalfa field (Appendix A: Photograph 11).

A total of 324 shovel tests were dug within Turbine 43 (Figure 4.18). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam with some areas of mottled light brownish gray with yellow brown silty loam, reaching an average depth of 29 cm (11 in). Stratum 2 was typically a mottled light brownish gray with yellowish brown silty loam, reaching an average terminal depth of 40 cm (16 in). Twenty shovel tests contained cobbles or gravel. One shovel test (STP 4.8) was terminated at Stratum 1 due to a rock impasse. No cultural materials were found and no evidence of historic or prehistoric features was identified within the APE.

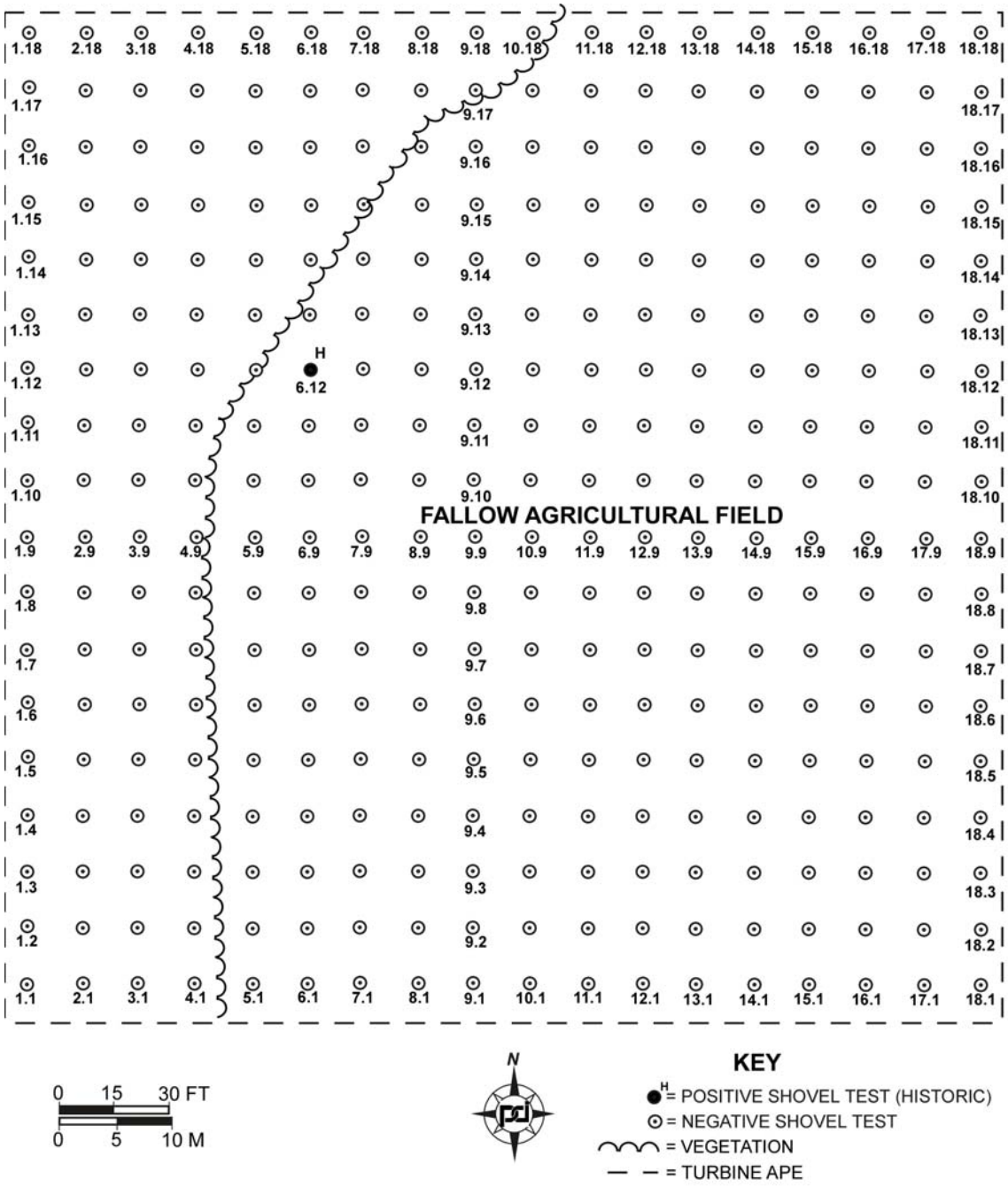


Figure 4.16. Turbine 32 shovel test transect locations.

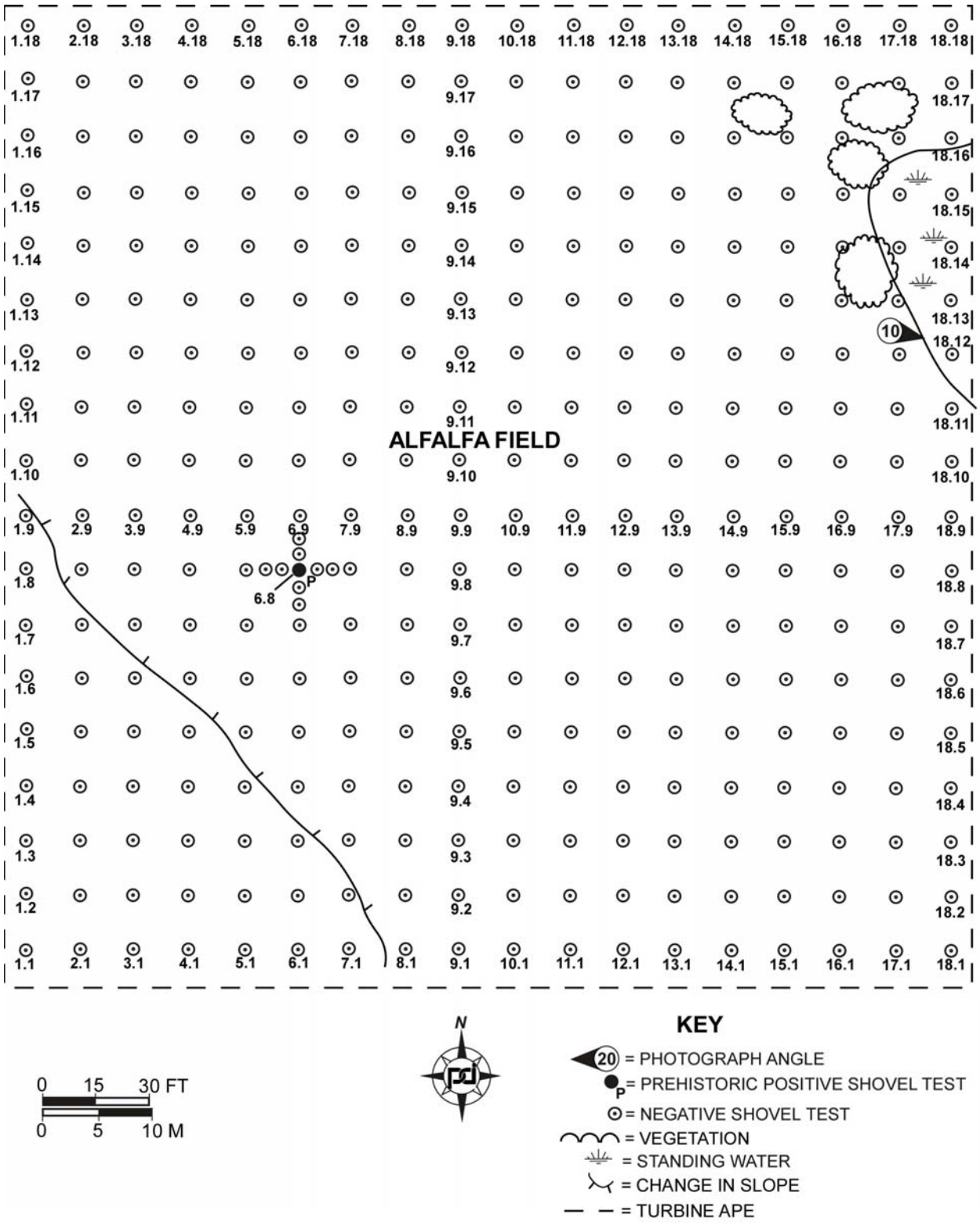


Figure 4.17. Turbine 42 shovel test transect locations.

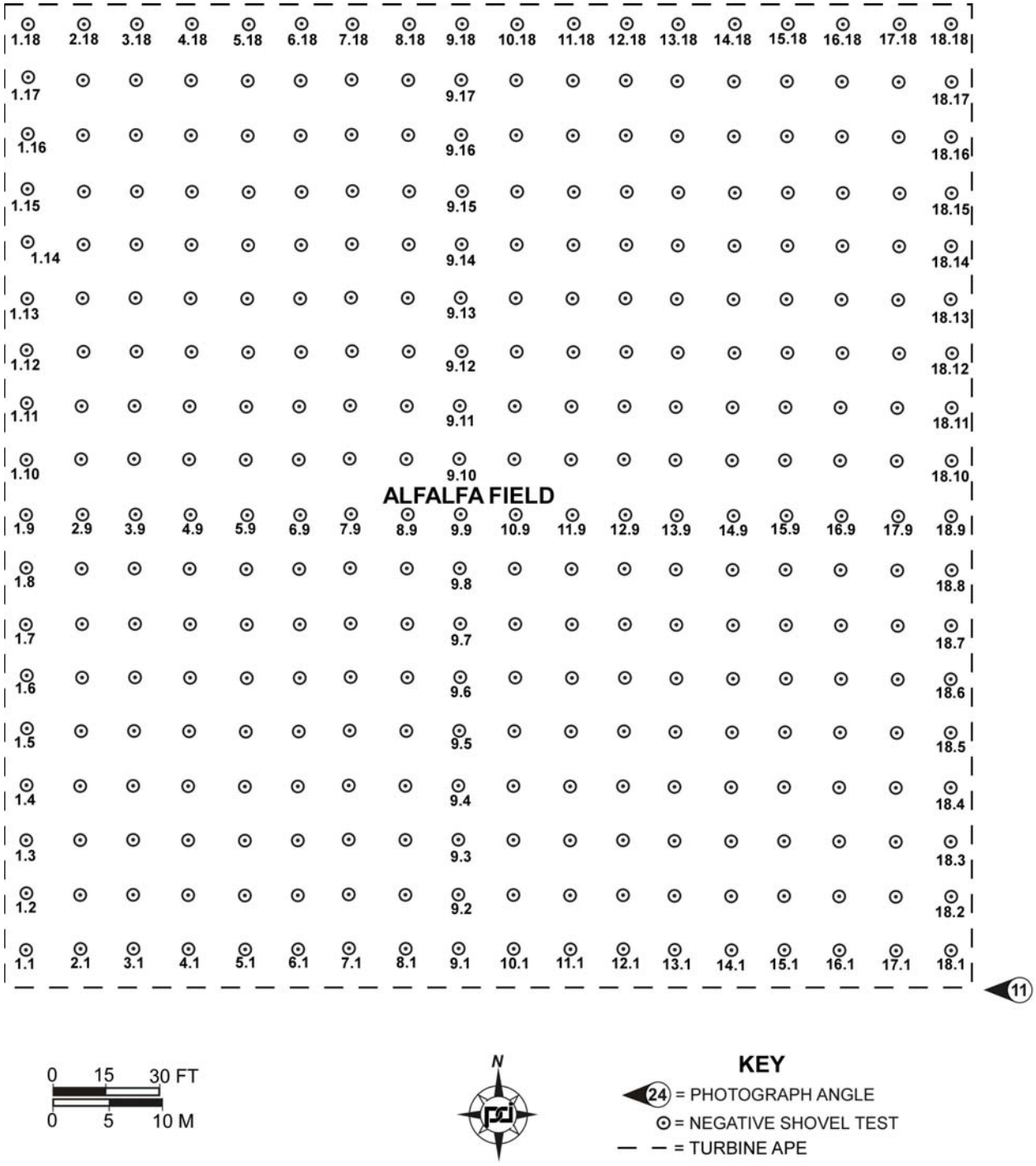


Figure 4.18. Turbine 43 shovel test transect locations.

Turbine 46. This turbine is located on the eastern side of Route 87 (Prospect Road) and the north side of Bartlett Hill Road, at an approximate elevation of 1,650 ft (503 m) amsl (see Figure 4.1). The APE is north of a farm complex along Bartlett Hill Road. The northwestern half of the APE consists of fenced pastures and an unpaved (gravel) access road. Shovel tests within the upper northeast corner of the APE were dug around areas of standing water. A hayfield covers the southeast portion of the APE. Wood-plank remnants of a hay wagon were found near the north extent (Appendix A: Photograph 12).

A total of 324 shovel tests were dug within Turbine 46 (Figure 4.19). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 consisted of yellowish brown silty loam and a mottled light brownish gray and yellowish brown clay loam, reaching an average depth of about 39 cm (15 in). Twenty-three shovel tests contained gravel or cobbles. Ten shovel tests were terminated at Stratum 1 due to water filling the pit with an additional seven tests also terminated in Stratum 1 due to rock or gravel impasses. Nine shovel tests had disturbances attributed to the unpaved access road. Half of a horseshoe was found in STP 6.15 and two cow bones were found in Stratum 1 in STP 12.16. Materials from these shovel tests were discarded in the field. No other cultural material or evidence of historic or prehistoric features was identified at this location.

Turbine 50. This turbine is located east of Route 87 (Prospect Road) and north of Bartlett Hill Road, at an approximate elevation of 1,660 ft (506 m) amsl (see Figure 4.1). The APE is located in a fairly level grass-covered pasture and extends northward from a small tree line along the south extent.

A total of 324 shovel tests were dug within Turbine 50 (Figure 4.20). Three soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 was typically a mottled light brownish gray with yellowish brown clay loam, dug to an average terminal depth of 39 cm (15 in). Stratum 3 occurred in two shovel tests (STPs 17.5 and 17.11) and was mottled light brownish gray and yellowish brown clay loam, reaching an average terminal depth of 50 cm (20 in). One shovel test (STP 12.4) contained gravel and one shovel test (STP 8.6) was terminated at Stratum 1 due to a rock impasse. No cultural materials were found and no historic or prehistoric features were identified.

Turbine 57. This turbine is located north of Hurlburt Road and east of Empire Road, at an approximate elevation of 1,450 ft (442 m) amsl (see Figure 4.1). The APE is located in a fenced cow pasture. A total of 324 shovel tests were dug within Turbine 57 (Figure 4.21). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 consisted of various soil colors and types, a reddish brown sandy loam or silty sand, a mottled yellowish brown and light brownish gray silty loam or a yellowish brown clay loam reaching an average terminal depth of about 38 cm (15 in). Two shovel tests contained rocks. One shovel test (STP 2.15) was terminated at Stratum 1 due to a rock impasse. No cultural materials were found and no historic or prehistoric features were identified.

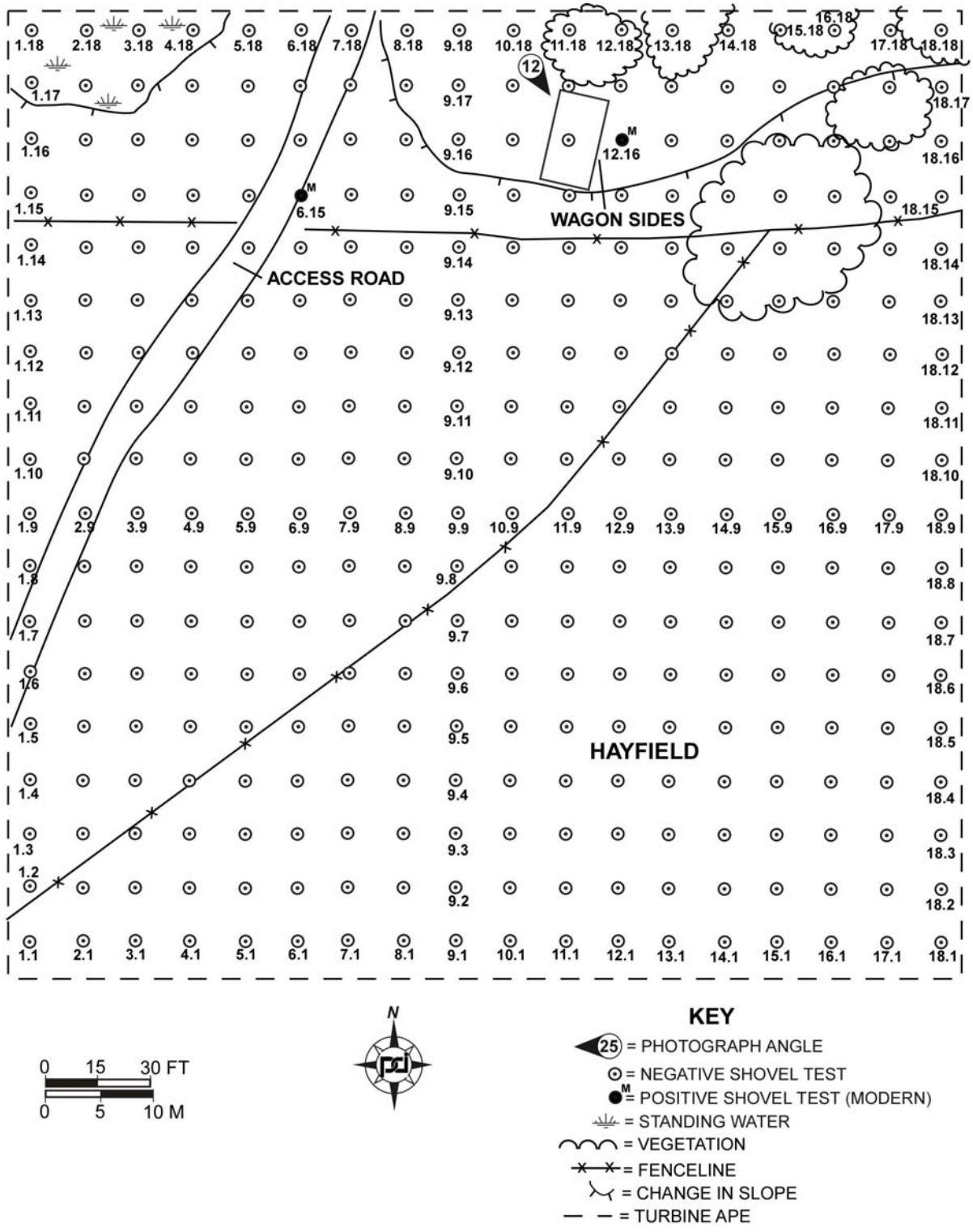


Figure 4.19. Turbine 46 shovel test transect locations.

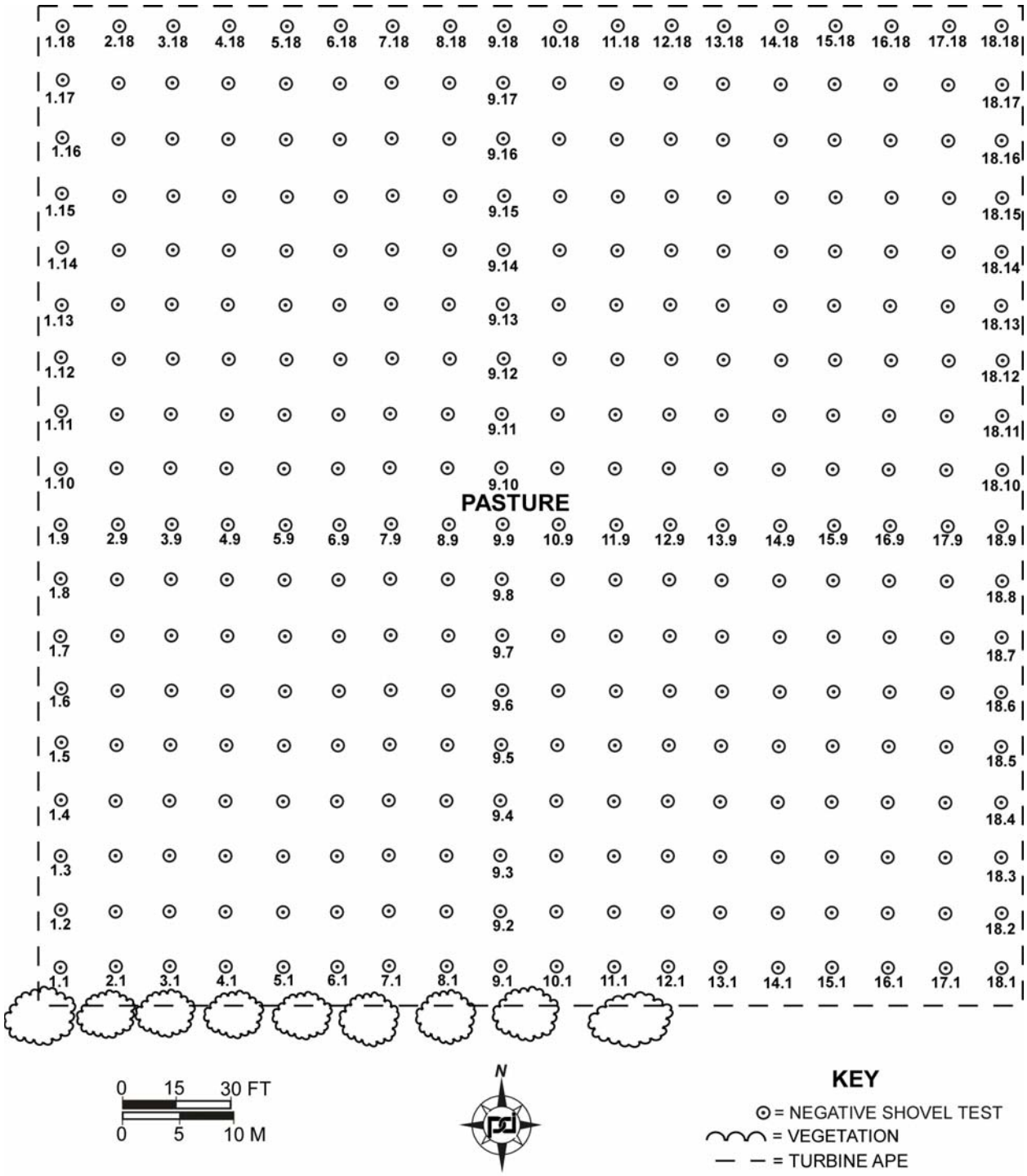


Figure 4.20. Turbine 50 shovel test transect locations.

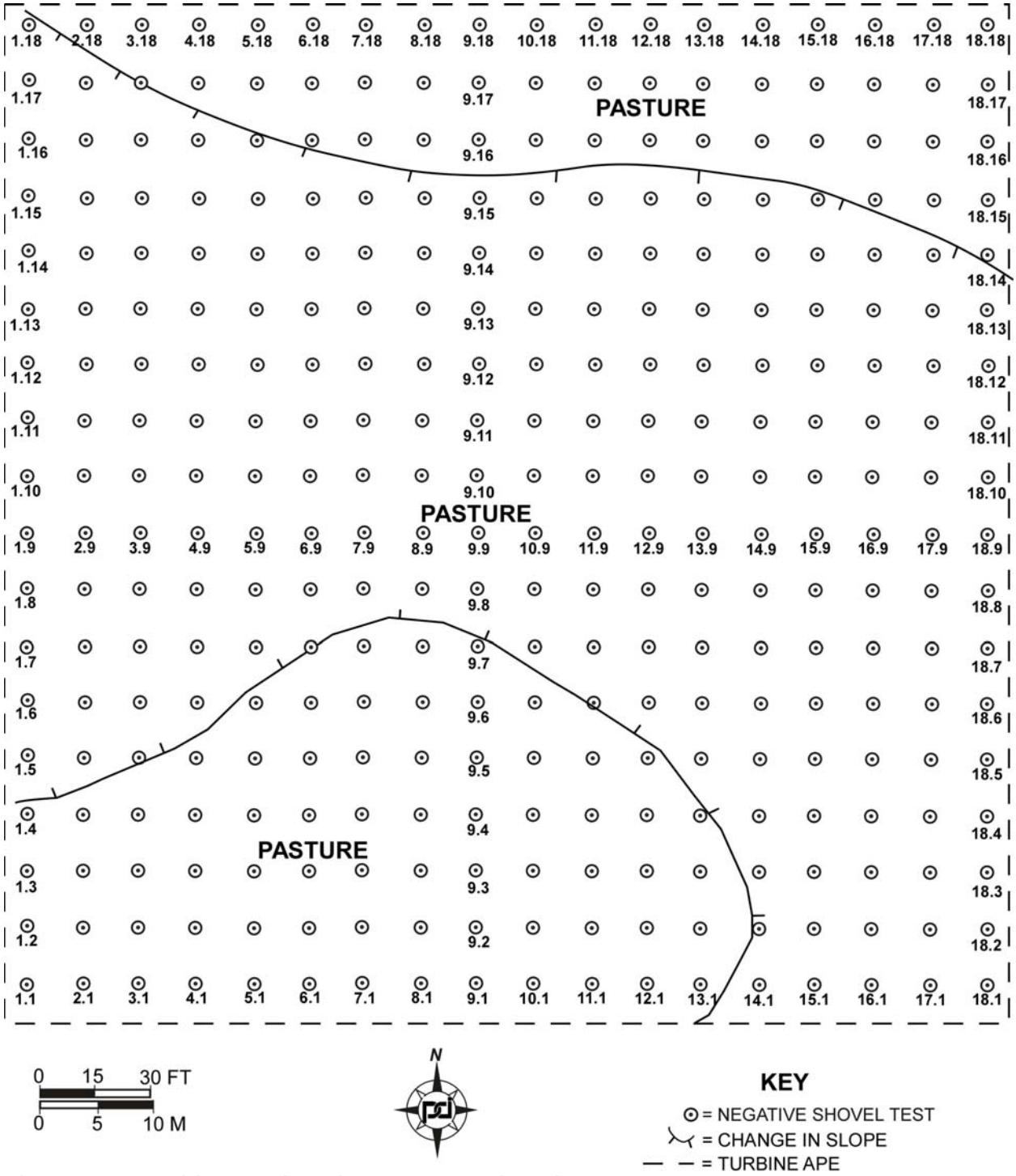


Figure 4.21. Turbine 57 shovel test transect locations.

Turbine 65. This turbine is located on the south side of Route 39 and east of Empire Road, at an approximate elevation of 1,390 ft (424 m) amsl (see Figure 4.1). The APE is in a cornfield behind a working dairy and crop farm.

Because the requirements for testing the model were met, a total of 55 shovel tests were dug within Turbine 65 (Figure 4.22). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 32 cm (13 in). Stratum 2 was typically a mottled yellowish brown with light brownish gray silty clay, reaching an average terminal depth of about 43 cm (17 in). No cultural materials were found during the shovel testing of Turbine 65.

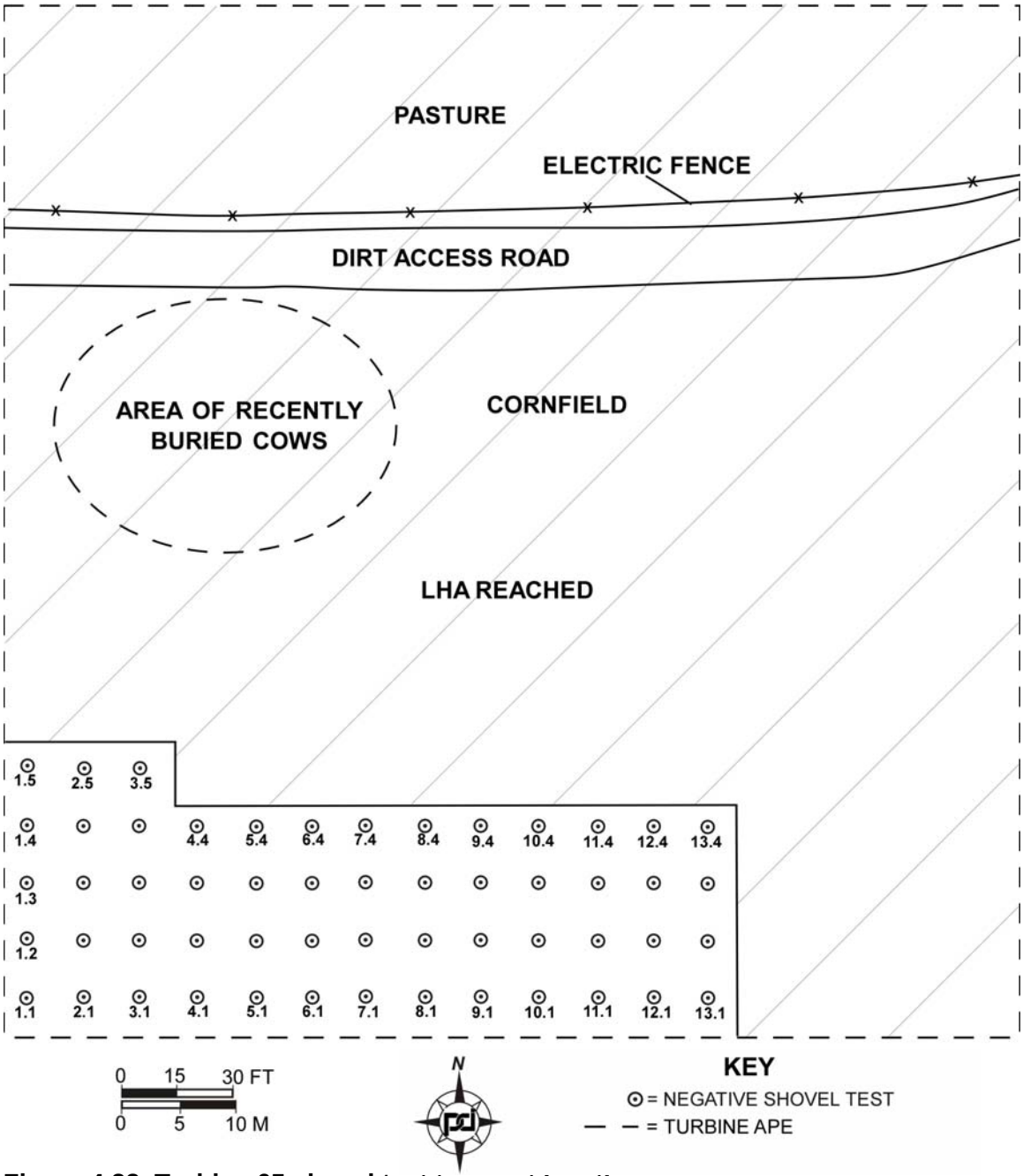


Figure 4.22. Turbine 65 shovel test transect locations.

Linear Surveys within Local Habitat Area 2

Linear 3. This linear survey tested a portion of an access road location originally proposed on the south side of Route 39 (see Figure 4.1; note: the proposed location of the access road was changed after the initial survey in order to avoid a site identified during the fieldwork—see below). The survey was located on a plowed field, approximately 7 to 13 meters (23 to 43 feet) east and south of a stone foundation located in a cluster of trees (Appendix A: Photograph 13). The foundation is approximately 80 ft (25 m) south of the edge of the road (Figure 4.23). A grass-covered agricultural field is located west of the foundation.

The foundation appears to be remnants of MDS 3, shown on one or more referenced historic maps (see Section 2.3 for complete discussion). The owner is identified as T. Bayley in 1867 and E. Bagley in 1881 (see Figure 4.3). MDS 3 also appears on the USGS topographic map from 1900. The intact foundation is fieldstone with eroded mortar giving it the appearance of dry stacking. The dimensions of the foundation are 20 ft (6 m) north-to-south and 36 ft (11 m) east-to-west. In the center was a foundation or footer (approximately 2 ft by 2 ft [6.5 m x 6.5 m]) for a fireplace or central floor support.

A total of 40 shovel tests were initially dug along two transects at Linear 3 to survey the originally proposed access road APE. Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 21 cm (8 in). Stratum 2 was typically gray and yellowish brown sandy loam, reaching an average terminal depth of 33 cm (13 in).

Historic artifacts were found on the surface and in eight shovel tests (STPs 1.5, 1.6, 1.7, 2.1, 2.4, 2.7, 2.9 and 2.14) dug in proximity to the MDS. These artifacts are summarized in Table 4.1 and are presented in Appendix C: Artifact Catalog. A total of 20 artifacts, consisting mostly of ceramic and glass household items, were initially found. Of the artifact total, 13 were ceramics, including: 8 undecorated whiteware, 2 undecorated ironstones, 1 undecorated porcelain, 1 salt-glazed stoneware, and 1 slipped yellow ware. Four glass artifacts were found, including: 3 container glass shards (amber and clear) and 1 one window glass. Three metal artifacts were found, including: 1 cut nail, 1 wire fragment, and 1 sheet iron fragment. The artifact sample is mostly non-diagnostic and is too small to determine a meaningful mean artifact date. The presence of whiteware, ironstone and yellow ware fragments can be indicative of the late nineteenth to early twentieth centuries.

A complete cobalt-glass Milk of Magnesia bottle was found inside the MDS foundation (located adjacent to the APE) on the surface (see Figure 4.23). The bottle dates from 1931 and later. The presence of the bottle provides limited evidence that the house was occupied as late as the 1930s. However, property owner Mr. Allen Gage stated that the house burned down ca. 1925 due to a fire set by a steam engine (personal communication with Mr. Gage).

The location of the foundation and cultural materials is designated PCI/Ball Hill-1. An OPRHP historic site form was completed and is presented in Appendix D. Once the site was identified, the location of the proposed access road was moved approximately 60 meters (200 ft) to avoid the site.

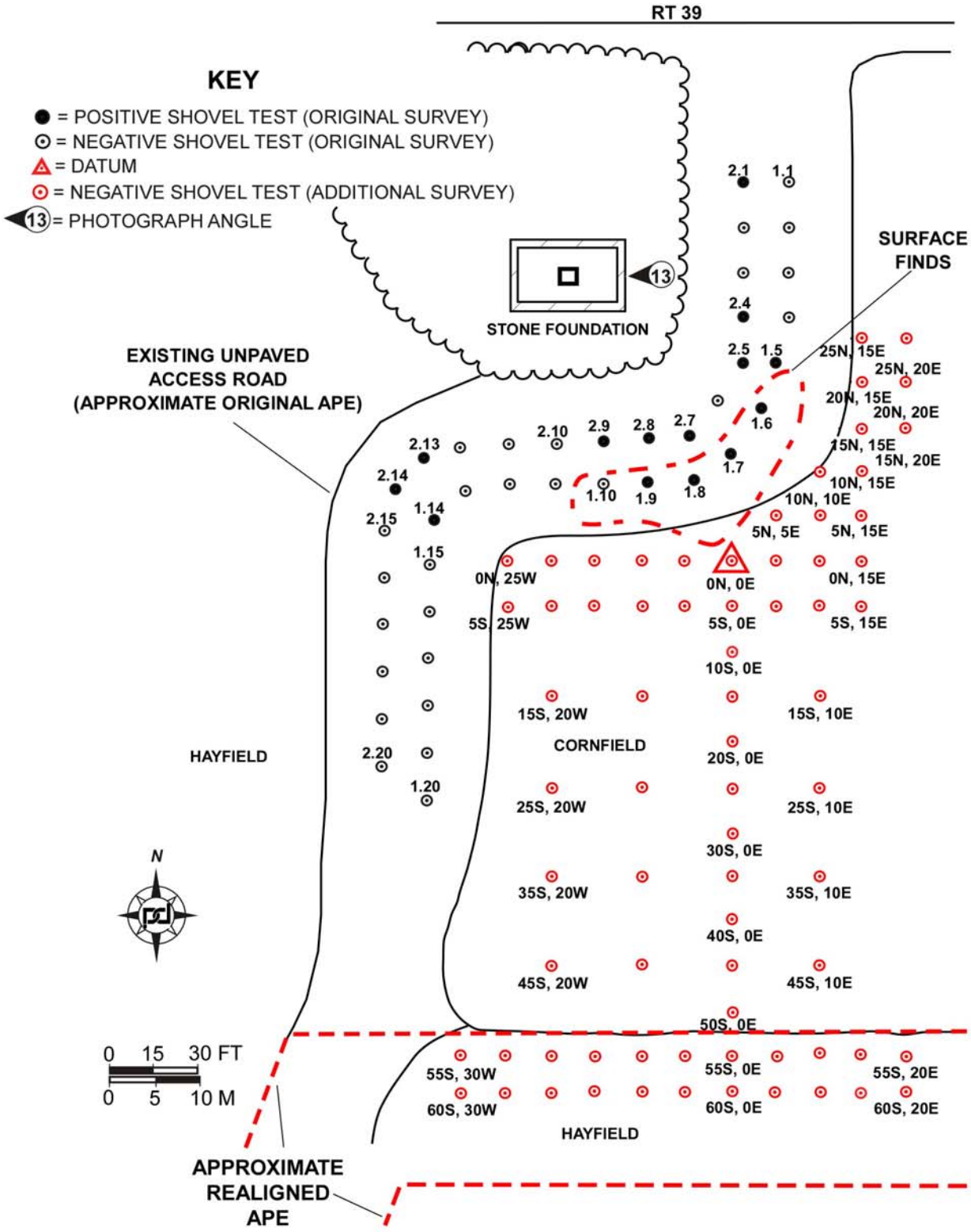


Figure 4.23. Shovel testing and MDS location at Linear 3.

Additional shovel testing and surface inspection was conducted to determine the boundaries of this historic site. Seventy-two (72) additional shovel tests were dug between the original positive STP locations and the newly proposed access road location. None of these tests were positive but additional historic artifacts (n=37; all under 4 cm / 1.6 in) were found over a 1,350 square-foot (.03 acre) area that included a portion of the access road and approximately 5 m (16.4 ft) on the southeast side covered in corn rows (see Figure 4.23). The surface finds, found in proximity to previously dug positive shovel tests, included: 22 undecorated ironstones, 3 blue transfer-printed ironstones, 1 black transfer-printed ironstone, 1 flow-black transfer-printed ironstone, 1 molded ironstone rim (possible small bowl), 1 undecorated porcelain, and 1 green-banded porcelain. Six glass artifacts were found, including five window glass and 1 milkglass. In addition, one brick fragment was found. These artifacts are included in Table 4.1 and are presented in Appendix C: Artifact Catalog.

Twenty-two (22) of the additional STPs were dug at 5-m (16.4-ft) intervals in the new APE but all were negative. The results of the shovel testing and surface inspection show that the site is now 52 meters (171 ft) north of the proposed access road's APE.

Table 4.1. Cultural materials found at Linear 3 (Site PCI/Ball Hill-1).

Material	Artifact Type	Count
Ceramic	ironstone, undecorated	24
	ironstone, blue transfer print	3
	ironstone, black transfer print	1
	ironstone, flow-black transfer print	1
	ironstone, molded, bowl rim	1
	porcelain, undecorated	2
	porcelain, green banded	1
	stoneware, salt-glazed	1
	whiteware, undecorated	8
	yellow ware, slipped	1
Ceramic Total		**43**
Glass	bottle glass	1
	container glass	1
	medicine bottle	1
	milkglass	1
	window glass	6
Glass Total		**10**
Metal	nail, cut	1
	sheet iron	1
	wire	1
Metal Total		**3**
Other	brick	1
Other Total		**1**
Grand Total		**57**

Linear 4. This linear survey tested a portion of the proposed access road south of Route 39 (see Figure 4.1). The APE is centered on an existing unpaved access road that extends from Route 39 northwards to a creek approximately 2,000 ft (610 m) from the road. An extant house is located about 115 ft (35 m) north of Route 39, adjacent to the east side of the APE. The house is located approximately where a structure is shown on historic maps from 1867 and 1881 belonging to L. Jones (see Figure 4.3). It is also shown on the 1900 USGS topographic map. The house is vernacular architecture with new aluminum windows and deteriorating modern siding. The foundation appears to be covered with concrete, making the actual foundation not visible.

A total of 40 shovel tests were dug along two transects on Linear 4 (Figure 4.24). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 25 cm (10 in). Stratum 2 was typically yellowish brown sandy loam, reaching an average depth of 25 cm (10 in). Fifteen historic and modern artifacts were found in STPs 1.8 and 1.10 (see Appendix C: Artifact Catalog). These include four ceramics, five glass shards, and six metal objects. The ceramics are four pieces of undecorated whiteware. The glass includes three pieces of an aqua canning jar probably dating after 1885, a modern amber bottle fragment, and a clear piece of flat glass. The metal objects include an iron knife, a file, and a piece of hardware, as well as a wire nail, an unidentified nail, and a railroad spike. Aside from the canning jar fragments, these items are generally non-diagnostic. No historic features were present and there was no evidence of a stratified context for the artifacts (i.e., modern and historic material were mixed together).

Linear 6. This linear survey tested a portion of the proposed access road aligned east to west, on the east side of Pope Hill Road (see Figure 4.1). A drainage ditch is along the road immediately west of the APE. The APE is in an alfalfa field, and parallel to a tree line located to the south. This linear is in proximity to MDS 6, shown as belonging to H. Sharp on the 1867 map (see Figure 4.2). This MDS is not shown on subsequent maps.

A total of 40 shovel tests were dug along two transects at Linear 6 (Figure 4.25). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silt or silty loam, reaching an average depth of 28 cm (11 in). Stratum 2 was typically yellowish brown silty or clayey loam, reaching an average depth of about 39 cm (15 in). No cultural materials were found at this location and no evidence of historic or prehistoric features was identified. No aboveground or subsurface evidence of the MDS was present within the APE.

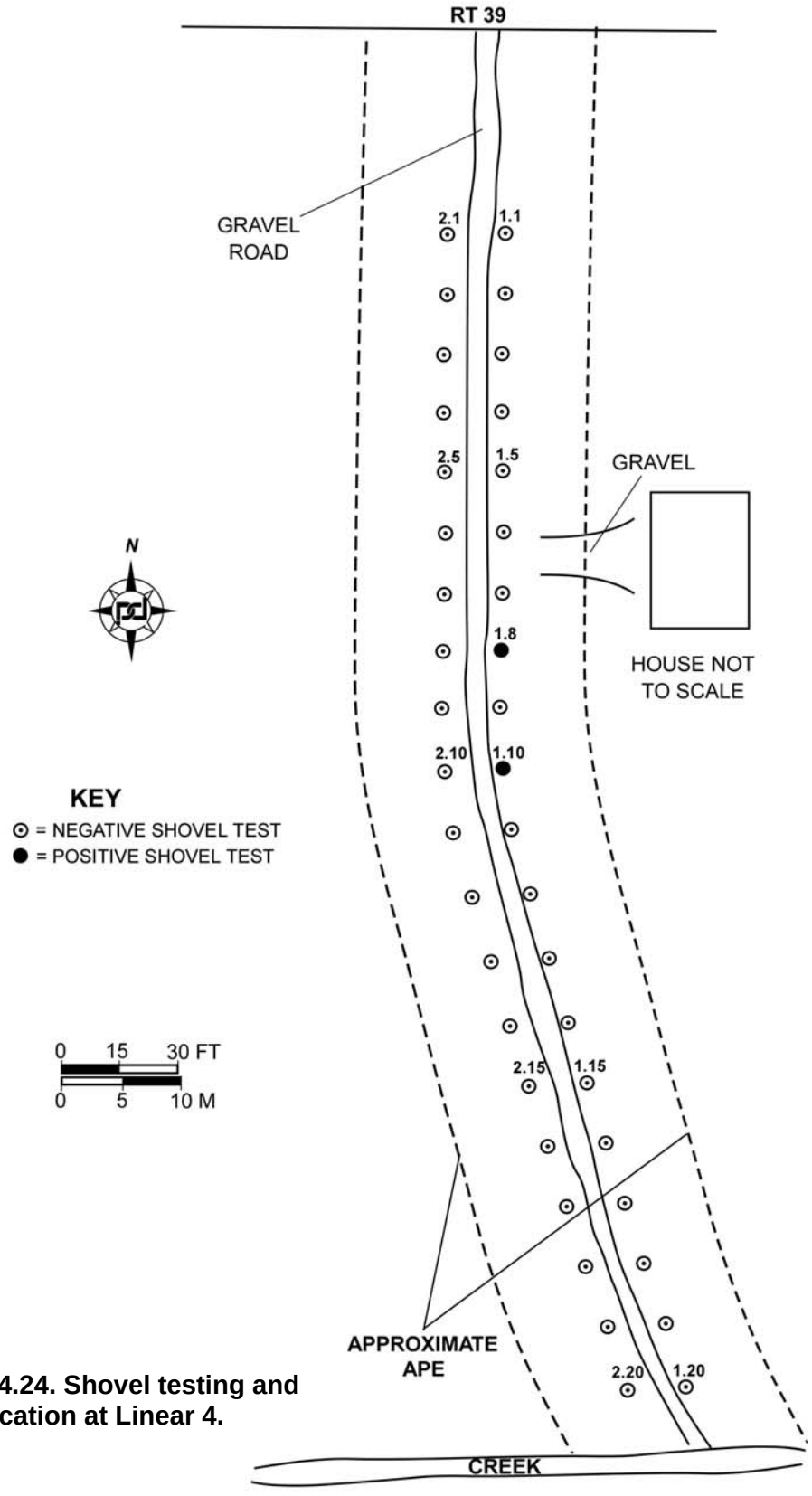


Figure 4.24. Shovel testing and MDS location at Linear 4.

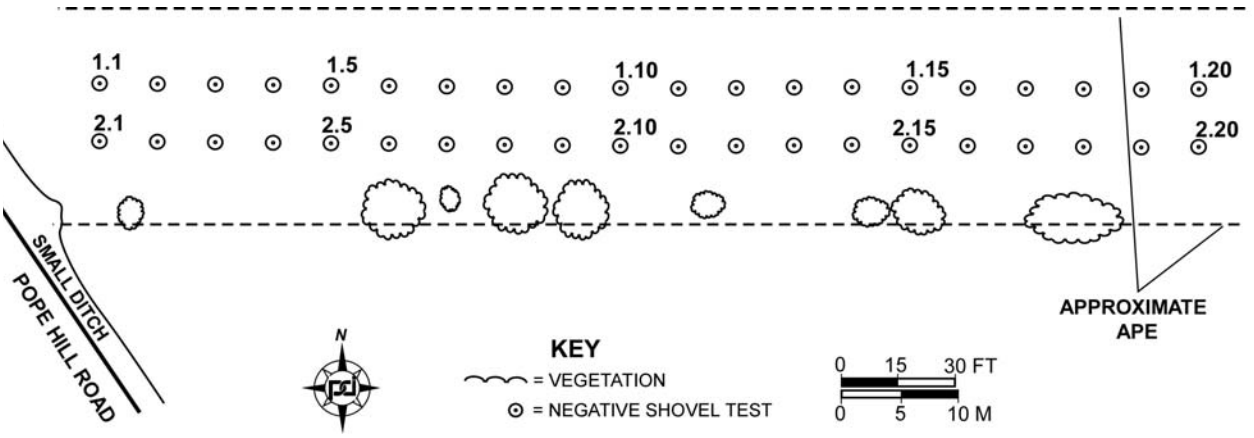


Figure 4.25. Shovel testing and MDS location at Linear 6.

Linear 7. This linear survey tested a portion of the proposed collection line located east of Pope Hill Road (see Figure 4.1). Situated within a pasture, there is a slight eastward slope. A wire fence is across the southern part of the APE. Trees and brush are in the center of the APE. Standing water was present in the southern part of the APE. This linear is in proximity to MDS 7, shown as belonging to O. Crowill in 1867 and B. Warner in 1881 (see Figure 4.2). This structure is not shown on the USGS topographic map from 1900.

A total of 40 shovel tests were dug along two transects on Linear 7 (Figure 4.26). Two soil strata were identified. Stratum 1 consisted of very dark grayish brown loam or silty loam, reaching an average depth of 31 cm (12 in). Stratum 2 was typically yellowish brown silty loam, reaching an average terminal depth of 42 cm (17 in). Water filled a portion of tests dug at the southern extent of the survey, denoting a high water table in that area. An isolated piece of clear glass was found in STP 2.10. No other cultural materials were found. No structural evidence of the MDS was found within the APE or observed adjacent to it.

Linear 8. This linear survey tested a portion of the proposed collection line located on the west side of Round Top Road (see Figure 4.1). Between the APE and the road is a drainage ditch (Appendix A: Photograph 14). Vegetation of the APE includes brush and trees in the south extent and a grass covered field in the north. An unpaved access road is located between the sixth and seventh shovel tests of both transects. This linear is in proximity to MDS 8, shown as belonging to M. Stearns on both the 1867 and 1881 historic maps (see Figure 4.2), but not on the 1900 USGS topographic map.

A total of 40 shovel tests were dug along two transects at Linear 8 (Figure 4.27). Typically, two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 was typically yellowish brown silty loam or silty clay, reaching an average depth of 39 cm (15 in). STP 1.18 had a third stratum, consisting of pale brown silt clay between 35 and 47 cm (14 and 19 in) depth. No cultural materials were found in the shovel tests of Linear 8. No evidence of the MDS was observed within or adjacent to the APE.

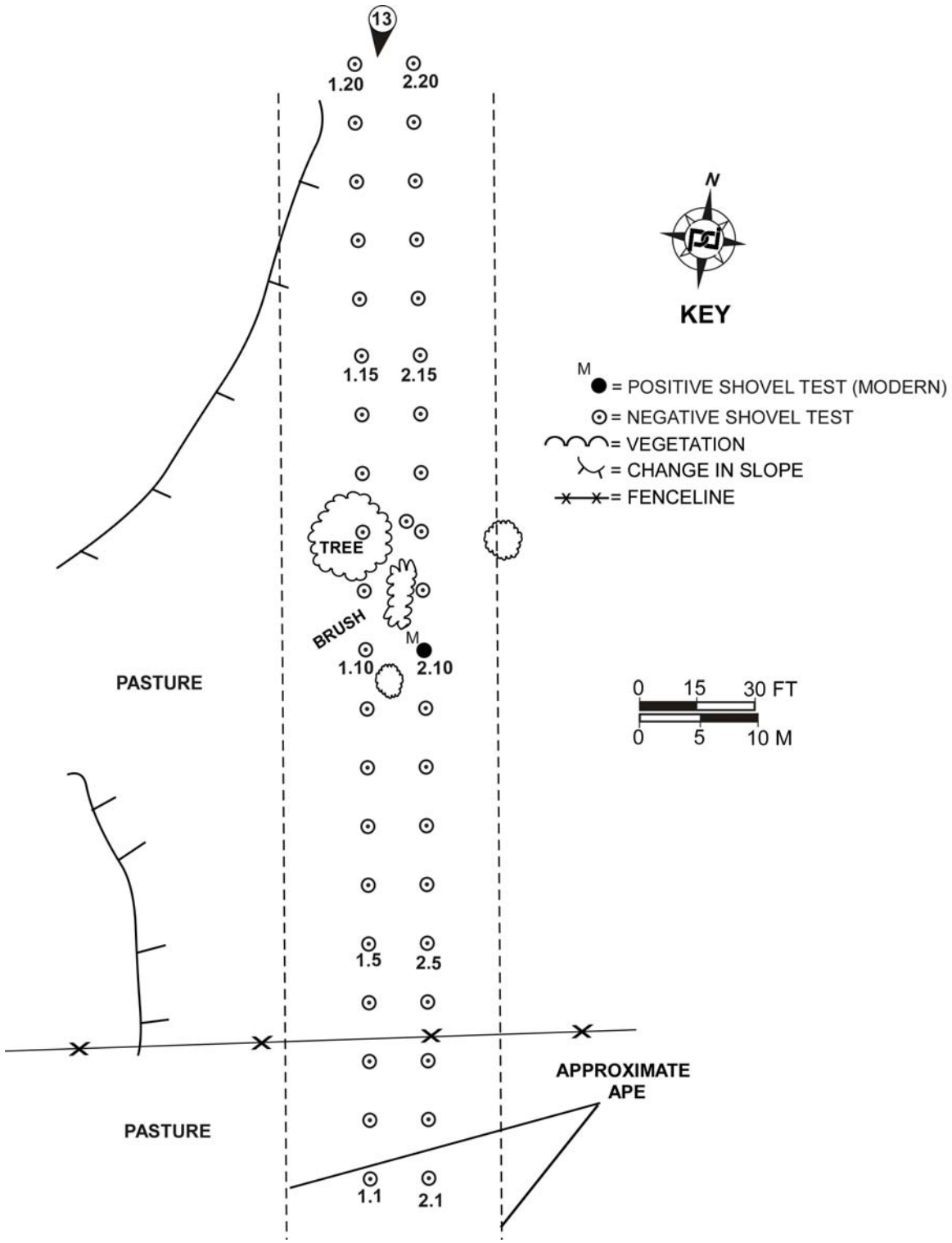


Figure 4.26. Shovel testing and MDS location at Linear 7.

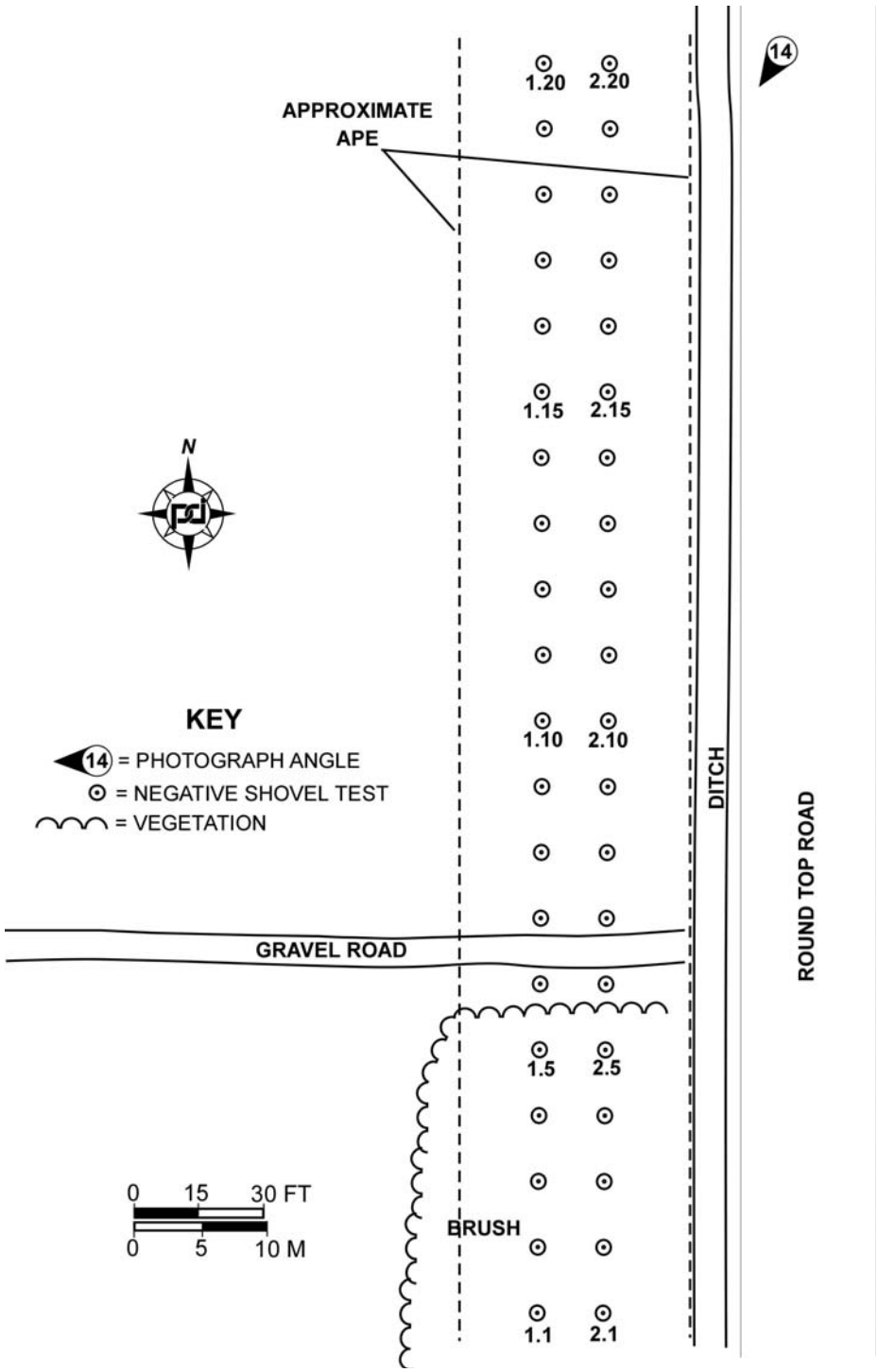


Figure 4.27. Shovel testing and MDS location at Linear 8.

Linear 9. This linear survey tested a portion of the proposed access road located on the west side of Pope Hill Road (see Figure 4.1). The APE is situated within a harvested cornfield with visible stubs of corn stalks and grass, exhibiting a slight eastward slope. The APE is at an approximate 60˚ angle to Pope Hill Road, paralleling an unpaved access road. A tree and fence line is north of the existing unpaved access road. Overhead utility lines cross the eastern portion of the APE near the third shovel tests of each transect. A ditch is between Pope Hill Road and the APE. A gas marker is on the north side of the existing access road.

This linear is in proximity to MDS 9, which includes a structure attributed to R. Werner in 1867, and a structure shown on the USGS topographic map from 1900 (see Figure 4.5). There is no structure shown on the 1881 map.

A total of 40 shovel tests were dug along two transects at Linear 9 (Figure 4.28). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 28 cm (11 in). Stratum 2 was typically light brownish gray and yellowish brown clayey silt, dug to an average terminal depth of 40 cm (16 in). An isolated non-diagnostic whiteware fragment was found in STP 1.18. No other cultural materials were found. No structural evidence of the MDS was found within the APE.

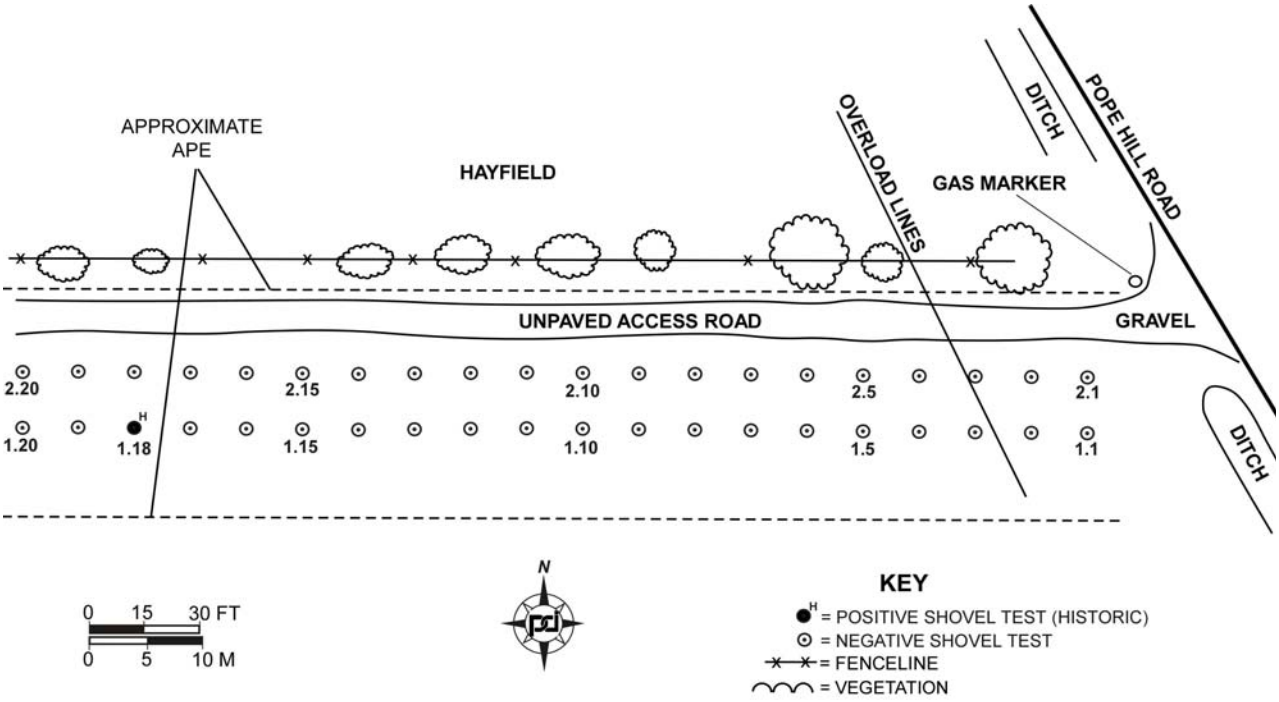


Figure 4.28. Shovel testing and MDS location at Linear 9.

Linear 10. This linear survey tested a portion of the proposed access road located perpendicular to Round Top Road (see Figure 4.1). Situated along the boundary of a wooded area and a grass covered field, the APE is parallel to a tree line. Linear 10 extends westward from Round Top Road. An area of standing water is between the road and the east end of the APE. Standing water is also in the vicinity of STPs 1.15 and 2.15. An electric corridor is oriented north-south over the seventh shovel test of each transect. This linear is in proximity to MDS 10. The structure is attributed to W. Eamons in 1867, but is not shown in 1881. There is also a structure in this approximate location in 1900 (see Figure 4.5).

A total of 40 shovel tests were dug along two transects on Linear 10 (Figure 4.29). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silt or silty loam, reaching an average depth of 27 cm (11 in). Stratum 2 was typically yellowish brown clayey or silty loam, reaching an average terminal depth of 41 cm (16 in). No cultural materials were found. No evidence of the MDS was present within the APE or observed adjacent to it.

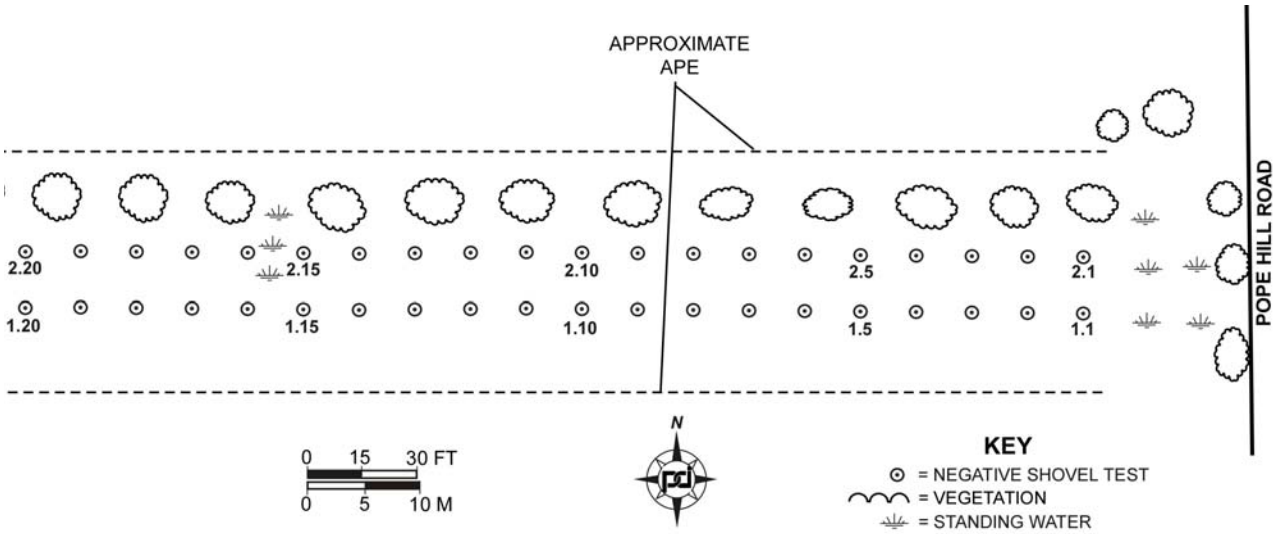


Figure 4.29. Shovel testing and MDS location at Linear 10.

Linear 13. This linear survey area tested a formerly proposed collection line location that was going to be parallel to the north side of Villenova Road (see Figure 4.1). The proposed location was revised to avoid the archaeological site found during this investigation and discussed herein). The originally proposed APE is just within the south edge of a wooded area, about 50 ft (15 m) from the edge of the road. Between the road and the survey area are a shallow drainage ditch, deciduous tree clusters, and a buried gas line. A cut-stone foundation (MDS 13) is located within the eastern half of the APE. It has been disturbed with portions of the walls pushed to the interior (Appendix A: Photograph 15). Standing water was within the foundation at the time of the field investigation. The location of the foundation correlates to a structure attributed to L. Congdon on the 1867 and 1881 maps and again appearing later on the 1900 map (see Figure 4.5).

A total of 40 shovel tests were dug along two transects on Linear 13 (Figure 4.30). Typically two strata were identified. Stratum 1 consisted of dark grayish brown silty loam, with

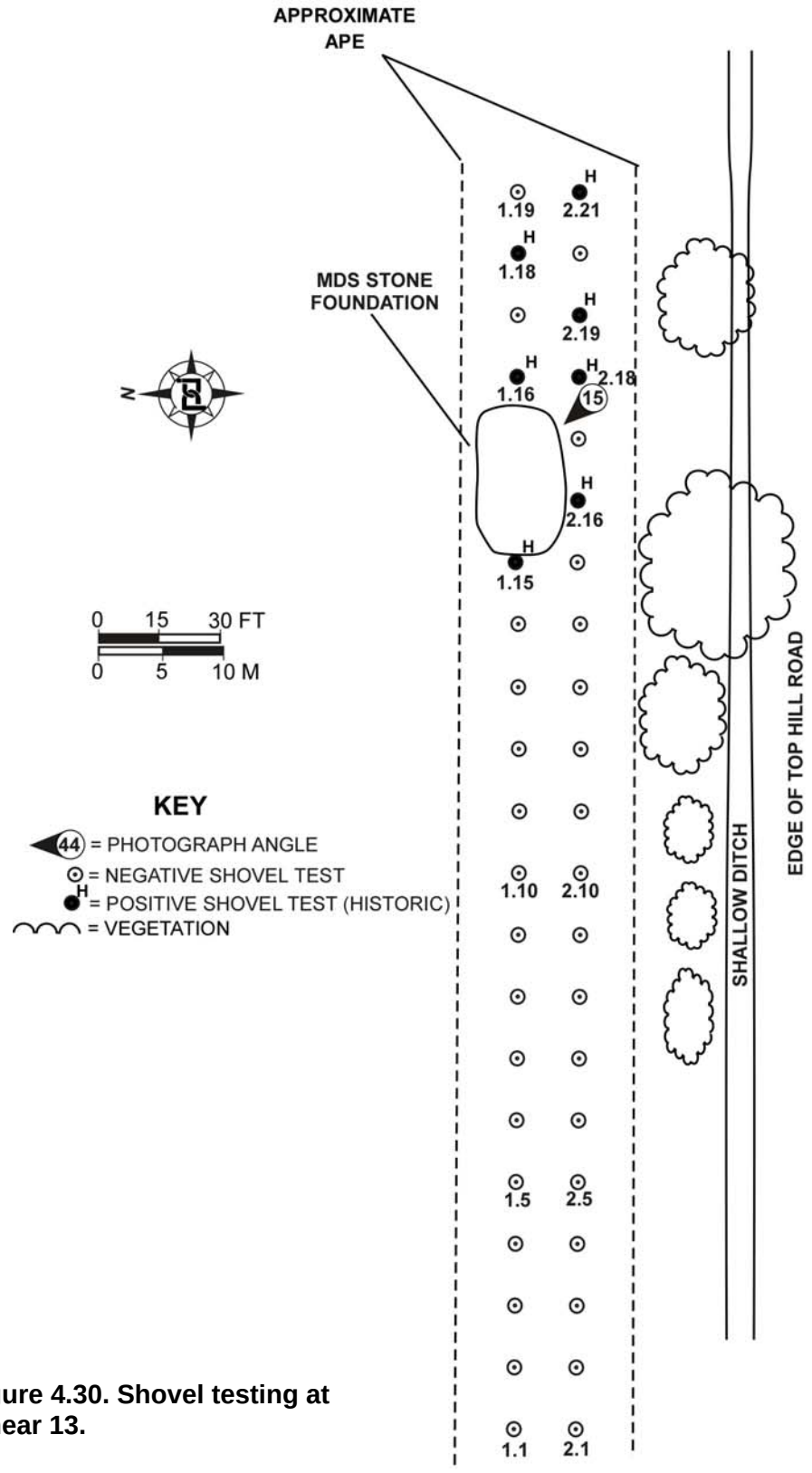


Figure 4.30. Shovel testing at Linear 13.

an average depth of 26 cm (10 in). Stratum 2 was typically yellowish brown loamy clay, dug to an average terminal depth of 38 cm (15 in). A third stratum was found in STP 1.5, consisting of a dark yellowish brown silty loam 13 to 39 cm (5 in to 15 in) deep.

A total of 21 artifacts were found in six shovel tests (STPs 1.15, 1.16, 1.18, 2.18, 2.19 and 2.21) dug in proximity of the MDS foundation (Table 4.2; see Appendix C: Artifact Catalog). The light scatter of artifacts includes ceramic, glass, and metal. The ceramics include four salt-glazed redware, three undecorated whiteware, two fragments of black matter glaze redware, and one salt-glazed stoneware, one molded ironstone, one molded green glazed art pottery, one blue hand-painted pearlware, one undecorated pearlware with a maker's mark. Also found was a white porcelain door knob fragment. Glass included two fragments of a lightning canning jar lid, two clear container glass, and one aqua window glass fragment. A cut nail was also found. These artifacts generally date to the late nineteenth century to early twentieth century and are consistent with the historic map analysis results.

Table 4.2. Cultural materials found at Linear 13 (Site PCI/Ball Hill-2).

Material	Artifact Type	Count
Ceramic	art pottery	1
	door knob, porcelain, white	1
	ironstone, molded	1
	pearlware, hand-painted, blue-and-white	1
	pearlware, maker's mark, circular impressed mark, "SHIRE", with crown in center	1
	redware, black matte glaze	2
	redware, salt-glazed	4
	stoneware, salt-glazed	1
	whiteware, undecorated	3
Ceramic Total		**15**
Glass	canning jar lid, lightning	2
	container glass, clear	2
	window glass, aqua	1
Glass Total		**5**
Metal	nail, cut	1
Metal Total		**1**
Total		**21**

The nineteenth century stone foundation (MDS 13) and associated fragmented ceramics and glassware found during the shovel testing of Linear 13 was designated as an historic site, PCI/Ball Hill-2. The foundation of MDS 13 and positive shovel tests reveal a possible extension of the historic site centered on the foundation. One would anticipate the area immediately north of the foundation (outside the APE) to have a higher archaeological sensitivity due to the increased probability of finding evidence of former farm structures and activity areas once associated with the farmhouse. An OPRHP historic site form was completed and is presented in Appendix D.

Linear 14. This linear survey tested a portion of the proposed collection line located on the north side of Villenova Road (see Figure 4.1). The APE is located approximately 50 ft (15 m) north of the edge of the road, situated in an alfalfa field. The historic map analysis identified a structure (MDS 14) attributed to L. Congdon (as was L/MDS 13, above) in 1867 and 1881 (see Figure 4.5), and appears to be represented on the USGS topographic map from 1900.

The location of MDS 14 was identified during the field investigation. It is located west of center of Linear 14, set back 50 ft (15 m) from the north edge of Villenova Road. An approximate 80-ft (24-m) diameter cluster of trees with piles of fieldstones, modern debris, and discarded appliances indicate the approximate location of the foundation (Appendix A: Photographs 16 and 17). The structure had been torn down and filled in circa 1950 (personal communication, James Congdon, property owner).

Forty shovel tests were dug along two transects at Linear 14 (Figure 4.31). Shovel tests 1.7 and 2.7 were dug at 30-m (100-ft) intervals to avoid digging in piles of rock and infill associated with MDS 14. Typically, two soil strata were identified. Stratum 1 consisted of dark grayish brown silt or silty loam, averaging 29 cm (11 in) deep. Stratum 2 was yellowish brown to dark yellowish brown silty loam, reaching an average terminal depth of 39 cm (15 in). A third stratum was found in STP 2.20, consisting of mottled yellowish brown and light grayish brown loam 33 to 45 cm (13 in to 18 in) deep. A single piece of non diagnostic glass was found in STP 2.7, which was noted and discarded in the field. No other cultural materials were found in the remaining shovel tests. The foundation exhibits extensive disturbance and the area appears to have been used as a general dump for household appliances and debris. There is no integrity to this feature and it is not considered a site that warrants further investigation.

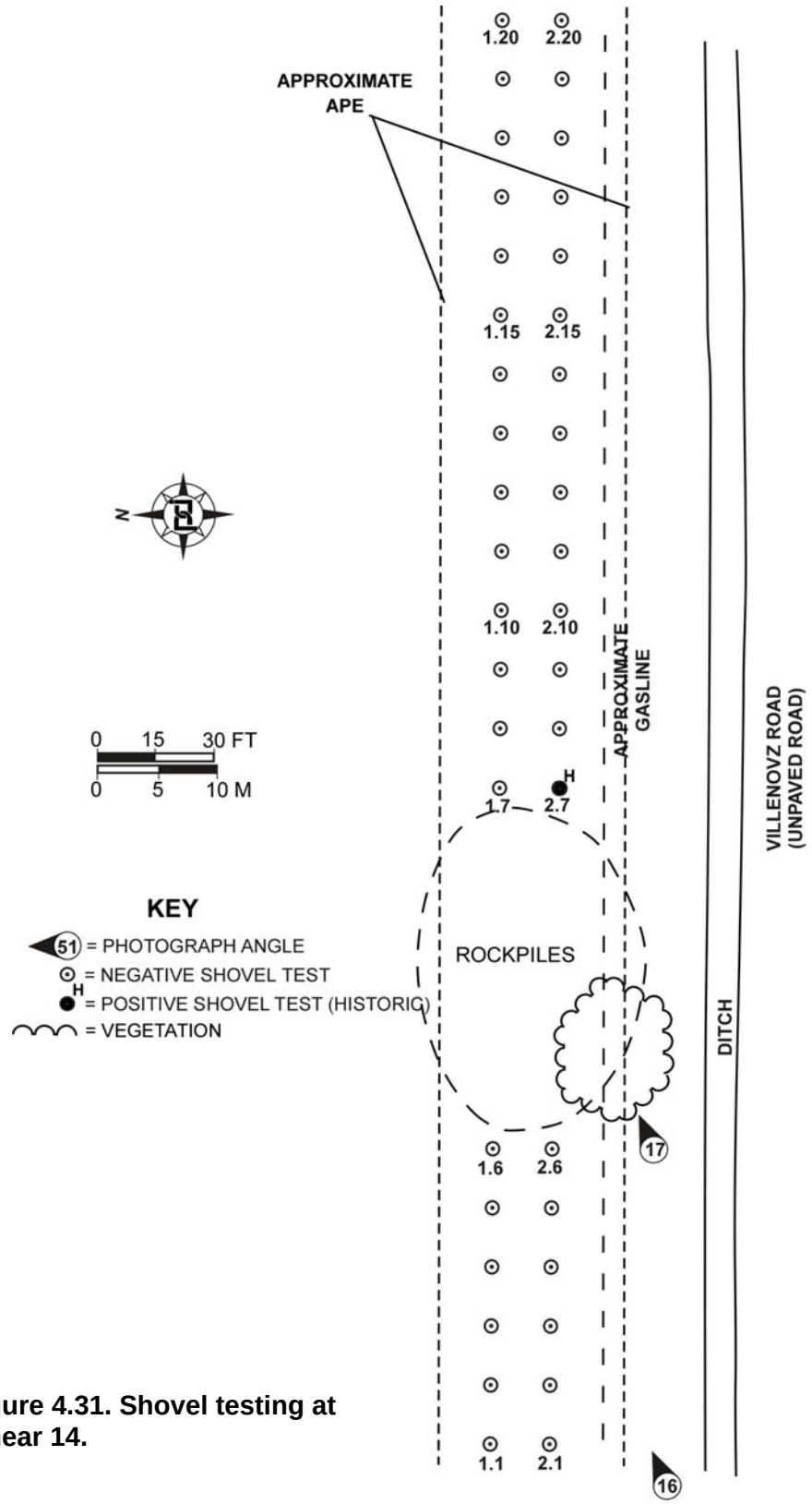


Figure 4.31. Shovel testing at Linear 14.

Linear 15. This linear survey tested a portion of the proposed access road crossing Prospect Road at an approximate 45˚ angle (see Figure 4.1). The APE on the west side of the road is situated on a grass covered field with a moderate southwestward slope of 10 percent. The APE on the east side of Prospect Road is situated on a fairly level alfalfa field.

The shovel testing of Linear 15 was conducted in proximity to MDS 15 (outside the APE). MDS 15 appears on the 1867 map and is attributed to J. Hamlin (see Figure 4.2). It is not shown on the 1881 map or the USGS topographic map. No surface evidence of this structure was found during the field investigation.

A total of 40 shovel tests were dug along two transects on Linear 15, with an equal number of tests dug on either side of Prospect Road (Figure 4.32). Two soil strata were identified. Stratum 1 consisted of dark grayish brown silty loam, reaching an average depth of 26 cm (10 in). Stratum 2 was typically yellowish brown silty loam, reaching an average terminal depth of 36 cm (14 in). A single piece of modern clear glass was found in STP 1.13. No other cultural materials were found. No evidence of MDS 15 was found within the shovel tests of Linear 15.

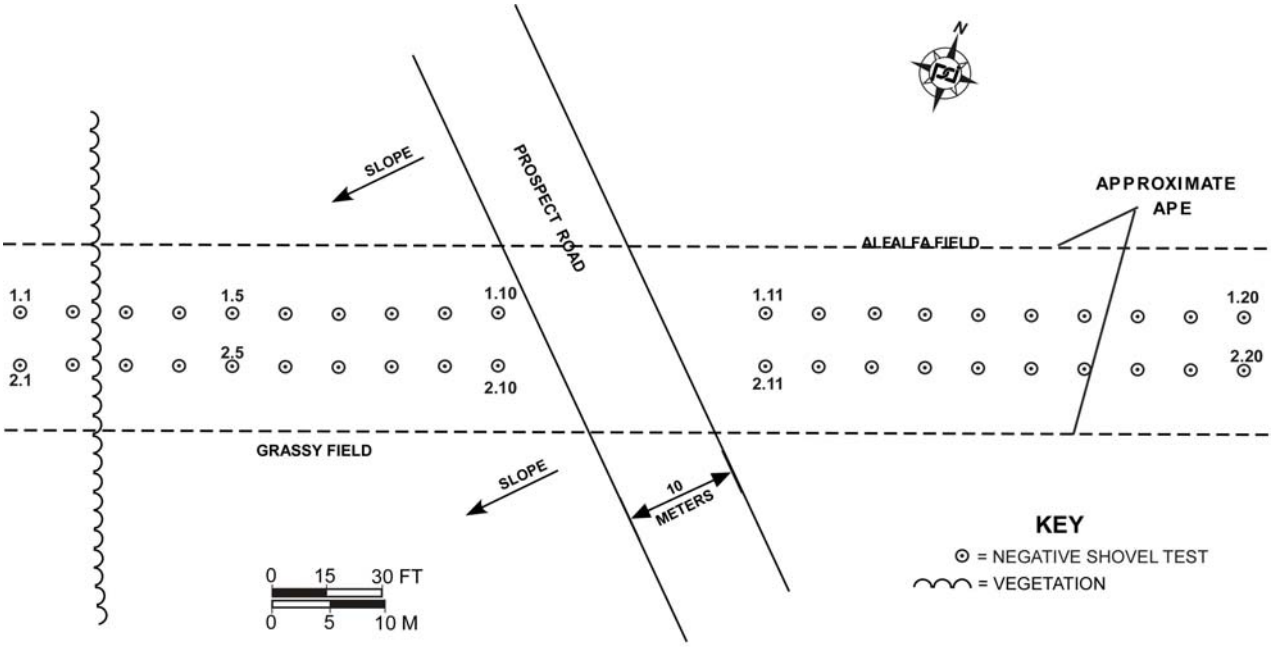


Figure 4.32. Shovel testing and MDS location at Linear 15.

Linear 16. This linear survey tested a portion of a proposed access road located 2,600 ft (792 m) south of NYS Route 39 (see Figure 4.1). The linear is situated on a grass covered agricultural field, between 100 and 130 ft (30 to 40 m) east of and parallel to an unpaved access road that connects with Route 39. An unpaved driveway is 40 ft (12 m) south of the APE. A buried gas line is between the unpaved access road and the APE. The linear was placed in proximity to MDS 16, a structure shown on all three historic maps (although the MDS appears to have changed location moving farther south between 1867 and 1881) (see Figure 4.3).

The field investigation identified an existing farmhouse and six outbuildings located opposite of the APE on the west side of the unpaved access road (see Appendix A: Photographs 18 through 20). The farmhouse is most likely the structure shown on referenced historic maps. Early cartographic techniques were not as precise as modern ones and structure locations were often distorted. In 1867, this structure is attributed to S. Parsell, and in 1881 it is labeled L. Jones. This MDS is also shown on the 1900 map. The land owner, Mr. Rich Brunea, stated that the house was built in 1847, which is consistent with the historic map analysis. The house is located outside the APE and has not maintained integrity since there are several extensive modifications and additions. The six outbuildings, including one metal pole barn, three wood framed barns or sheds, one milk house, and one stone spring house, are located west and south of the APE (Appendix A: Photographs 20 and 21).

A total of 40 shovel tests were dug along two transects on Linear 16 (Figure 4.33). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam or sandy silt, reaching 27 cm (11 in) average depth. Stratum 2 consisted of a mottled yellowish brown and light grayish brown sandy silt or yellowish brown sandy loam, dug to an average terminal depth of 39 cm (15 in). One non-diagnostic glass was found in STP 1.14 and was discarded in the field. No other cultural materials were found in the shovel tests of Linear 16.

Linear 17. This linear survey tested a portion of a proposed collection line located adjacent to the west side of Round Top Road, next to a ditch, in a wooded and brushy lot that is along the road. The northern extent of the linear is a grass covered agricultural field (see Figure 4.1). This linear is in proximity to MDS 17, which includes a structure attributed to W. Frank in 1881 (see Figure 4.4). No structure is shown on the 1867 historic map or the USGS topographic map from 1900.

A total of 40 shovel tests were dug along two transects on Linear 17 (Figure 4.34). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 30 cm (12 in). Stratum 2 consisted of yellowish brown sandy silt or clay loam, reaching an average terminal depth of about 42 cm (16 in). One shovel test was terminated in Stratum 1 due to a rock impasse. Four shovel tests contained rock or gravel.

A total of 10 historic artifacts were found in STPs 1.20, 2.18 and 2.20. These tests were located in an area adjacent to the road providing access to the agricultural field. Nine ceramic fragments were found in Strata 1 and 2 of STPs 1.20 and 2.20; one small brick fragment (which was noted and discarded in the field) was found in STP 2.18. The ceramics include one glazed redware, one black transfer-printed whiteware, one blue transfer-printed whiteware, one gray-blue cabled whiteware, one polychrome pearlware, one blue shell-edged pearlware, and two undecorated whitewares (see Appendix C: Artifact Catalog).

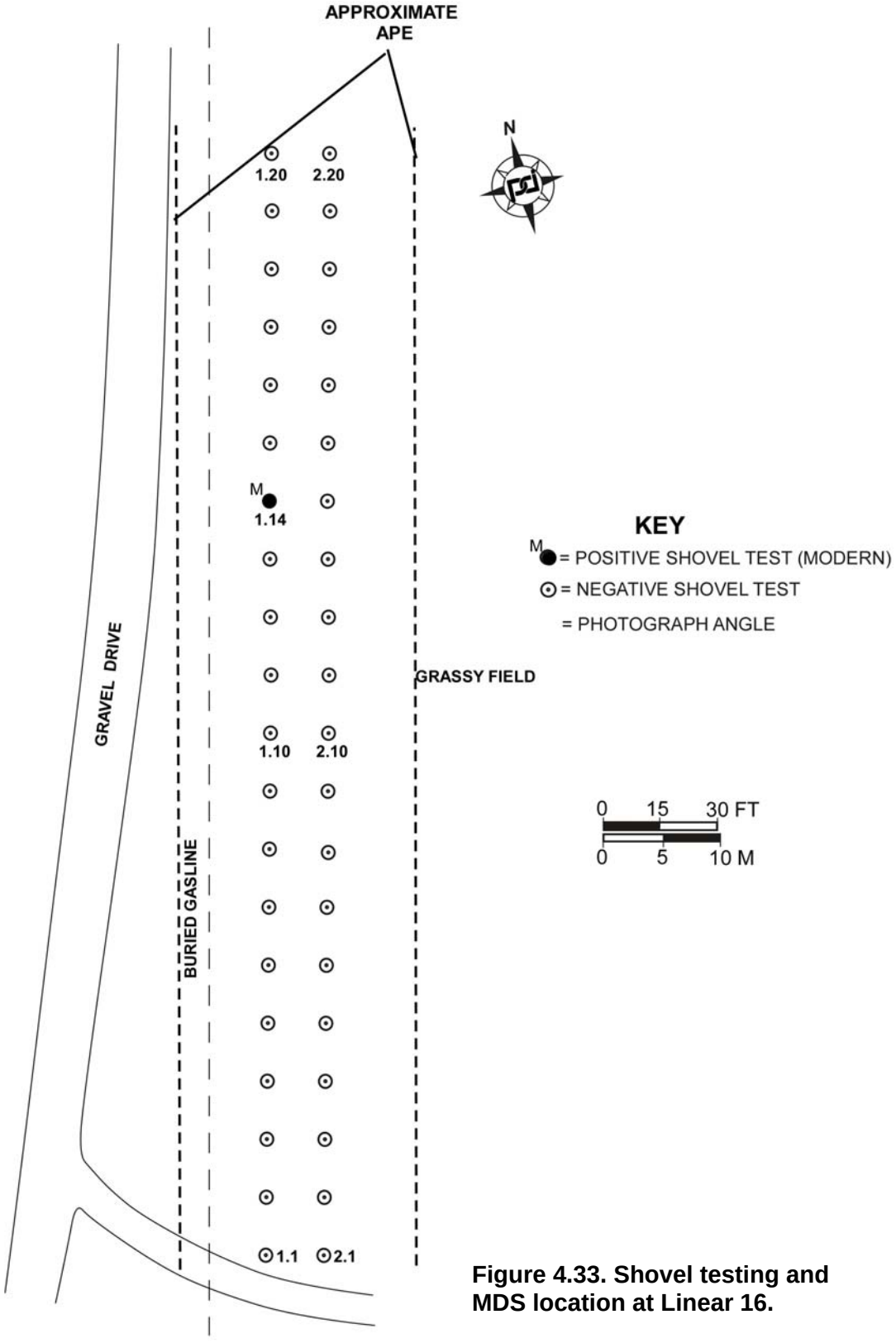


Figure 4.33. Shovel testing and MDS location at Linear 16.

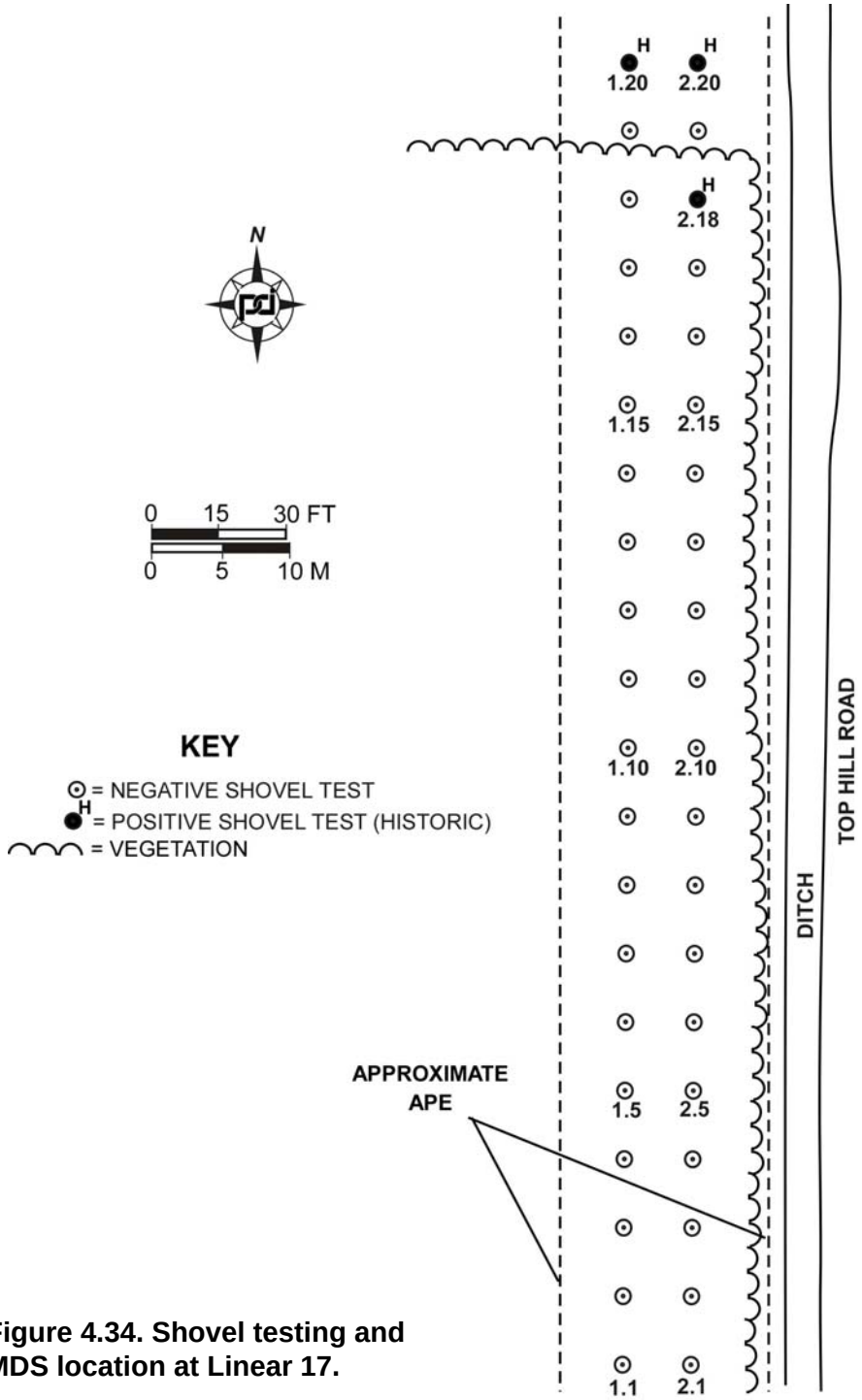


Figure 4.34. Shovel testing and MDS location at Linear 17.

No other cultural materials were found in the shovel tests of Linear 17. The historic artifacts are a mix of nineteenth and twentieth century artifacts found in the plowzone, lacking association with any historic feature. These materials are interpreted as a scatter of historic materials commonly found in agricultural fields adjacent to roads.

Linear 18. This linear survey tested a portion of a proposed collection line north of Linear 17, adjacent to the west side of Round Top Road (see Figure 4.1). The APE is located in a grass covered agricultural field, next to a ditch. This linear is in proximity to MDS 18, which includes a structure attributed to W. Frank in 1881 (as was MDS 17, above) (see Figure 4.4). No structure is shown on the 1867 or 1900 maps.

A total of 40 shovel tests were dug along two transects on Linear 18 (Figure 4.35). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 31 cm (12 in). Stratum 2 consisted of yellowish brown silty loam or sandy silt, reaching an average terminal depth of 42 cm (17 in). One blue shell-edge whiteware was found in STP 2.3, in Stratum 1. This artifact is interpreted as an isolated find. No other cultural materials or evidence of MDS 18 were found within the close-interval (5-m) shovel tests of Linear 18.

Linear 21. This linear survey tested a portion of a proposed access road located 197 ft (60 m) north of Bartlett Road (see Figure 4.1). The APE is located on a level working agricultural field, with the linear oriented north-to-south. A pond lies immediately east of the APE. This linear is in proximity to MDS 21, which includes a structure attributed to M.A. Ball in 1881 (see Figure 4.4). No structure is shown on the 1867 historic map or the USGS topographic map from 1900.

A total of 40 shovel tests were dug along two transects on Linear 21 (Figure 4.36). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 30 cm (12 in). Stratum 2 consisted of a mottled yellowish brown and light grayish brown or yellowish brown sandy silt, reaching an average terminal depth of 41 cm (16 in). No evidence of MDS 18 was found within the shovel tests of Linear 21.

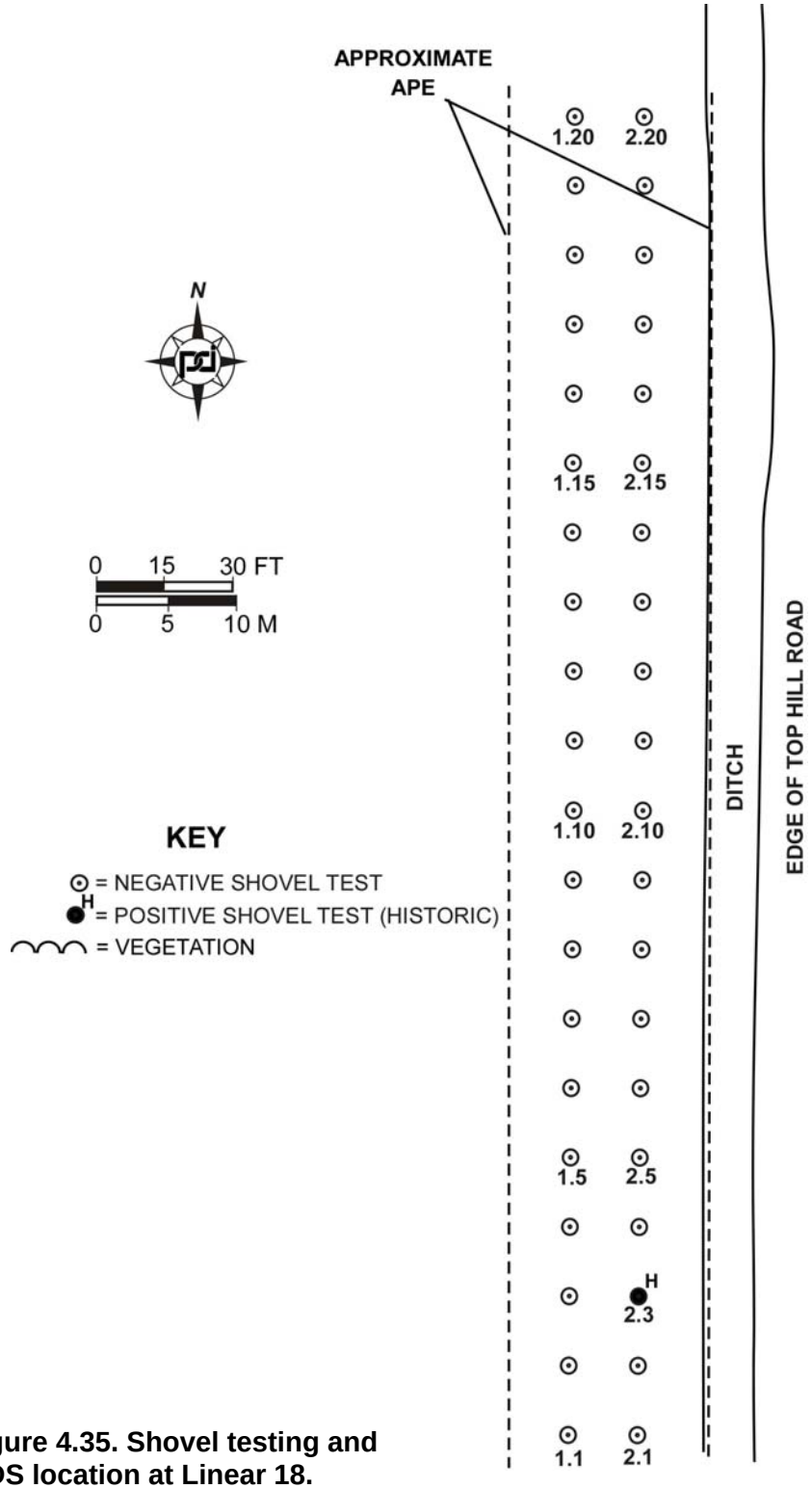


Figure 4.35. Shovel testing and MDS location at Linear 18.

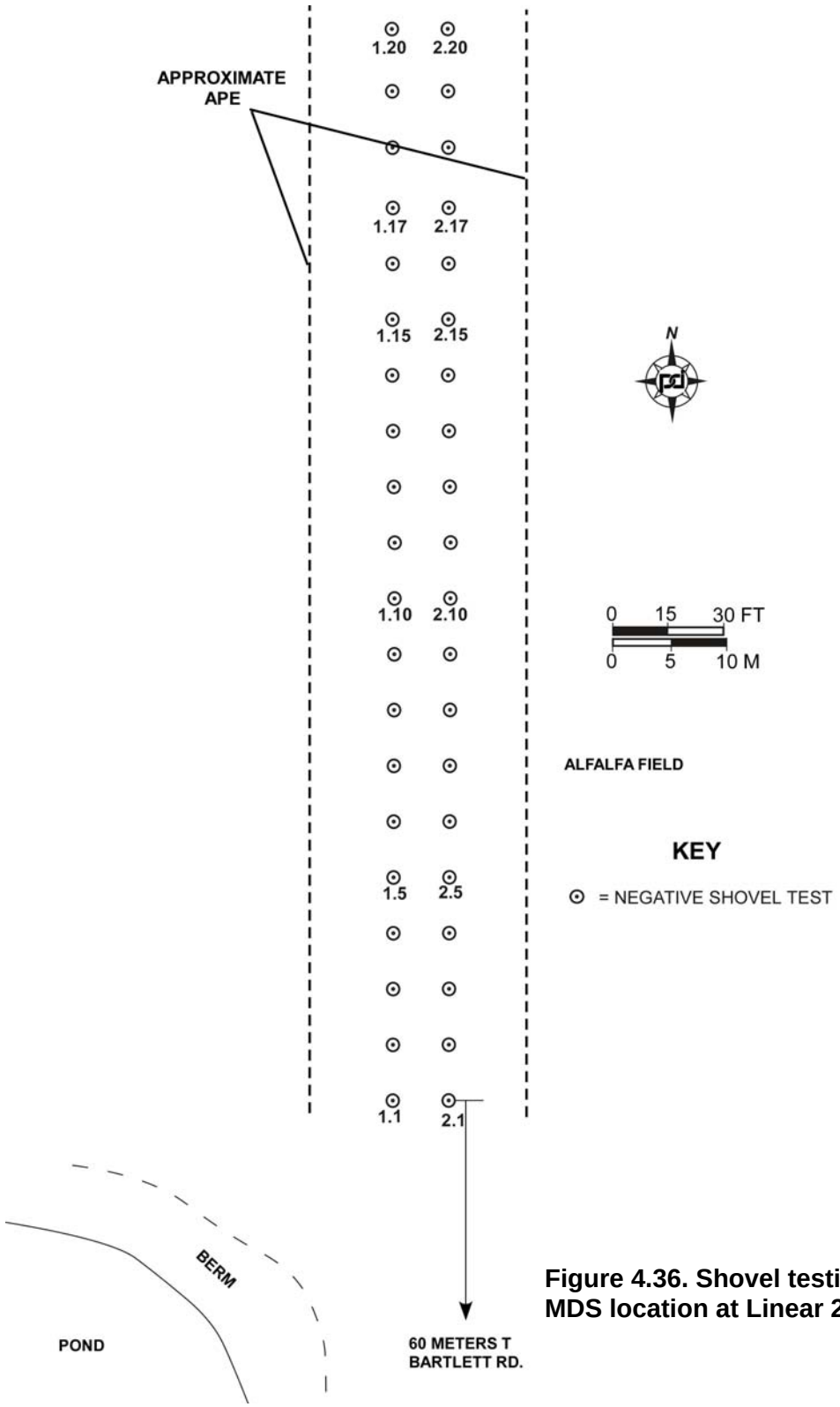


Figure 4.36. Shovel testing and MDS location at Linear 21.

Linear 22. This linear survey tested a portion of a proposed access road located on the western side of Route 87 (Prospect Road). The linear survey area has an east to west alignment and is bounded by a plowed and disked field to the north and a grass covered agricultural field on the south. A drainage ditch crosses the west extent of the APE. An overhead transmission line is located 25 ft (7.6 m) from the west edge of Prospect Road. Linear 22 is near MDS 22, which includes a structure attributed to A. Hamlin in 1881 (see Figure 4.4) and that appears to also be shown on the USGS topographic map from 1900. No structure is shown on the 1867 historic map.

A total of 40 shovel tests were dug along two transects on Linear 22 (Figure 4.37). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam or silt, averaging 27 cm (11 in) deep. Stratum 2 consisted of mottled yellowish brown and light grayish brown sandy silt, dug to 38 cm (15 in) average terminal depth. STP 2.16 contained gravel. No cultural materials were found and no evidence of historic or prehistoric features was identified within the APE.

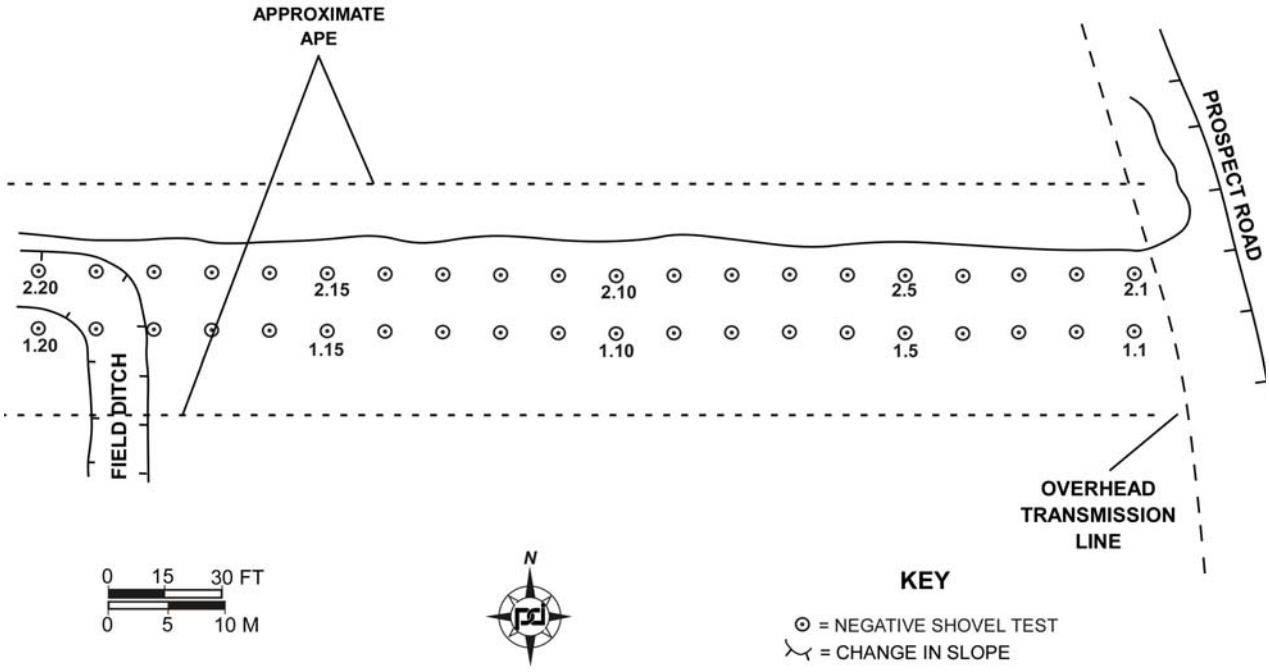


Figure 4.37. Shovel test locations at Linear 22.

Linear 23. This linear survey tested a portion of a proposed collection line located approximately 400 ft (122 m) west of Round Top Road (see Figure 4.1). The APE is located in a fenced cow pasture. There is an unpaved access road and a fence at the northern boundary. A wire fence is across the APE at STP 1.10 and STP 2.11. The APE has an increased archaeological sensitivity due to a map-documented structure (MDS 23) shown along the west side of the road, in proximity to the APE. The MDS is shown on the 1867 and 1900 maps (see Figure 4.5). The structure does not appear on the 1881 map.

A total of 40 shovel tests were dug along two transects on Linear 23 (Figure 4.38). Two soil strata were identified. Stratum 1 was varied, from dark gray to very dark or dark gray brown silty loam, reaching an average 29 cm (11 in) depth. Stratum 2 was typically yellowish brown sandy silt, reaching an average terminal depth of 41 cm (16 in). One shovel test (STP 1.3) was terminated at Stratum 1 due to water filling the pit. STP 1.14 contained gravel in both strata. No cultural materials were found in the shovel tests of Linear 23.

A stand of trees with standing water are present to the east of the linear which may coincide with the MDS location, but no structural evidence of the MDS was observed.

Linear 28. This linear survey tested a portion of a proposed access road and collection line located on the south side of Route 87 (Prospect Road) (see Figure 4.1). The APE is perpendicular to the road and is located in a formerly fenced pasture now covered in tall grass and weeds. A ditch is along the eastern boundary of the APE. Parallel to this ditch is a dilapidated wire fence that also is along the northern extent of the APE.

Linear 28 is in proximity to MDS 28 (shown north of the APE) which includes a structure attributed to R. Sharp in 1881 (see Figure 4.4). No structure is shown in this location on either of the later historic maps. The field investigation identified a farm complex dating more than fifty years old approximately 65 m (213 ft) northwest of the linear at 9069 Prospect Road. It is likely the extant farmhouse located at 9069 Prospect Road (i.e., the same as the R. Sharp house shown on referenced historical maps).

Forty shovel tests were dug along two transects on Linear 28 (Figure 4.39). Two soil strata were identified. Stratum 1 consisted of brown loam or dark grayish brown silty loam, averaged 27 cm (11 in) deep. Stratum 2 was typically yellowish brown sandy silt, dug to an average terminal depth of 38 cm (15 in). No cultural materials were found in the shovel tests of Linear 28.

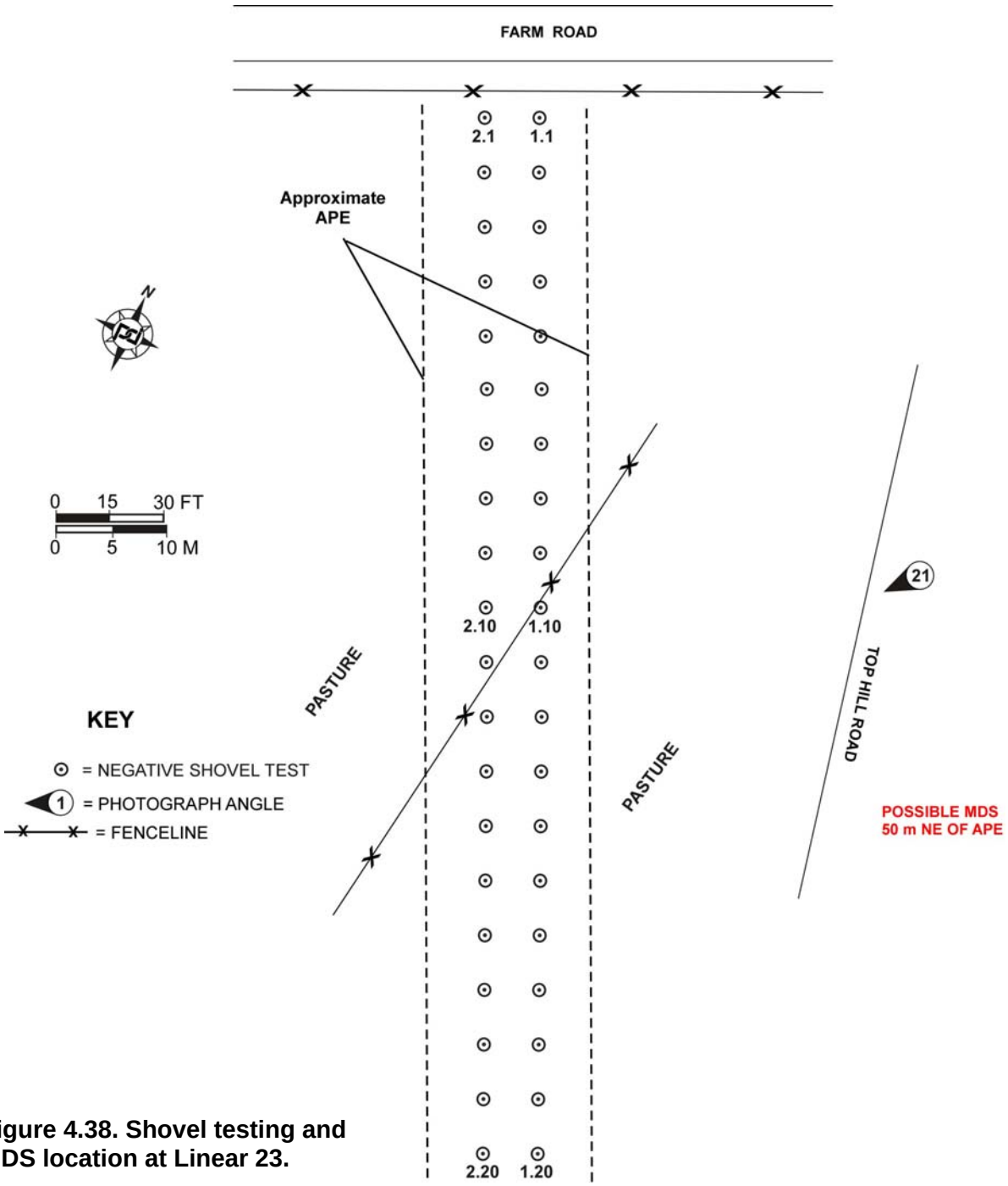


Figure 4.38. Shovel testing and MDS location at Linear 23.

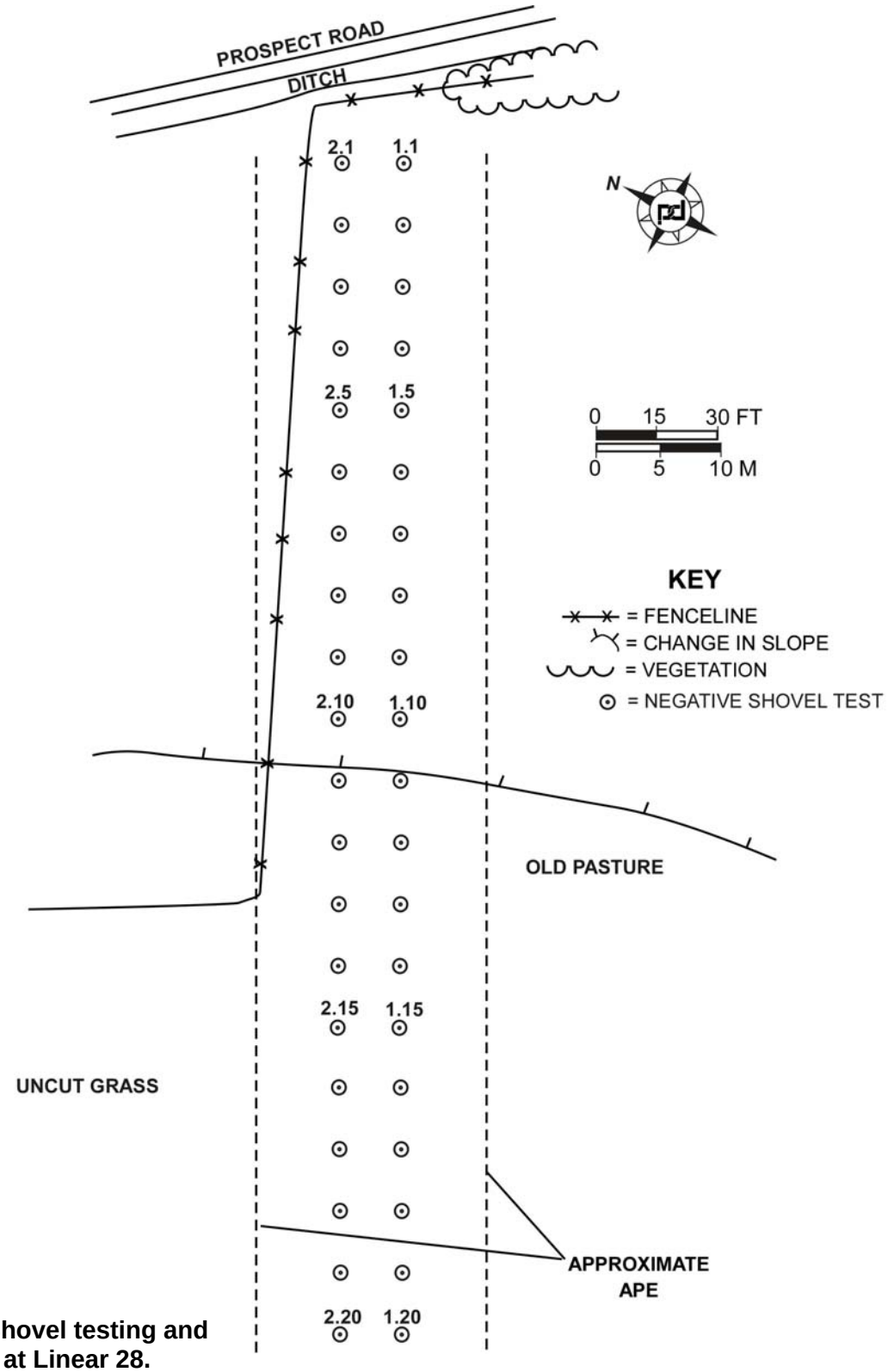


Figure 4.39. Shovel testing and MDS location at Linear 28.

Linear 28a. This linear survey tested a portion of a proposed access road and collection line located on the west side of Route 87 (Prospect Road) (see Figure 4.1). The linear is adjacent to the road, extending 100 m (330 ft) southeastward from the east terminus of Linear 28. A ditch is along the eastern extent of the APE.

A total of 40 shovel tests were dug along two transects on Linear 28a (Figure 4.40). Two soil strata were identified. Stratum 1 was typically brown and dark grayish brown silty loam, reaching an average 28 cm (11 in) depth. Stratum 2 consisted of yellowish brown silt or yellowish brown silty clay, reaching an average terminal depth of 38 cm (15 in). Four shovel tests were terminated at Stratum 1 due to rock or gravel impasses. STPs 1.3 and 1.4 contained gravel. No cultural materials were found in the shovel tests of Linear 28a.

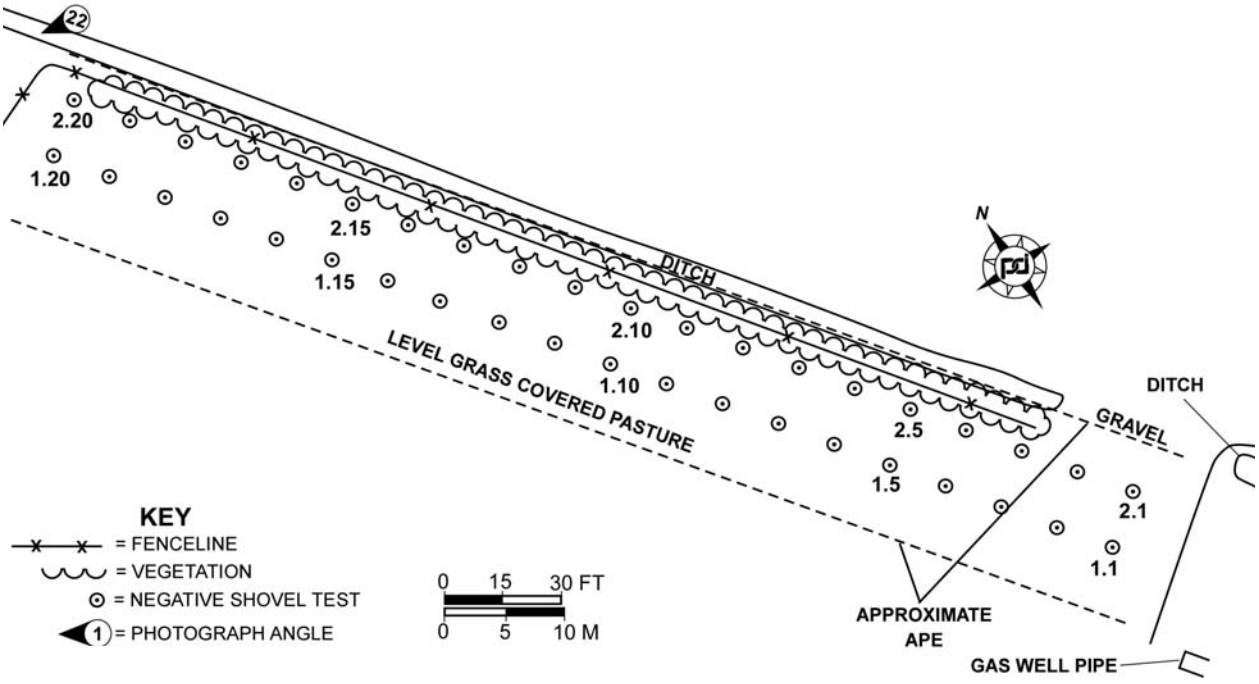


Figure 4.40. Shovel test locations at Linear 28a.

4.3 LOCAL HABITAT AREA 3

This LHA was not shovel tested due to project redesign and property access limitations. The negative effects to the research design are considered minimal, as this LHA comprises only two percent of the APE.

4.4 LOCAL HABITAT AREA 4

Local Habitat Area 4 consists of topographical features identified as *near bogs, swamps, and ponds*. The following linear section within LHA-4 environs was shovel tested during the Phase IB investigation and is described below:

Linear Survey: L-30

Linear Survey within Local Habitat Area 4

Linear 30. This linear survey tested a portion of a proposed access road located 65 ft (20 m) from the east side of Route 87 (Prospect Road) (see Figure 4.1). The APE is located in a recently plowed and disked field. A ditch and grassy area as well as a wooded area are alongside the western boundary of the APE. There are no map-documented structures within or in proximity of Linear 30.

A total of 134 shovel tests were dug at 5-m (16-ft) intervals along four transects on Linear 30 (Figures 4.41 and 4.42). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 30 cm (12 in). Stratum 2 consisted of mottled light brownish gray and yellowish brown sandy silt or yellowish brown sandy silt, reaching an average depth of about 39 cm (15 in). No cultural materials were found in the shovel tests of Linear 30.

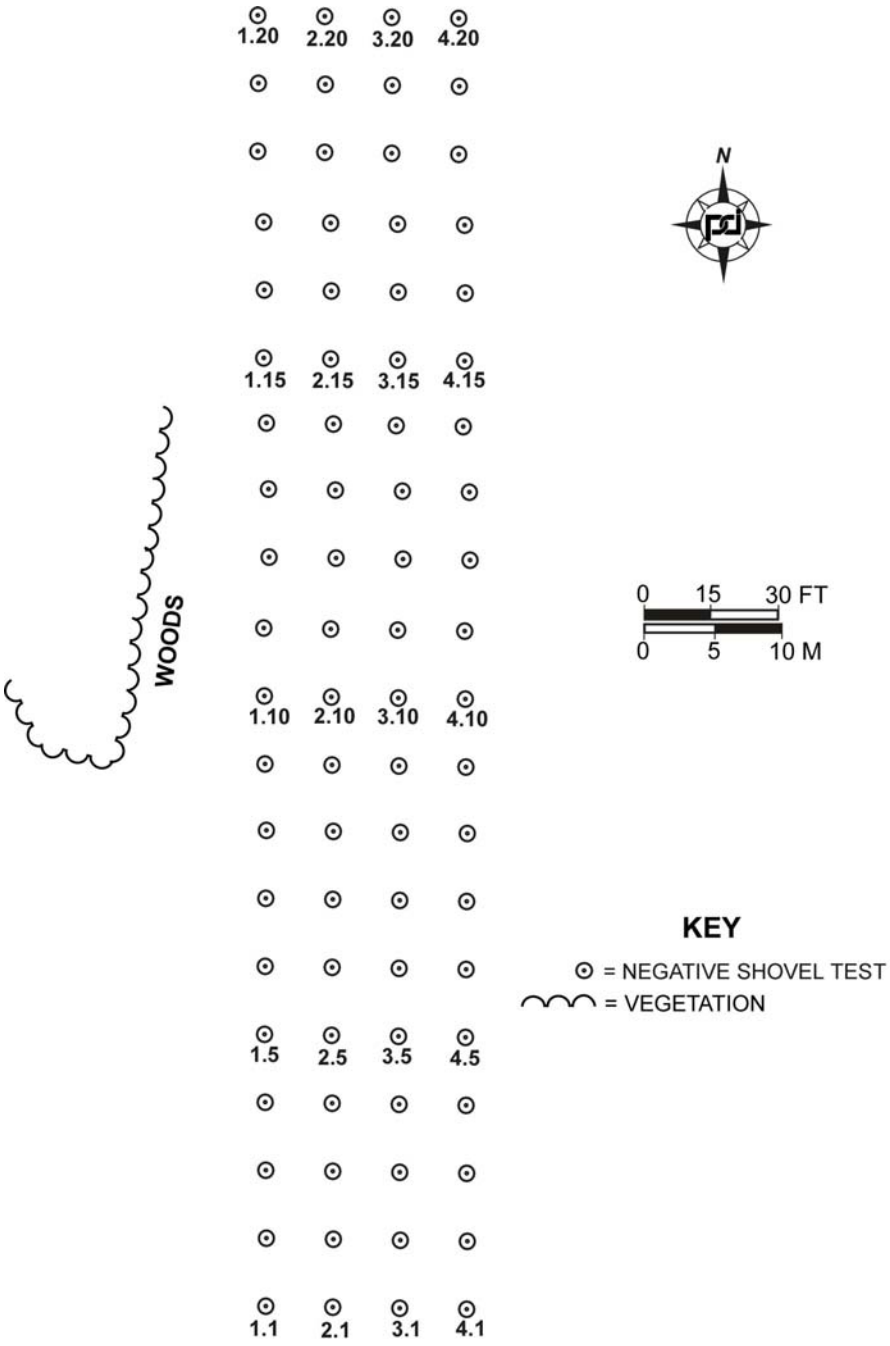


Figure 4.41. Shovel testing in southern portion of Linear 30.

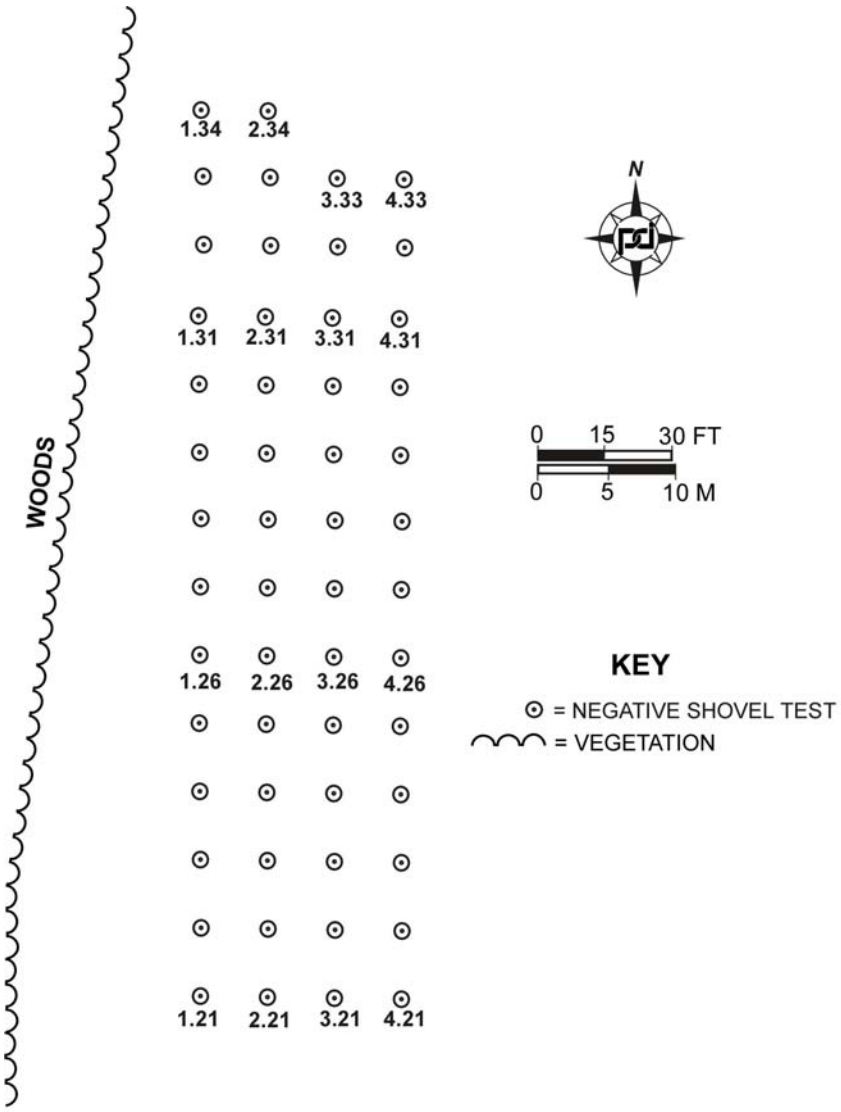


Figure 4.42. Shovel testing in northern portion of Linear 30.

4.5 LOCAL HABITAT AREA 5

Local Habitat Area 5 consists of topographical features identified as *upland margin*. The following turbine and linear section within LHA-5 environs were shovel tested during the Phase IB investigation and are described below:

Turbine Surveys: T66

Linear Surveys: L-29

Turbine Survey within Local Habitat Area 5

Turbine 66. This turbine is located on the south side of Route 39 at an approximate elevation of 1,300 ft (400 m) amsl (see Figure 4.1). Seventy-five percent of the APE is located on active agricultural land. The southeastern portion of the APE is within a wooded area (Appendix A: Photograph 23). Erosion has exposed many large rocks on slopes over 15 percent within the tree line. The wooded area is fenced and used as part of a cow pasture. The agricultural field appears to have recently been fallow, covered with tall grass and alfalfa. The northern border of Turbine 66 had recently been plowed approximately to the depth of the topsoil (30 to 40 cm / 12 to 16 in deep).

A total of 324 shovel tests were dug within Turbine 66 (Figure 4.43). Two soil strata were identified. Stratum 1 was typically dark grayish brown silt or silty loam, reaching an average depth of 29 cm (11 in). Stratum 2 was varied, consisting of either yellowish brown silty clay or clay loam or a mottled yellowish brown with light brownish gray clay loam, reaching an average terminal depth of 40 cm (16 in). Six shovel tests contained rocks, cobble or gravel. Twenty-one shovel tests were terminated at Stratum 1 due to a rock impasse.

One undecorated whiteware fragment was found in STP 4.1 (Stratum 1). No radials were dug due to the non-diagnostic nature of the find and the presence of negative tests at 5-m (16-ft) interval in proximity of the positive test. No other cultural materials were found in the shovel tests of Turbine 66.

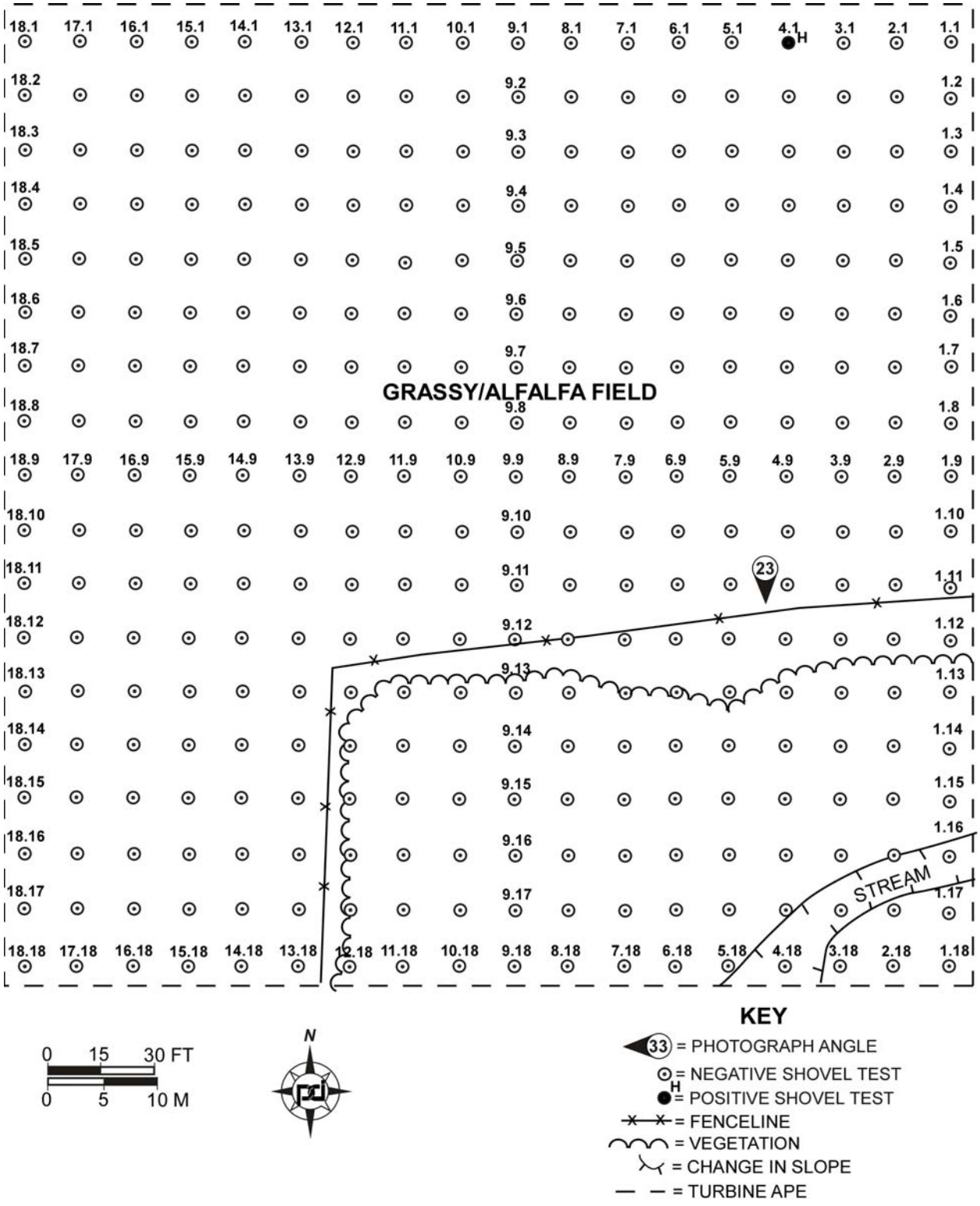


Figure 4.43. Turbine 66 shovel test transect locations.

Linear Survey within Local Habitat Area 5

Linear 29. This linear survey tested a portion of a proposed transmission line located east of the intersection of Hopper Road and NYS Route 39 (see Figure 4.1). There are no map-documented structures within or in proximity of Linear 29. This linear survey was selected to test the local habitat area.

The APE is aligned south to north and is divided into two segments. The south segment starts on the north side of NYS Route 39, extending 278 ft (85 m) north. This portion of the APE is located on a former agricultural field covered with tall grass and limited amounts of brush. A footpath is across the APE between STPs 1.16 and 1.17 and 2.15 and 2.16. The linear location was truncated at STPs 1.17 and 2.17 due to thick brush and extensive standing water which continued northward to the south side of Hopper Road.

The APE was extended and the linear was re-established on the north side of Hopper Road. The north segment of Linear 29 is located in a fenced pasture and is 113 m (370 ft) long. A wire fence is located approximately 30 ft (10 m) west of the centerline of the linear. As the linear continues north, the APE follows an unpaved access road that is obscured by vegetation. Slope was in excess of 25 percent at the north extent of APE, where there was a ravine. The linear was not re-established for further testing due to property line constraints.

A total of 182 shovel tests were dug along two transects on Linear 29 (Figures 4.44 to 4.48). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 26 cm (10 in). Stratum 2 consisted of a mottled yellowish brown and light grayish brown sandy silt or sandy loam and yellowish brown sandy silt or silty loam, reaching an average depth of about 40 cm (16 in). Eleven shovel tests were terminated at Stratum 1 due to rock impasses, and one shovel test was terminated at Stratum 1 due to water filling the pit (see Appendix A: Shovel Test Log). Seventeen shovel tests contained rock or gravel, one contained eroded sandstone, and two were disturbed. No cultural materials were found and no evidence of historic or prehistoric features was identified within the APE.

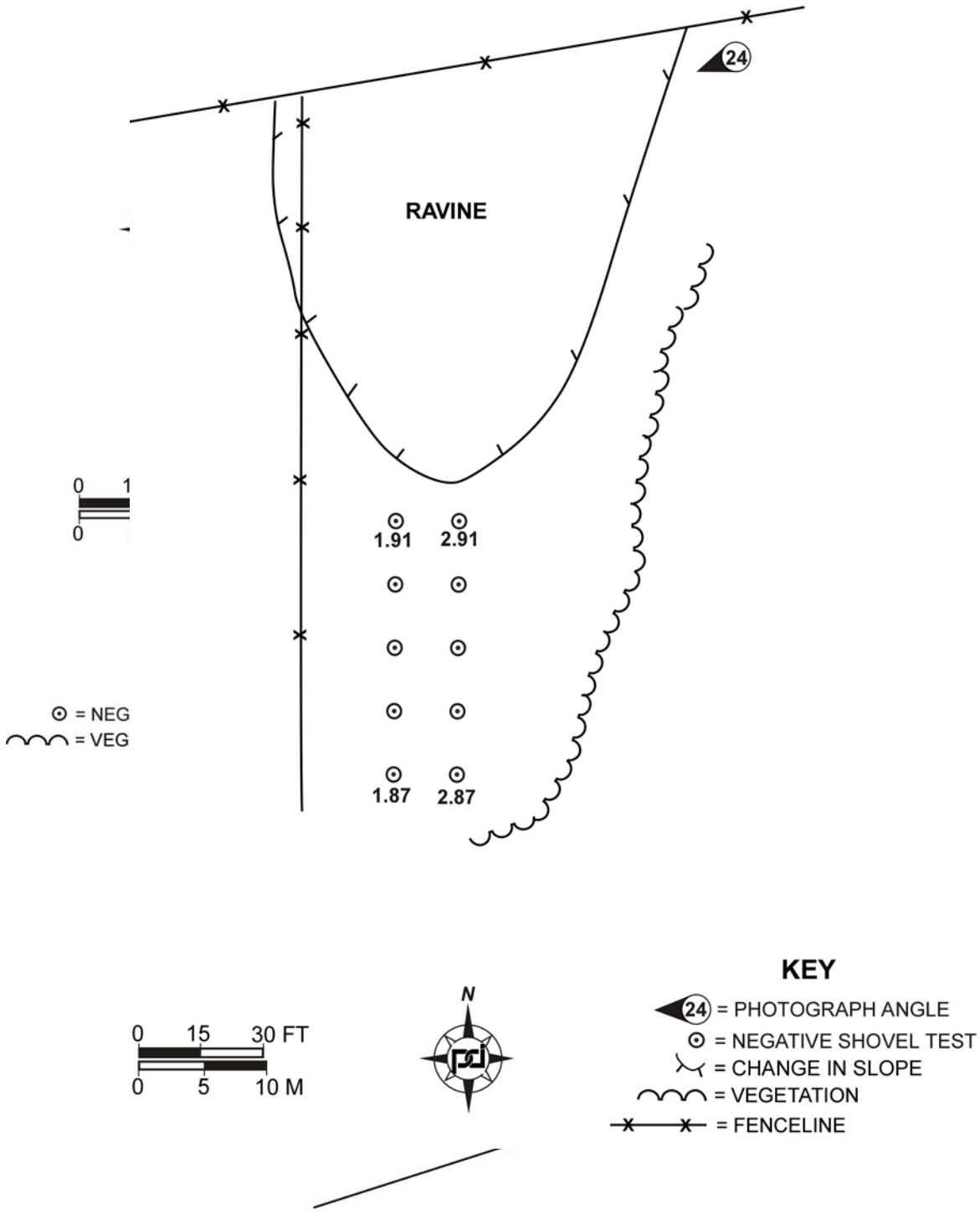


Figure 4.44. Shovel testing at southern portion of Linear 29 (between NYS Route 39 and Hopper Road).

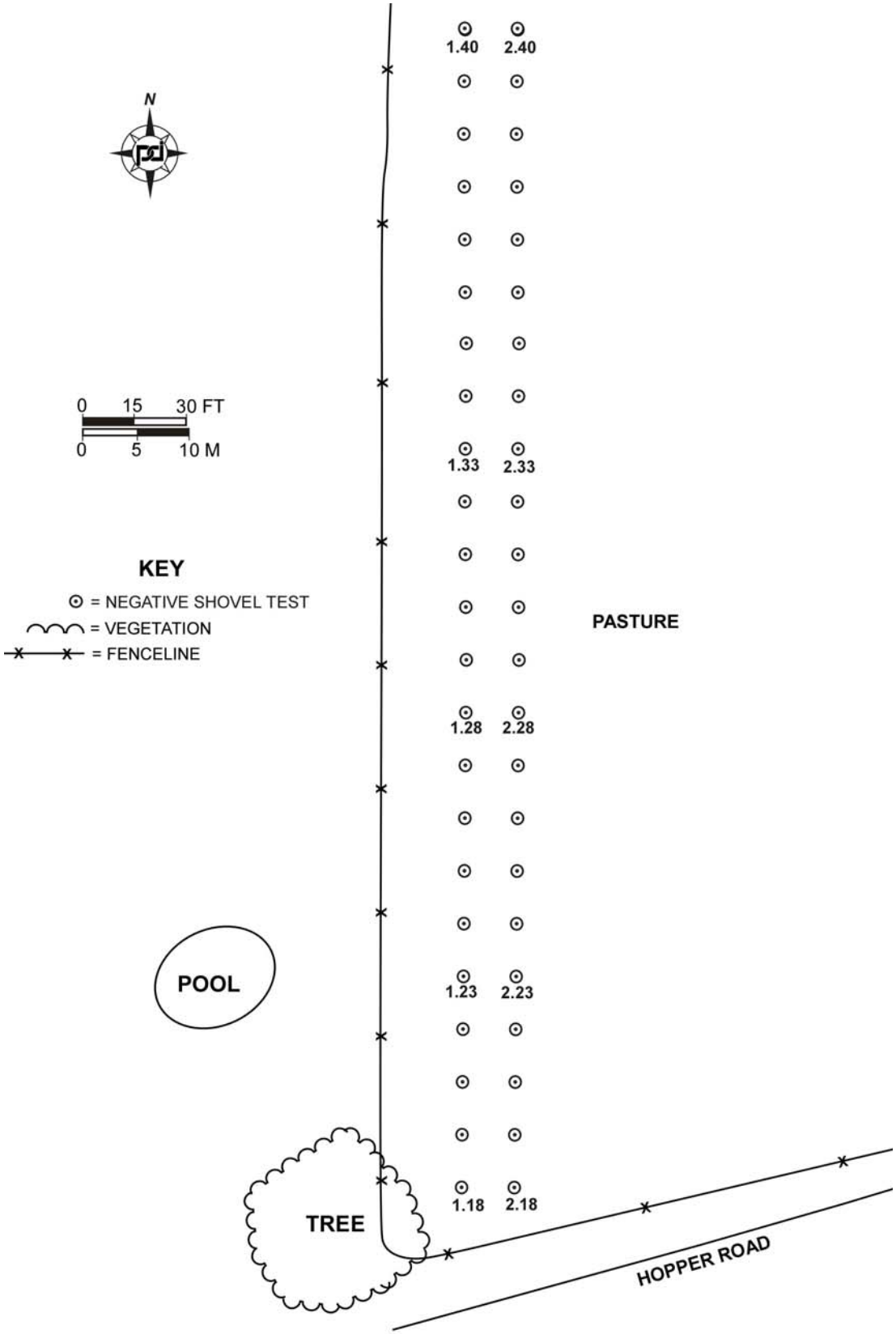


Figure 4.45. Shovel testing at Linear 29, north of Hopper Road.

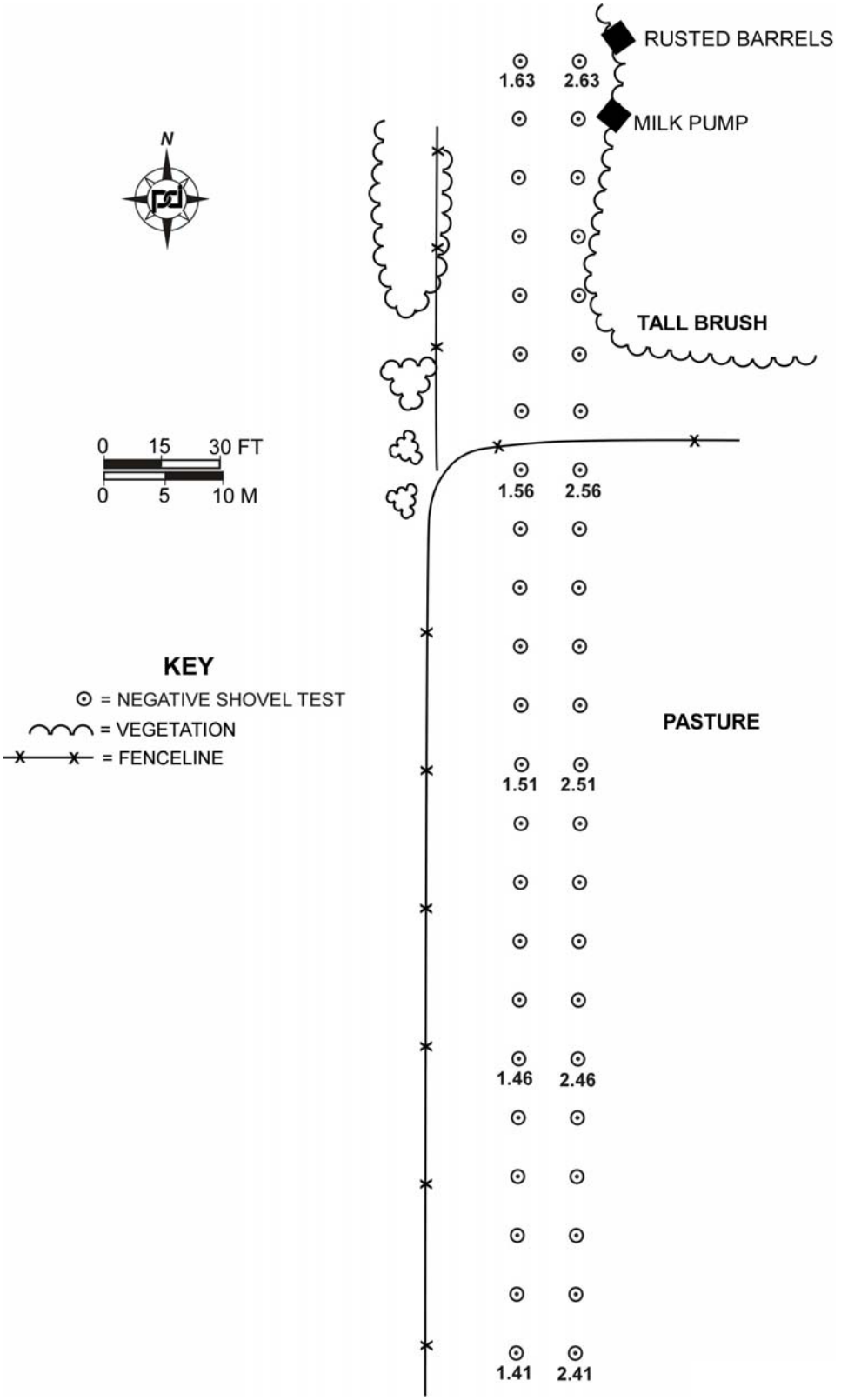


Figure 4.46. Shovel testing at Linear 29 (north-central portion).

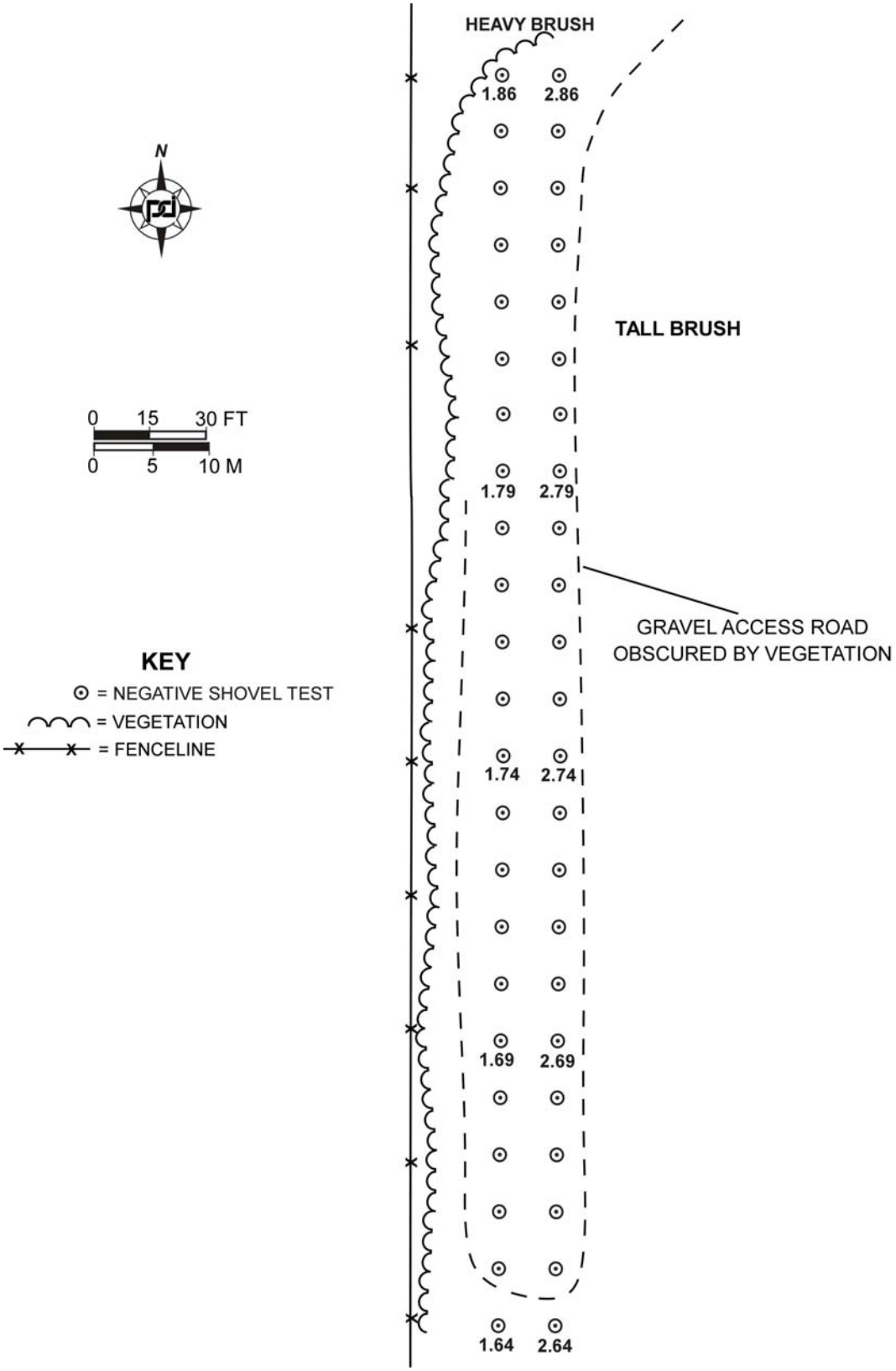


Figure 4.47. Shovel testing at Linear 29 (north portion).

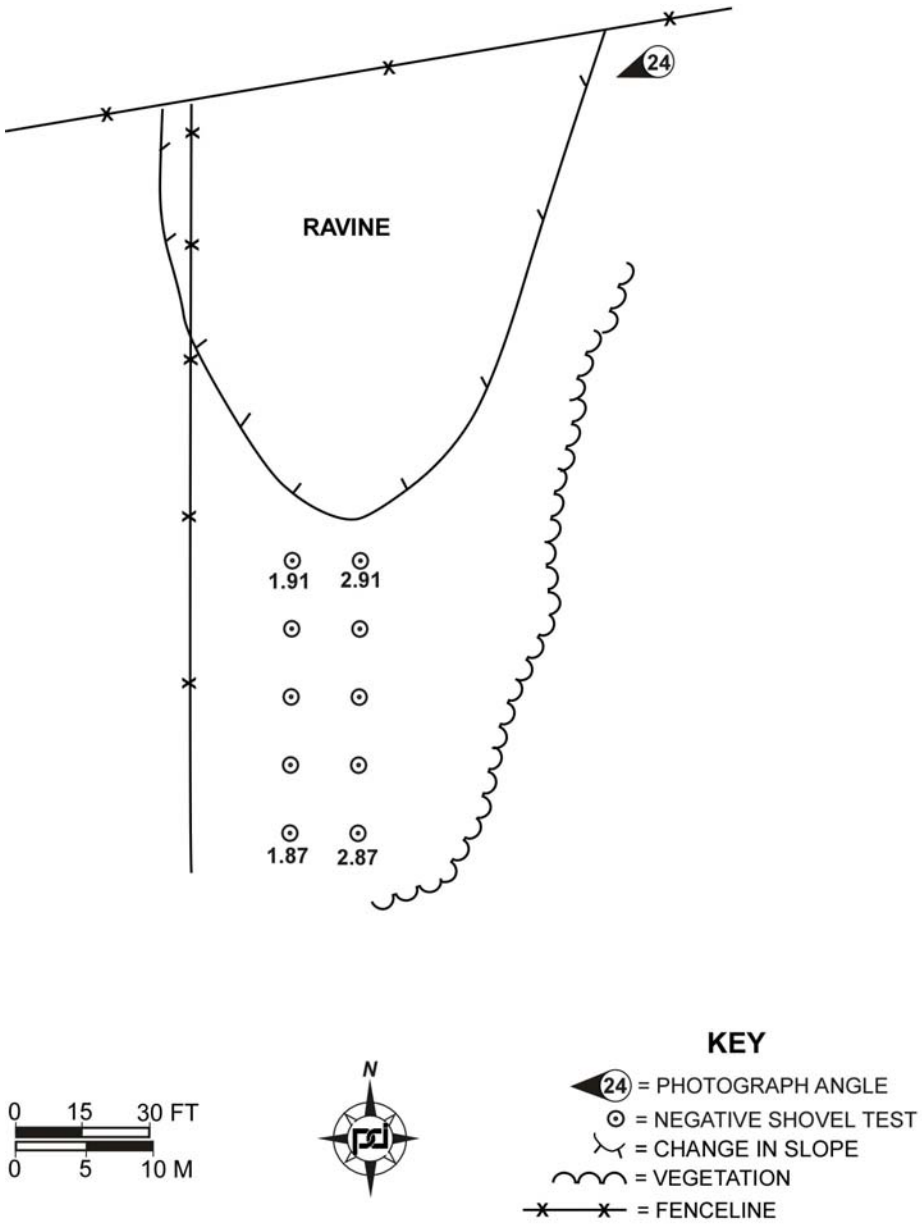


Figure 4.48. Shovel testing at Linear 29 (northern end).

4.6 LOCAL HABITAT AREA 6

Local Habitat Area 6 consists of topographical features identified as *Lake Plain*. The following linear section within LHA-6 environs was shovel tested during the Phase IB investigation and is described below:

Linear Surveys: L/MDS-26

Linear Survey within Local Habitat Area 6

Linear 26. This linear survey tested a portion of a proposed access road located near MDS 26, on the southeast side of the intersection of Overhiser and Dennison Roads (see Figure 4.1). The APE appears to be in an area collecting runoff. Much of the APE has pockets of standing water or extremely saturated soils. There are cattails and soils over the APE and surrounding area. MDS 26 was a structure shown on the 1900 map (see Figure 4.6). No structure is shown in this location on either of the earlier referenced historic maps.

A total of 40 shovel tests were dug along two transects on Linear 26 (Figure 4.49). Two soil strata were identified. Stratum 1 was typically dark grayish brown silty loam, reaching an average depth of 28 cm (11 in). Stratum 2 consisted of a mottled gray and yellowish brown silty loam or clay loam, reaching an average terminal depth of 38 cm (15 in). Fifteen tests were terminated at Stratum 1 due to water filling the pit (see Appendix A: Shovel Test Log). Seven tests had water seepage. No cultural materials were found in the shovel tests of Linear 26. No evidence of MDS 26 was found within the shovel tests of Linear 26.

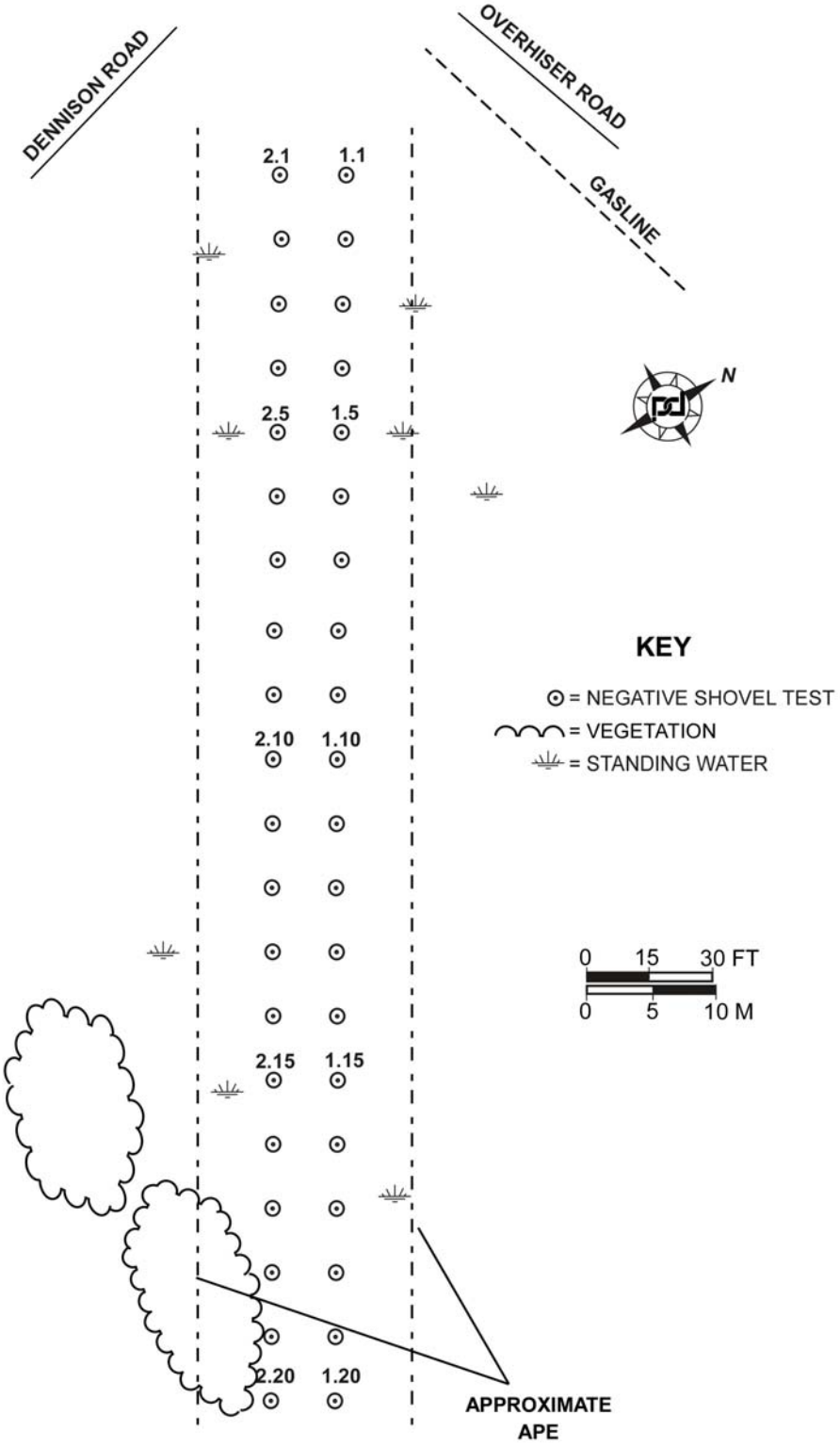


Figure 4.49. Shovel test locations at Linear 26.

5.0 Conclusions and Recommendations

5.1 CONCLUSIONS

Following NYSHPO survey guidelines for wind power projects (NYSHPO 2006), the Phase IB field investigation shovel tested a sample (n=16) of the 60 proposed wind turbine locations and 21 segments of proposed linear component routes (e.g., proposed access roads, collection lines, transmission line). A total of 6,096 shovel tests were dug initially at five-meter intervals. An additional 16 shovel tests were dug at close intervals (1 and 3 meter). Seventy-two additional shovel tests (60 STPs at 5-meter and 12 at 10-meter intervals) were dug to further delimit historic site PCI/Ball Hill-1. Despite the large number of shovel tests excavated throughout the project area only two prehistoric artifacts (both lithic debitage) were found. These were determined to be isolated/stray finds due to the negative results of close-interval shovel testing surrounding each findspot. Although neither findspot is considered an archaeological site, an OPRHP Site Form has been completed to include both locations. Two historic archaeological sites were found during this investigation. A few scattered historic and modern artifacts were also found in various parts of the APE but they were isolated and found within the plow zone. These unremarkable artifacts were found in areas adjacent to roads where such materials are common.

Historic Conclusions. As presented in Section 3.1.4, the proposed turbine locations are generally set in agricultural fields well behind locations of existing and map-documented farmsteads and, therefore, the likelihood for historic sites was low and the negative results of the field investigation are not surprising. A total of 19 MDS locations are in proximity to linear components of the APE. Most of these did not contain intact cultural deposits (e.g., artifacts found in context) or features (e.g., foundations). A listed summary of results at each MDS is as follows:

- *MDS 1 (Linear 1).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 2 (Linear 2).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 3 (surveyed at Linear 3).* An MDS is shown on three historic maps. In 1867, the owner is identified as T. Bayley and in 1881 it is E. Bagley. It also appears on the USGS topographic map from 1900. A historic site was found here during the present investigation and designated PCI/Ball Hill-1 until it is assigned an OPRHP site number. A foundation, probably a remnant of this MDS, is adjacent to the original APE. Fourteen of the shovel tests dug in the original APE adjacent to the foundation were positive: to the east, southeast, and southwest of the foundation (see Figure 4.23). Using diagnostic artifacts found (e.g., whiteware, ironstone, yellow ware, Phillips' Milk of Magnesia bottle) and historic maps, the site appears to date from the late nineteenth century and was occupied into the first half of the twentieth century.

  The proposed location of the access road was moved to avoid this site. Additional shovel testing and surface inspection was conducted to determine the boundaries of this historic site including 72 STPs dug between the original positive STP locations and the newly proposed access road location. None of these tests were positive but additional

historic artifacts (n=37) were found on the surface in proximity of the original positive STP locations. A total 57 artifacts (mostly undecorated ironstone sherds) associated with MDS 3 were found during the Phase I investigation. The results of the shovel testing and surface inspection show that the site is now 52 meters (171 ft) north of the proposed access road's APE.

- *MDS 4 (surveyed at Linear 4).* This MDS is shown on historic maps from 1867 and 1881 as belonging to L. Jones (see Figures 2.2 and 2.4). It is also shown on the 1900 USGS topographic map. An existing building possibly representing this MDS is about 50 ft (15 m) east of STP 1.6 and may be the structure shown on these maps. This building is vernacular architecture with new aluminum windows and deteriorating modern siding. The foundation appears to be covered with concrete, so that the original foundation was not visible. Artifacts were found in the shovel tests dug in vicinity to the extant structure but they are non-diagnostic or modern. The proposed construction of an access road will not impact cultural resources as there is no site within the 60-ft wide APE.

- *MDS 5 (Linear 5).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 6 (surveyed by Linear 6).* The MDS is shown on the historic map from 1867, attributed to H. Sharp, but is not shown on subsequent maps. No evidence of this structure was within the APE and no cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. Modern, clear bottle glass was found in one STP. The APE either misses the MDS or there are no associated remains.

- *MDS 7 (surveyed by Linear 7).* The MDS is shown as belonging to O. Crowill in 1867 and B. Warner in 1881. This structure is not shown on the 1900 USGS topographic map. No evidence of this structure was found within the APE during the present field survey. A single piece of clear glass was found in one shovel test. No other cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 8 (surveyed by Linear 8).* The MDS is shown as belonging to M. Stearns on both the 1867 and 1881 historic maps, but does not appear on the 1900 USGS topographic map. No evidence of this structure was within the APE and no cultural materials were found during the present field survey. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 9 (surveyed by Linear 9).* The MDS includes a structure attributed to R. Werner in 1867 and a structure shown in the same location on the USGS topographic map from 1900. There is no structure shown at this location on the Beers map from 1881. A piece of non-diagnostic whiteware was found in one shovel test. No other cultural materials were found and no evidence of historic or prehistoric features was identified. The historic or modern whiteware ceramic is interpreted as an isolated find. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 10 (surveyed by Linear 10)*. The MDS is attributed to W. Eamons in 1867, but is not shown in 1881. There is a structure in this approximate location in 1900 (see Figure 4.2). No evidence of this structure was found within the APE during the field survey and no cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 11 (surveyed by Linear 11)*. The MDS is shown on the Stewart map from 1867 (attributed to JW) and the Beers map from 1881 (attributed to C. Wooley). This structure was not shown on the USGS topographic map from 1900. No evidence of this structure was found within the APE during the field survey and no cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 12 (Linear 12).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 13 (surveyed by Linear 13)*. The MDS is attributed to L. Congdon in 1867 and 1881 and appears to be represented on the USGS topographic map from 1900. A historic site was found here during the present Phase I investigation and designated PCI/Ball Hill-2 until it is assigned an OPRHP site number. A partially intact cut-stone foundation was identified within the eastern half of the original APE. It has been disturbed with portions of the walls not intact (see Appendix A: Photograph 15). Based on diagnostic ceramic artifacts found at the site (e.g., redware, whiteware, black matter glaze, salt-glazed stoneware, molded ironstone, molded green glazed art pottery, blue hand-painted pearlware, undecorated pearlware with a maker's mark) and historic maps, the site appears to date from the late nineteenth century and was occupied into the first half of the twentieth century. Shovel testing across the APE did not identify any features associated with this MDS other than the foundation (see Figure 4.30).

  The proposed location of the collection line was moved to avoid this site. It is no longer within or adjacent to the project APE. The APE is now more than 580 ft (177 m) north of the archaeological site. No MDSs or archaeological sites have been recorded within or near the newly proposed access road location.

- *MDS 14 (surveyed by Linear 14)*. The MDS is attributed to L. Congdon (a second MDS with the same name as MDS 13) in 1867 and 1881 and appears to be represented on the USGS topographic map from 1900. An approximately 85-ft (26-m) diameter cluster of trees with piles of field stones, modern debris, and discarded appliances within the APE is the location of the former building. The structure had been torn down and infilled circa 1950 (personal communication, James Congdon, property owner). A single modern piece of glass was found in STP 2.7 (discarded in the field). No other cultural materials were found in any of the shovel tests. The foundation is not visible and the location has been used as a general dump for modern farm debris (see Appendix A: Photograph 17). This location has not been designated an archaeological site due to low research potential exhibited by the negative shovel test results.

- *MDS 15 (surveyed by Linear 15)*. The MDS appears on only the 1867 map and is labeled J. Hamlin. It is not shown on the 1881 map or the 1900 USGS topographic map. No surface evidence of this structure was found during the field investigation. A single

piece of modern clear glass was found in STP 1.13. No other cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The MDS may not have been in or immediately adjacent to the APE, given its very early historic map representation. The APE either misses the MDS or there are no associated remains. Therefore, no further investigation is recommended.

- *MDS 16 (surveyed by Linear 16)*. The MDS is a structure shown on all three historic maps. Although this MDS appears to have changed location (farther south) between 1867 and 1881, the existing structure located to the immediate west of the unpaved access road, and outside the APE, is most likely the structure shown on both maps. Early cartographic techniques were less precise than what is now achieved and map locations may be understood as general representations. In 1867 this structure is attributed to S. Parsell and in 1881 it is labeled L. Jones. The structure is also shown on the USGS topographic map from 1900. The current land owner, Mr. Rich Brunea, stated that the house was built in 1847, which is consistent with the historic map analysis. The house has not maintained integrity since there are several modifications and additions. Nearby outbuildings are not located within the APE. Shovel testing across the APE did not identify any features or artifacts associated with this structure.

- *MDS 17 (surveyed by Linear 17)*. The MDS is a structure attributed to W. Frank in 1881. No structure is shown in this location on the 1867 map or the USGS topographic map from 1900. No historic features were found and no prehistoric artifacts were identified within the APE. Artifacts found in three shovel tests appear to represent a scatter of nineteenth and twentieth century refuse commonly found along the edge of roads in agricultural fields. It does not appear to indicate the presence of an archaeological site.

- *MDS 18 (surveyed by Linear 18)*. The MDS is a second structure attributed to W. Frank in 1881 (who also owns the property on which MDS 17 was located). No structure is shown on the 1867 map or the USGS topographic map from 1900. A piece of blue shell-edge whiteware was found in STP 2.3. This artifact is interpreted as an isolated find. No other cultural materials were found. Shovel testing across the APE did not identify any features associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 19 (Linear 19).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 20 (Linear 20).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 21 (surveyed by Linear 21)*. The MDS is a structure attributed to M.A. Ball in 1881. No structure is shown on the 1867 map or the USGS topographic map from 1900. No evidence of the MDS was within the APE and no cultural materials were found. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 22 (surveyed by Linear 22)*. The MDS is a structure attributed to A. Hamlin in 1881 and appears to also be shown on the USGS topographic map from 1900. No structure is shown on the 1867 historic map. No evidence of the MDS was within the APE and no cultural materials were found. Shovel testing across the APE did not identify any

features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 23 (surveyed by Linear 23)*. The MDS is found on the 1867 map and also on the 1900 USGS topographic map. The structure does not appear on the 1881 map. A stand of trees with standing water was present to the east of the linear which may coincide with the MDS location, but no aboveground or subsurface evidence of the MDS was found within the APE during the Phase I field investigation. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 24 (Linear 24).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 25 (Linear 25).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 26 (surveyed by Linear 26)*. The MDS is shown on the USGS topographic map from 1900. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

- *MDS 27 (Linear 27).* This location is now outside the APE. The project was redesigned during the field survey.

- *MDS 28 (surveyed by Linear 28 and 28a)*. The MDS is attributed to R. Sharp in 1881. Shovel testing across the APE did not identify any features or artifacts associated with this MDS. The APE either misses the MDS or there are no associated remains.

Prehistoric Conclusions/Local Habitat Area Discussion. The two stray prehistoric artifacts were found approximately 1,320 ft (402 m) apart. Although found in the same general area, one lithic flake was found in the *Uplands between Summits and Knolls* LHA (at Turbine 42) and the other was within the *Summits and Knolls and Ridges* LHA. Both artifacts are debitage that were likely the byproduct of tool finishing done by a small hunting or gathering expedition in the uplands. Described as a Camp or Workshop, Prehistoric Site 01326.000001 (UB 2217 [Villenova 3]) was previously identified approximately 3,000 ft (910 m) west of these stray finds in the *Uplands between Summits and Knolls* LHA. All three locations occupy part of a large peninsula-shaped upland overlooking lowland valleys to the southwest and east. No additional prehistoric artifacts were found during investigation of other locations between these valleys (e.g., Turbines 31, 32, Linears 15, 22, 28, 28a and 30).

A comparison of site type or frequency between LHAs is not practical due to the low number of artifacts found in the project area and the large proportional differences for the APE relative to LHAs. Nearly 70 percent of the APE is in the *Uplands between Summits and Knolls* LHA. Therefore, the results cannot be readily compared between LHAs on an intra-project level. A comparison of the results between various archaeological investigations might become feasible as similar landforms and LHAs are investigated.

5.2 RECOMMENDATIONS

No State or National Register-listed or -eligible archaeological resources will be impacted as a result of the proposed project. No prehistoric sites were found within the APE. The two isolated prehistoric artifacts are not associated with additional materials and further investigation will not likely produce positive results. The two historic sites found during this investigation are no longer within the project APE. Site PCI/Ball Hill-1 will now be avoided by more than 50 meters (164 ft). Site PCI/Ball Hill-2 is more than 177 m (580 ft) from the newly proposed north APE. A Phase II investigation conducted to determine NRHP eligibility, however, is recommended if the project layout returns to the original configuration.

Consideration of Project Design Changes. As discussed in Section 3.1.7, the design of the proposed windpark was continually modified during this investigation and the APE was reduced from 411.7 acres to 374.6 acres during the field investigations. This difference is primarily due to the removal of six turbines and associated access roads and interconnects from the project design. The final quantity of shovel tests dug per local habitat area varies slightly from the testing plan due to project redesign concurrent with fieldwork and property access limitations. Testing discrepancies were largest in Local Habitat Areas comprising the smallest percentage of the APE. Therefore, there should be minimal negative effects to the research design. A comparison of the design changes is presented in Figure 5.1 (also see Table 3.1).

As discussed in Section 3.1.1, the total APE now includes 400.61 acres due to additional project redesign since completion of fieldwork. Therefore, nearly 20 acres of APE need to be surveyed. The excavation of an additional 314 shovel tests will account for this difference in APE. As discussed, the results of the additional fieldwork will be submitted as an addendum to this report.

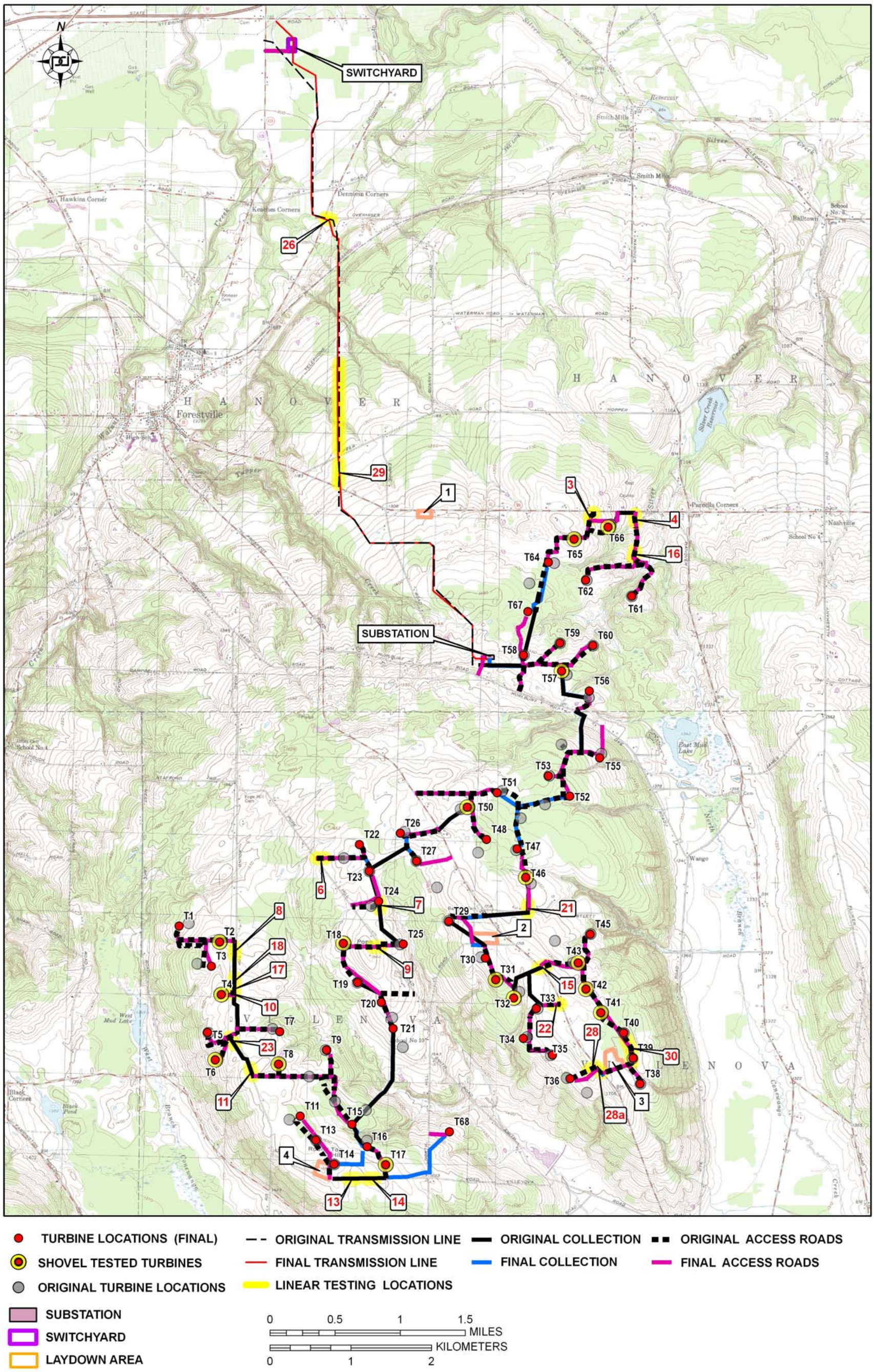


Figure 5.1. The Ball Hill Windpark project area showing original alignment and revised alignment *(USGS Perrysburg, NY 1980; Forestville, NY 1980).*

6.0 References

Abler, Thomas S., and Elisabeth Tooker

1978 Seneca. In *Northeast*, edited by Bruce G. Trigger, pp. 505-517. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Adams, William

1893 *Historical Gazetteer and Biographical Memorial of Cattaraugus County, New York.* Lyman, Horton & Company, Ltd, Syracuse.

Beauchamp, William M.

1900 *Aboriginal Occupation of New York*. New York State Museum Bulletin 7(32). Albany.

Beers, D.G., J.H. Goodhue, and E.F. Sanford

1869 *Atlas of Cattaraugus County, New York*. D.G. Beers & Co., New York.

Beers, Frederick W.

1881 *Illustrated Historical Atlas of the County of Chautauqua, New York*. F.W. Beers, New York.

Callahan, Errett

1979 The Basics of Biface Knapping in the Eastern Fluted Point Tradition, A Manual for Flintknappers and Lithic Analysts. In *Archaeology of Eastern North America*, Volume 7, No. 1. Braun Brumfield, Inc.

Chautauqua History Company

1904 *The Centennial History of Chautauqua County*. Chautauqua History Company, Jamestown, NY.

Clune & Johnson

1987 *Archaeological Survey of the Proposed Rock Ridge Mine Site, Town of Villenova, Chautauqua County, New York*. Clune & Johnson, np.

Crawford, G.W., D.G. Smith, and V.E. Bowyer

1997 Dating the Entry of Corn (*Zea mays*) into the Lower Great Lakes Region. *American Antiquity* 62:112-119.

Cressey, George B.

1966 Land Forms. In *Geography of New York State*, edited by John H. Thompson, pp. 19-53. Syracuse University Press, Syracuse.

de Laubenfels, David J.

1966 Vegetation. In *Geography of New York State,* edited by John H. Thompson, pp. 90-103. Syracuse University Press, Syracuse.

Dent, Richard J.

1991 Archaeology in the Upper Delaware Valley: The Earliest Populations. In *The People of Minisink*, edited by D.G. Orr and D.V. Campana, pp. 117-144. National Park Service, Philadelphia.

Doty, William J., Charles E. Congdon, and Lewis H. Thornton
1940 *The Historic Annals of Southwestern New York*. 3 vols. Lewis Historical Publishing Co., Inc., New York.

Downs, John P., and Fenwick Y. Hedley, eds
1921a History of Hanover, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-hanover.htm, [accessed February 14, 2008]

1921b History of Villenova, NY. In *History of Chautauqua County, New York, and Its People.* John P. Downs, Editor-in-Charge, and Fenwick Y. Hedley, Editor-in-Chief. American Historical Society, Inc., Boston. Ray's Place Explore New England's Past Website, np, [online www]. Available URL: "http://www.rays-place.com/ny/chau-villenova.htm, [accessed February 14, 2008]

Edson, Obed
1894 *History of Chautauqua County, New York. Edited by Georgia Drew Merrill.* W.A. Ferguson & Co., Boston.

Ellis, David M., James A. Frost, Harold C. Syrett, and Harry J. Carmen
1967 *A History of New York State.* Cornell University Press, Ithaca, NY.

Ellis, Franklin
1879 *History of Cattaraugus County, New York*. L.H. Everts, Philadelphia.

Emans, Rebecca J.
2007 *Tribalization, Ethnic Formation, and Migration on the Allegheny Plateau of Southwestern New York*. Unpublished Ph.D dissertation, Department of Anthropology, State University of New York at Buffalo.

Engelbrecht, William E.
2003 *Iroquoia: The Development of a Native World.* The Iroquois and Their Neighbors series. Syracuse University Press, NY.

Engelbrecht, William, Eric G. Hansen, James Hartner, Elaine B. Herold, and John D. Holland
1993 *Prehistory of Western New York*. The Archaeological Survey, Department of Anthropology, State University of New York at Buffalo and The Frederick M. Houghton Chapter, New York State Archaeological Association, Buffalo.

Feder, Kenneth L.
1984 Pots, Plants, and People: The Late Woodland Period in Connecticut. *Archaeological Society of Connecticut Bulletin* 47:99-111.

Fitting, James E.
1968 Environmental Potential and the Postglacial Readaptation in Eastern North America. *American Antiquity* 33(4):441-445.

Fletcher, Stevenson Whitcomb
1971 *Pennsylvania Agriculture and Country Life, 1640-1840*. Second printing (First printing 1950). Pennsylvania Historical and Museum Commission, Harrisburg.

Funk, Robert E.
1972 Early Man in the Northeast and the Late Glacial Environment. *Man in the Northeast* 4:7-42.

1978 Post-Pleistocene Adaptations. In *Northeast*, edited by Bruce G. Trigger, pp. 16-27. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1991 The Middle Archaic in New York. *Journal of Middle Atlantic Archaeology* 7:7-18.

1993 *Archaeological Investigations in the Upper Susquehanna Valley, New York State, Volume 1*. Persimmon Press, Buffalo.

Geo-Marine Inc.
2002 *Phase 1A and 1B Cultural Resources Survey Farnham (7/1:3) and Gould (7/1:4) Projects, Chautauqua County, New York*. Geo-Marine Inc., Plano, TX.

Goldman, Mark
1983 *High Hopes; The Rise and Decline of Buffalo, New York*. State University of New York Press, Albany.

Gramly, Richard M.
1977 Deerskins and Hunting Territories: Competition for a Scarce Resource in the Northeast. *American Antiquity* 42:601.

Gramly, Richard M., and Robert E. Funk
1990 What is Known and Not Known About the Human Occupation of the Northeastern United States Until 10,000 B.P. *Archaeology of Eastern North America* 18:5-32.

Guthe, Alfred K.
1958 *The Late Prehistoric Occupation in Southwestern New York: an Interpretive Analysis.* Research Records No. 11, Rochester Museum of Arts and Sciences, Rochester, New York.

Hart, John P.
1999 “Dating Roundtop’s Domesticates: Implications for Northeast Late Prehistory.” In *Current Northeast Paleoethnobotany*, edited by John P. Hart, 47-68. New York State Museum Bulletin 494. State Education Department, Albany.

2000 New Dates from Classic New York Sites: Just How Old are Those Longhouses? *Northeast Anthropology* 60:1-22.

Hart, John P., and Hetty Jo Brumbach
2003 The Death of Owasco. *American Antiquity* 68(4):737-752.

Hart, John P., Robert G. Thompson, and Hetty Jo Brumbach
2003 Phytolith Evidence for Early Maize (*Zea Mays*) in the Northern Finger Lakes Region of New York. *American Antiquity* 68(4):619-640.

Hartner, James E., and Benjamin Nelson
1985 Cultural Resources Survey of Gaslines 6310 and 6311 in the Town of Villenova, Chautauqua County, New York. *Reports of the Archaeological Survey*, State University of New York at Buffalo.

Hutchins, Francis G.
2004 *The Iroquois, New York and Federal Tribal Policy*. Oneida Indian Land Claim Information Site, Madison County, New York, home page, Wampsville, NY [formerly online]. Not readily available URL: http://www.madisoncounty.org/motf/OINTrustMain.html. On file, Historian's Office, Panamerican Consultants, Inc. Buffalo.

Kraft, Herbert
1986 *The Lenape: Archaeology, History, and Ethnology*. The New Jersey Historical Society, Newark.

Leet, Ernest D.
1980 *History of Chautauqua County New York 1938-1978.* Chautauqua County Historical Society, Westfield, NY.

MacNeish, Richard S.
1952 *Iroquois Pottery Types: A Technique for the Study of Iroquois Prehistory*. National Museum of Canada, Bulletin 124, Anthropological Series No. 31. The Minister of Resources and Development, Ottawa.

Mason, Ronald J.
1981 *Great Lakes Archaeology.* Academic Press, New York.

Miller, G.L.
2000 Telling Time for Archaeologists. *Northeast Historical Archaeology* 29:1-22.

Munger, William P. (editor)
1941 *Historical Atlas of New York State*. Franke E. Richards, Publisher, Phoenix, NY.

Munsey, Cecil
1970 *An Illustrated Guide to Collecting Bottles.* Hawthorn Books, Inc., New York.

New York Archaeological Council (NYAC)
1994 *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York State*. New York Archaeological Council, Albany, NY.

New York State Historic Preservation Office (NYSHPO)
2006 *Guidelines for Wind Farm Development Cultural Resources Survey Work*. New York State Historic Preservation Office, Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.

nd State Preservation Historical Information Network Exchange (SPHINX) Access Web Page. New York State Office of Parks, Recreation, and Historic Preservation, Peebles Island, Waterford [online www]. Available URL: "http://www.nysparks.com/shpo/resources/index.htm" [accessed February 13, 2008].

New York State Museum
2004 *Artifact Cataloging Catalog, Cultural Resource Survey Program. Policies and Procedures for the Archaeological Collections of the New York State Museum*. Anthropological Survey, Albany, New York. Developed by M. Pickands and A. Lain. Expanded by J. Pasquini and T. Thomas.

Noël Hume, I.
1969 *A Guide to Artifacts of Colonial America*. Alfred A. Knopf, New York.

Parker, Arthur C.
1922 *The Archaeological History of New York*. New York State Museum Bulletin Nos. 235-238. Albany.

Pearson, C.S., J.C. Bryant, W. Secor, S.R. Bacon, C. Lounsbury, W.J. Camp, and C.B. Beadles
1940 *Soil Survey, Cattaraugus County, New York*. U.S. Department of Agriculture, Bureau of Plant Industry, Washington, D.C. in Cooperation with the Cornell University Agricultural Experiment Station.

Preservation League of New York State
2001 Seven to Save 2000. Preservation League of New York State website , Albany [online www]. Available URL: "http://www.preservenys.org/seven2001.htm" [accessed March 13, 2008]

Prezzano, Susan C.
1988 Spatial Analysis of Post Mold Patterns at the Sackett Site, Ontario County, New York. *Man in the Northeast* 35:27-45.

Puglia, Paul S.
1994 *Soil Survey of Chautauqua County, New York*. United States Department of Agriculture, Soil Conservation Service in cooperation with the Cornell University Agricultural Experiment Station. U.S. Government Printing Office, Washington, D.C.

Ritchie, William A.
1955 The Northern Burial Cult. *Pennsylvania Archaeologist* 25:45-50.

1980 *The Archaeology of New York State*. Revised. Harbor Hill Books, Harrison, NY.

1989 *A Typology and Nomenclature for New York Projectile Points.* New York State Museum Bulletin No. 348.

Ritchie, William A., and Robert E. Funk
1973 *Aboriginal Settlement Patterns in the Northeast*. New York State Museum and Science Service Memoir No. 20. Albany.

Salwen, Bert
1975 Post-Glacial Environments and Cultural Change in the Hudson River Basin. *Man in the Northeast* 10:43-70.

Schulenberg, Janet K.
2002 “New Dates for Owasco Pots.” In *Northeast Subsistence Settlement Change AD 700-1300*, edited by John P. Hart and Christina Rieth, pp. 153-165. New York State Museum Bulletin 496. State Education Department, Albany.

Sears, William H.
1948 What is the Archaic? *American Antiquity* 14(2):122-124.

Schein, Richard H.
1993 Framing the Frontier: The New Military Tract Survey in Central New York. In *New York History* 74(1), pp. 5-28.

Smith, Ivan
2008 Timeline of the Seven Years War or Timeline of the French and Indian War. From Nova Scotia's Electric Scrapbook Webpage, Canning, Nova Scotia, Canada [online www]. Available URL: “http://www.ns1763.ca/remem/7yw-timeline-w.html” [accessed February 20, 2008]

Smith, H. Perry (editor)
1884 *History of the City of Buffalo and Erie County*. 2 vols. D. Mason & Co., Syracuse.

Snow, Dean R.
1980 *The Archaeology of New England*. Academic Press, New York.

South, S.A.
1977 *Method and Theory in Historical Archeology*. Academic Press, New York.

Spiegelman, Bob
2007 Sullivan/Clinton Campaign; Then & Now. Sullivan/Clinton Campaign website, New York [online www]. Available URL: ”http://sullivanclinton.com,” [accessed August 20, 2007].

Springfirth, Kenneth C.
1970 *Grape Belt Trolleys.* Kenneth C. Springworth, Erie, Pennsylvania.

Stelle, Lenville J.
2001 *An Archaeological Guide to Historic Artifacts of the Upper Sangamon Basin. Center For Social Research, Parkland College*.
http://virtual.parkland.edu/lstelle1/len/archguide/documents/arcguide.htm

Stevens, Sylvester K., and Donald H. Kent, eds.
2000 [1941] The Expedition of Baron de Longueuil. In *The Expedition of Baron de Longueuil*, 2nd & rev. ed for the Erie County Historical Society, Pennsylvania Historical Commission, Harrisburg. Online edition Glenn A. Black Laboratory of Archaeology, Indiana University [online www]. Available URL: “http://www.gbl.indiana.edu/archives/miamis8/M31-45_50a.html,” [accessed February 20, 2008]

Stewart, William
1867 *New Topographical Atlas of Chautauqua County, New York*. William Stewart, Publisher, Philadelphia.

Sullivan, Lynne P., editor
1996 *Reanalyzing the Ripley Site: Earthworks and Late Prehistory on the Lake Erie Plain*. New York State Bulletin, No. 489. Albany.

Sullivan, James
2004a [1927] Chapter I. The French and Indian Wars—The Struggle for Supremacy (1609-1763). In *The History of New York State*. Book XI, Part VI. Lewis Historical Publishing Company, Inc., New York. Online edition Holice B. Young, Debbie Axtman & Pam Rietsch. USGenNet web page, Rio Vista, CA [online www]. Available: "http://www.usgennet.org/usa/ny/state/his/bk11/ch1/pt6.html," [accessed February 20, 2008].

2004b [1927] Chautauqua County. In *The History of New York State.* Book V, Chapter I. Lewis Historical Publishing Company, Inc., New York. Online edition Holice B. Young, Debbie Axtman & Pam Rietsch. USGenNet web page, Rio Vista, CA [online www]. Available: "http://www.usgennet.org/usa/ny/state/his/bk5/ch1.html" [accessed 13 March 2007].

Tooker, Elisabeth
1978 The League of the Iroquois: Its History, Politics, and Ritual. In *Northeast*, edited by Bruce G. Trigger, pp. 418-441. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Trigger, Bruce G.
1978 Early Iroquois Contacts with Europeans. In *Northeast*, edited by Bruce G. Trigger, pp. 344-356. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Tuck, James A.
1978a Northern Iroquoian Prehistory. In *Northeast*, edited by Bruce G. Trigger, pp. 322-333. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Regional Cultural Development, 3000 to 300 B.C. In *Northeast*, edited by B.G. Trigger, pp. 28-43. Handbook of North American Indians, vol. 15, W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Turner, Orsamus
1974 [1850] *Pioneer History of the Holland Purchase of Western New York*. Geo. H. Derby and Co., Buffalo. Rpt edition: James Brunner, Geneseo, NY.

U.S. Geological Survey
1900 *Cherry Creek, NY. 15 Minute Series Quadrangle Maps*, U.S. Government Printing Office, Washington, D.C. Historic USGS Maps of New England & New York, Documents Department & Data Center, Dimond Library, University of New Hampshire, Durham [online www]. Available URL: "http://docs.unh.edu/nhtopos/CherryCreek.htm"

1980 *Forestville, New York Quadrangle, 7.5 Minute Series (Topographic).* Photorevised. U.S. Geological Survey, Department of the Interior, Washington, D.C.

1980 *Perrysburg, New York Quadrangle, 7.5 Minute Series (Topographic).* Photorevised. U.S. Geological Survey, Department of the Interior, Washington, D.C.

University of Akron
1996 Historical Note in Erie Lackawanna Railroad Inventory. University of Akron Archival Services, Akron, OH [online www]. Available URL: "http://www3.uakron.edu/archival/ErieLack/erie1.htm," [accessed March 14, 2008].

Waldorf, D.C.
1993 *The Art of Flint Knapping*, Fourth Edition. D.C. Waldorf and Valerie Waldorf.

Western New York Railroad Archive
nda Buffalo & Southwestern Railroad. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/railroads/erie/bsw_home.htm," [accessed March 14, 2008]

ndb Erie Railroad. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/railroads/erie/erie_home.htm," [accessed March 14, 2008]

ndc Dayton, New York. Western New York Railroad Archive website, np [online www]. Available URL: "http://wnyrails.org/cities/dayton_home.htm," [accessed March 14, 2008].

Whallon, Robert, Jr.
1968 Investigations of Late Prehistoric Social Organization in New York State. In *New Perspectives in Archaeology,* edited by Sally and Lewis Binford. Aldine Press, Chicago.

White, Marian E.
1960 Niagara Frontier Iroquois Village Movements. *Eastern States Archaeological Federation Bulletin* 19:16.

1961 Iroquois Culture History in the Niagara Frontier Area of New York State. *University of Michigan Museum of Anthropology, Anthropological Papers,* No. 16. Ann Arbor.

1963 Settlement Pattern Change and the Development of Horticulture in the New York-Ontario Area. *Pennsylvania Archaeologist* 33:1-12.

1978 Neutral and Wenro. In *Northeast*, edited by Bruce G. Trigger, pp. 407-411. Handbook of North American Indians, vol. 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Young, Andrew W.
1875 *History of Chautauqua County, New York*. Printing House of Mathews & Warren, Buffalo.

Appendix A
PHOTOGRAPHS

Photograph 1. Northern portion of Turbine 31, facing southwest.

Photograph 2. A view of Turbine 41, facing northeast.

Photograph 3. Possible location of MDS 11 at Linear 11, facing west.

Photograph 4. Overhead power lines and Turbine 2, facing northwest.

Photograph 5. A view of Turbine 4, showing level surface and vegetation, facing northwest.

Photograph 6. Unpaved access road within Turbine 6, facing south.

Photograph 7. Harvested cornfield of Turbine 8, facing northeast.

Photograph 8. Turbine 17 and unpaved access road, facing north.

Photograph 9. Fallow field at Turbine 18, facing east.

Photograph 10. Pond east of Turbine 42, facing east.

Photograph 11. Shovel testing of Turbine 43, facing west.

Photograph 12. Wood pile at Turbine 46, facing southeast.

Photograph 13. Overview of Linear 7, facing south.

Photograph 14. Drainage ditch between Round Top Road and Linear 8, facing southwest.

Photograph 15. Damaged foundation at Linear 13, facing northwest.

Photograph 16. Linear 14 with location of MDS 14 in trees, facing northeast.

Photograph 17. Close-up of MDS 14 foundation for Linear 14, facing northeast.

Photograph 18. House located outside the APE of Linear 16, facing southwest.

Photograph 19. Spring House adjacent to Linear 16, located outside the APE, facing southwest.

Photograph 20. Outbuildings on property adjacent to Linear 16, facing south.

Photograph 21. Possible location of MDS 23 in Linear 23, facing southwest.

Photograph 22. House and barn adjacent to Linear 28a, facing west.

Photograph 23. Wooded area in Turbine 66, facing south.

Photograph 24. Ravine within Linear 29 and area not shovel tested, facing southwest.

Appendix B
SHOVEL TEST LOG

Full results of the shovel testing conducted at Noble Ball Hill Windpark are presented in pdf format on a compact disk inside the back cover of this report.

Turbines, pp. B-1 to B-197
Linears, pp. B-198 to B-248

KEY TO ABBREVIATIONS FOR SHOVEL TEST LOG

Soil Colors:		**Soil Descriptions:**	
BL	Black	CL	Clay
BR	Brown	LO	Loam
DK	Dark	SA	Sand
GR	Gray	SI	Silt
LT	Light		
V	Very	**Comments:**	
YL	Yellow	NCM	No Cultural Material

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
Turbine 2						
1.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	23-35	10YR 5/4	YL BR	SA SI	NCM
1.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	22-32	10YR 5/4	YL BR	SA SI	NCM
1.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	22-35	10YR 5/4	YL BR	SA SI	NCM
1.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	26-36	10YR 5/4	YL BR	SA SI	NCM
1.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	24-34	10YR 5/4	YL BR	SA SI	NCM
1.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	25-35	10YR 5/4	YL BR	SA SI	NCM
1.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	28-40	10YR 5/4	YL BR	SA SI	NCM
1.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	29-40	10YR 5/4 10YR 3/1	YL BR V DK GR	SA SI	NCM
1.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	28-38	10YR 5/4 10YR 3/1	YL BR V DK GR	SA SI	NCM
1.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	24-35	10YR 4/6	DK YL BR	SA SI	NCM
1.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; natural chert piece
1.11	2	23-33	10YR 4/6	DK YL BR	SA SI	NCM
1.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; natural chert piece
1.12	2	23-33	10YR 4/6	DK YL BR	SA SI	NCM
1.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	22-32	10YR 4/6	DK YL BR	SA SI	NCM
1.14	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	23-35	10YR 4/6	DK YL BR	SA SI	NCM
1.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	23-33	10YR 4/6	DK YL BR	SA SI	NCM
1.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	23-33	10YR 4/6	DK YL BR	SA SI	NCM
1.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM
1.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	24-36	10YR 4/6	DK YL BR	SA SI	NCM
2.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	25-36	10YR 5/4	YL BR	SA LO	NCM
2.2	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	18-30	10YR 5/4	YL BR	SA LO	NCM
2.3	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	20-35	10YR 5/4	YL BR	SA LO	NCM
2.4	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	15-28	10YR 5/4	YL BR	SA LO	NCM
2.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	22-34	10YR 4/6	DK YL BR	SA LO	NCM
2.6	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	21-31	10YR 4/6	DK YL BR	SA LO	NCM
2.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	27-38	10YR 5/4	YL BR	SA LO	NCM
2.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	26-40	10YR 5/4	YL BR	SA LO	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	27-37	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	25-38	10YR 4/6	DK YL BR	SA LO	NCM
2.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	26-40	10YR 4/6	DK YL BR	SA LO	NCM
2.12	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	20-33	10YR 4/6	DK YL BR	SA LO	NCM
2.13	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	17-27	10YR 4/6	DK YL BR	SA LO	NCM
2.14	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	20-31	10YR 4/6	DK YL BR	SA LO	NCM
2.15	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	24-34	10YR 4/6	DK YL BR	SA LO	NCM
2.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	21-31	10YR 4/6	DK YL BR	SA LO	NCM
2.17	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	22-27	10YR 4/6	DK YL BR	SA LO	NCM
2.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	24-36	10YR 4/6	DK YL BR	SA LO	NCM
3.1	1	0-26	10YR 4/1	DK GR BR	SI LO	NCM; bone
3.1	2	26-38	10YR 4/3	BR	SA LO	NCM
3.2	1	0-25	10YR 4/1	DK GR BR	SI LO	NCM
3.2	2	25-38	10YR 4/4	DK YL BR	SA LO	NCM
3.3	1	0-23	10YR 4/1	DK GR BR	SI LO	NCM
3.3	2	23-35	10YR 4/4	DK YL BR	LO	NCM
3.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.4	2	22-33	10YR 5/4	YL BR	SA LO	NCM
3.5	1	0-21	10YR 4/2	DK GR BR	SI	NCM
3.5	2	21-34	10YR 4/6	DK YL BR	SI LO	NCM
3.6	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.6	2	24-37	10YR 4/6	DK YL BR	SI LO	NCM
3.7	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.7	2	24-38	10YR 4/6	DK YL BR	SI LO	NCM
3.8	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.8	2	25-39	10YR 4/6	DK YL BR	SI LO	NCM
3.9	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.9	2	23-37	10YR 4/6	DK YL BR	SI LO	NCM
3.10	1	0-29	10YR 4/2	DK GR BR	SI	NCM
3.10	2	29-41	10YR 4/6	DK YL BR	SI LO	NCM
3.11	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.11	2	27-40	10YR 4/6	DK YL BR	SI LO	NCM
3.12	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.12	2	27-39	10YR 4/6	DK YL BR	SI LO	NCM
3.13	1	0-21	10YR 4/2	DK GR BR	SI	NCM
3.13	2	21-33	10YR 4/6	DK YL BR	SI LO	NCM
3.14	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.14	2	23-34	10YR 4/6	DK YL BR	SI LO	NCM
3.15	1	0-26	10YR 4/2	DK GR BR	SI	NCM; rocky
3.15	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM; rocky
3.16	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.16	2	24-37	10YR 4/6	DK YL BR	SI LO	NCM
3.17	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.17	2	23-33	10YR 4/6	DK YL BR	SI LO	NCM
3.18	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.18	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
4.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.1	2	23-36	10YR 5/4	YL BR	SI LO	NCM; water at 32cm
4.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM; some small stones & rocks

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.2	2	33-46	10YR 5/4	YL BR	SI LO	NCM; some small stones & rocks
4.3	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	38-50	10YR 5/4	YL BR	SI LO	NCM; water at 38cm
4.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	30-40	10YR 5/4	YL BR	SI LO	NCM
4.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	27-37	10YR 5/4	YL BR	SI LO	NCM
4.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	24-35	10YR 5/4	YL BR	SI LO	NCM
4.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	25-36	10YR 5/4	YL BR	SI LO	NCM
4.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
4.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	24-36	10YR 4/6	DK YL BR	SI LO	NCM
4.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; some small stones & rocks
4.10	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM; some small stones & rocks
4.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	23-33	10YR 5/4	YL BR	SI LO	NCM
4.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	26-38	10YR 5/4	YL BR	SI LO	NCM
4.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; some small stones & rocks
4.13	2	30-40	10YR 4/6	DK YL BR	SI LO	NCM; some small stones & rocks
4.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.14	2	30-40	10YR 5/4	YL BR	SI LO	NCM
4.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	23-35	10YR 4/6	DK YL BR	SI LO	NCM
4.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	23-35	10YR 4/6	DK YL BR	SI LO	NCM
4.17	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	23-38	10YR 4/6	DK YL BR	SI LO	NCM
4.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM
5.1	1	0-29	10YR 4/3	BR	SI LO	NCM; cobbles
5.1	2	29-39	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.2	1	0-33	10YR 4/3	BR	SI LO	NCM; cobbles
5.2	2	33-43	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.3	1	0-32	10YR 4/3	BR	SI LO	NCM; cobbles
5.3	2	32-42	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
5.4	2	30-40	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
5.5	2	27-37	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
5.6	2	35-45	10YR 5/4	YL BR	SI CL	NCM; seepage at transition; cobbles
5.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
5.7	2	26-36	10YR 5/4	YL BR	SI CL	NCM; cobbles
5.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	29-39	10YR 4/6	DK YL BR	SI CL	NCM
5.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	34-44	10YR 4/6	DK YL BR	SI CL	NCM
5.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	27-37	10YR 4/6	DK YL BR	SI CL	NCM
5.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	32-42	10YR 4/6	DK YL BR	SI CL	NCM
5.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	26-36	10YR 4/6	DK YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	27-37	10YR 4/6	DK YL BR	SI CL	NCM
5.14	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	21-31	10YR 5/6	YL BR	SI CL	NCM
5.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	23-33	10YR 4/6	DK YL BR	SI CL	NCM
5.16	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	22-32	10YR 6/2	LT BR GR	SI CL	NCM
5.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.17	2	31-41	10YR 6/2	LT BR GR	SI CL	NCM
5.18	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	22-32	10YR 6/2	LT BR GR	SI CL	NCM
6.1	1	0-24	10YR 4/3	BR	SI LO	NCM
6.1	2	24-44	10YR 4/4	DK YL BR	SA SI	NCM
6.2	1	0-29	10YR 4/3	BR	SI LO	NCM
6.2	2	29-40	10YR 4/4	DK YL BR	SA SI	NCM
6.3	1	0-31	10YR 4/3	BR	SI LO	NCM; seepage at 31cm
6.4	1	0-22	10YR 4/3	BR	SI LO	NCM; seepage at 22cm
6.5	1	0-27	10YR 4/3	BR	SI LO	NCM; seepage at 27cm
6.6	1	0-27	10YR 4/3	BR	SI LO	NCM
6.6	2	27-37	10YR 4/4	DK YL BR	SA SI	NCM; seepage at 37cm
6.7	1	0-24	10YR 4/3	BR	SI LO	NCM
6.7	2	24-48	10YR 5/4	YL BR	SA SI	NCM
6.8	1	0-26	10YR 4/3	BR	SI LO	NCM
6.8	2	26-40	10YR 5/4	YL BR	SA SI	NCM
6.9	1	0-25	10YR 4/3	BR	SI LO	NCM
6.9	2	25-37	10YR 5/4	YL BR	SA SI	NCM
6.10	1	0-31	10YR 4/3	BR	SI LO	NCM
6.10	2	31-42	10YR 5/4	YL BR	SA SI	NCM
6.11	1	0-27	10YR 4/3	BR	SI LO	NCM
6.11	2	27-43	10YR 5/4	YL BR	SA SI	NCM
6.12	1	0-23	10YR 4/3	BR	SI LO	NCM
6.12	2	23-40	10YR 5/4	YL BR	SA SI	NCM
6.13	1	0-24	10YR 4/3	BR	SI LO	NCM
6.13	2	24-38	10YR 5/4	YL BR	SA SI	NCM
6.14	1	0-28	10YR 4/3	BR	SI LO	NCM
6.14	2	28-38	10YR 5/4	YL BR	SA SI	NCM
6.15	1	0-28	10YR 4/3	BR	SI LO	NCM
6.15	2	28-39	10YR 5/4	YL BR	SA SI	NCM
6.16	1	0-36	10YR 4/3	BR	SI LO	NCM
6.16	2	36-47	10YR 5/4	YL BR	SA SI	NCM
6.17	1	0-32	10YR 4/3	BR	SI LO	NCM
6.17	2	32-44	10YR 5/4	YL BR	SA SI	NCM
6.18	1	0-24	10YR 4/3	BR	SI LO	NCM
6.18	2	24-38	10YR 5/4	YL BR	SA SI	NCM
7.1	1	0-28	10YR 4/3	BR	SI LO	NCM
7.1	2	28-40	10YR 4/4	DK YL BR	SI LO	NCM
7.2	1	0-27	10YR 4/3	BR	SI LO	NCM
7.2	2	27-38	10YR 4/4	DK YL BR	SI LO	NCM
7.3	1	0-29	10YR 4/3	BR	SI LO	NCM
7.3	2	29-40	10YR 4/4	DK YL BR	SI LO	NCM
7.4	1	0-30	10YR 4/3	BR	SI LO	NCM
7.4	2	30-42	10YR 4/4	DK YL BR	SI LO	NCM
7.5	1	0-27	10YR 4/3	BR	SI LO	NCM
7.5	2	27-39	10YR 4/4	DK YL BR	SI LO	NCM
7.6	1	0-25	10YR 4/3	BR	SI LO	NCM
7.6	2	25-36	10YR 4/4	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.7	1	0-26	10YR 4/3	BR	SI LO	NCM
7.7	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
7.8	1	0-25	10YR 4/3	BR	SI LO	NCM
7.8	2	25-35	10YR 4/4	DK YL BR	SI LO	NCM
7.9	1	0-24	10YR 4/3	BR	SI LO	NCM
7.9	2	24-35	10YR 4/4	DK YL BR	SI LO	NCM
7.10	1	0-27	10YR 4/3	BR	SI LO	NCM
7.10	2	27-39	10YR 4/4	DK YL BR	SI LO	NCM
7.11	1	0-26	10YR 4/3	BR	SI LO	NCM
7.11	2	26-36	10YR 4/4	DK YL BR	SI LO	NCM
7.12	1	0-24	10YR 4/3	BR	SI LO	NCM
7.12	2	24-35	10YR 4/4	DK YL BR	SI LO	NCM
7.13	1	0-25	10YR 4/3	BR	SI LO	NCM
7.13	2	25-38	10YR 4/4	DK YL BR	SI LO	NCM
7.14	1	0-27	10YR 4/3	BR	SI LO	NCM
7.14	2	27-39	10YR 4/4	DK YL BR	SI LO	NCM
7.15	1	0-26	10YR 4/3	BR	SI LO	NCM
7.15	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
7.16	1	0-28	10YR 4/3	BR	SI LO	NCM
7.16	2	28-40	10YR 4/4	DK YL BR	SI LO	NCM
7.17	1	0-26	10YR 4/3	BR	SI LO	NCM
7.17	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
7.18	1	0-24	10YR 4/3	BR	SI LO	NCM
7.18	2	24-35	10YR 4/4	DK YL BR	SI LO	NCM
8.1	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.1	2	20-38	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO CL	NCM
8.2	1	0-23	10YR 3/2	V DK GR BR	SA LO	NCM
8.2	2	23-39	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO CL	NCM
8.3	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.3	2	20-32	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO CL	NCM
8.4	1	0-16	10YR 3/2	V DK GR BR	SA LO	NCM
8.4	2	16-17	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO CL	NCM
8.5	1	0-17	10YR 3/2	V DK GR BR	SA LO	NCM
8.5	2	17-18	10YR 5/6	YL BR	SA LO CL	NCM
8.6	1	0-22	10YR 3/2	V DK GR BR	SA LO	NCM; rocky
8.6	2	22-38	10YR 5/6	YL BR	SA LO CL	NCM; rocky
8.7	1	0-27	10YR 3/2	V DK GR BR	SA LO	NCM
8.7	2	27-40	10YR 5/4	YL BR	SA LO CL	NCM; seepage at 40cm
8.8	1	0-23	10YR 3/2	V DK GR BR	SA LO	NCM
8.8	2	23-35	10YR 5/4	YL BR	SA LO CL	NCM; seepage at 35cm
8.9	1	0-23	10YR 3/2	V DK GR BR	SA LO	NCM
8.9	2	23-35	10YR 5/4	YL BR	SA LO CL	NCM
8.10	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.10	2	20-35	10YR 5/4	YL BR	SA LO CL	NCM; seepage at 35cm
8.11	1	0-23	10YR 3/2	V DK GR BR	SA LO	NCM
8.11	2	23-40	10YR 5/4	YL BR	SA LO CL	NCM; seepage at 40cm
8.12	1	0-26	10YR 3/2	V DK GR BR	SA LO	NCM
8.12	2	26-36	10YR 5/4	YL BR	SA LO CL	NCM
8.13	1	0-19	10YR 3/2	V DK GR BR	SA LO	NCM
8.13	2	19-31	10YR 5/4	YL BR	SA LO CL	NCM; seepage at 31cm
8.14	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.14	2	20-37	10YR 5/4	YL BR	SA LO CL	NCM
8.15	1	0-26	10YR 3/2	V DK GR BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.15	2	26-40	10YR 5/4	YL BR	SA LO CL	NCM
8.16	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.16	2	20-40	10YR 5/4	YL BR	SA LO CL	NCM
8.17	1	0-27	10YR 3/2	V DK GR BR	SA LO	NCM
8.17	2	27-38	10YR 5/4	YL BR	SA LO CL	NCM
8.18	1	0-21	10YR 3/2	V DK GR BR	SA LO	NCM
8.18	2	21-34	10YR 5/4	YL BR	SA LO CL	NCM
9.1	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
9.1	2	33-43	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO	NCM
9.2	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
9.2	2	29-39	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO	NCM
9.3	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
9.3	2	27-37	10YR 5/4 10YR 4/4	YL BR DK YL BR	SA LO	NCM
9.4	1	0-28	10YR 3/3	DK BR	SI LO	NCM
9.4	2	28-38	10YR 5/4	YL BR	SA LO	NCM
9.5	1	0-29	10YR 3/3	DK BR	SI LO	NCM
9.5	2	29-39	10YR 5/4	YL BR	SA LO	NCM
9.6	1	0-31	10YR 3/3	DK BR	SI LO	NCM
9.6	2	31-41	10YR 5/6	YL BR	SA LO	NCM
9.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	29-39	10YR 5/6	YL BR	SA LO	NCM
9.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	31-41	10YR 5/6	YL BR	SA LO	NCM
9.9	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
9.9	2	27-37	10YR 5/6	YL BR	SA LO	NCM
9.10	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
9.10	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.11	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
9.11	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.12	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
9.12	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.13	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
9.13	2	29-39	10YR 5/4	YL BR	SA LO	NCM
9.14	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
9.14	2	30-40	10YR 6/3	PALE BR	SA LO	NCM
9.15	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
9.15	2	28-38	10YR 4/6	DK YL BR	SA LO	NCM
9.16	1	0-27	10YR 3/3	DK BR	SI LO	NCM
9.16	2	27-37	10YR 5/6	YL BR	SA LO	NCM
9.17	1	0-29	10YR 3/3	DK BR	SI LO	NCM
9.17	2	29-39	10YR 6/3	PALE BR	SA CL	NCM
9.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	34-44	10YR 6/3	PALE BR	SA CL	NCM
10.1	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	20-36	10YR 5/4	YL BR	SA LO	NCM
10.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	33-36	10YR 5/4	YL BR	SA LO	NCM; rock impasse
10.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	27-40	10YR 5/4	YL BR	SA LO	NCM
10.4	1	0-30	10YR 4/3	BR	SI LO	NCM
10.4	2	30-41	10YR 4/4	DK YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.5	1	0-33	10YR 4/3	BR	SI LO	NCM
10.5	2	33-45	10YR 5/4	YL BR	SA LO	NCM
10.6	1	0-29	10YR 4/3	BR	SI LO	NCM
10.6	2	29-39	10YR 5/4	YL BR	SI LO	NCM
10.7	1	0-30	10YR 4/3	BR	SI LO	NCM
10.7	2	30-40	10YR 4/4	DK YL BR	SI LO	NCM
10.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.8	2	32-42	10YR 5/4	YL BR	SI LO	NCM
10.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.9	2	27-37	10YR 5/4	YL BR	SI LO	NCM
10.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; water seepage at 31cm
10.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.11	2	30-40	10YR 5/4	YL BR	SI LO	NCM
10.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.12	2	32-45	10YR 5/4	YL BR	SI LO	NCM
10.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
10.13	2	24-36	10YR 5/6	YL BR	SI LO	NCM
10.14	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
10.14	2	38-50	10YR 5/6	YL BR	SI LO	NCM
10.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.15	2	29-39	10YR 5/6	YL BR	SI LO	NCM
10.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.16	2	28-40	10YR 5/4	YL BR	SI LO	NCM
10.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.17	2	29-39	10YR 5/4	YL BR	SI LO	NCM
10.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.18	2	27-37	10YR 5/4	YL BR	SI LO	NCM
11.1	1	0-23	10YR 4/2	DK GR BR	LO	NCM
11.1	2	23-38	10YR 4/4	DK YL BR	SI LO	NCM
11.2	1	0-26	10YR 4/2	DK GR BR	LO	NCM
11.2	2	26-37	10YR 4/4	DK YL BR	SI LO	NCM
11.3	1	0-26	10YR 4/2	DK GR BR	LO	NCM
11.3	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
11.4	1	0-26	10YR 4/2	DK GR BR	LO	NCM
11.4	2	26-40	10YR 4/4	DK YL BR	SA LO	NCM
11.5	1	0-25	10YR 4/2	DK GR BR	LO	NCM
11.5	2	25-37	10YR 4/4	DK YL BR	SA LO	NCM
11.6	1	0-23	10YR 4/2	DK GR BR	LO	NCM
11.6	2	23-39	10YR 4/4	DK YL BR	SA LO	NCM
11.7	1	0-22	10YR 4/3	BR	LO	NCM
11.7	2	22-35	10YR 4/6	DK YL BR	SA LO	NCM
11.8	1	0-24	10YR 4/3	BR	LO	NCM
11.8	2	24-36	10YR 4/6	DK YL BR	SA LO	NCM
11.9	1	0-22	10YR 4/3	BR	LO	NCM
11.9	2	22-34	10YR 4/6	DK YL BR	SA LO	NCM
11.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	24-36	10YR 5/6	YL BR	CL LO	NCM
11.11	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	19-32	10YR 5/6	YL BR	CL LO	NCM
11.12	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	21-34	10YR 5/6	YL BR	CL LO	NCM
11.13	1	0-27	10YR 4/2	DK GR BR	LO	NCM
11.13	2	27-38	10YR 5/6	YL BR	SA LO	NCM
11.14	1	0-26	10YR 4/2	DK GR BR	LO	NCM
11.14	2	26-37	10YR 5/6	YL BR	SA LO	NCM
11.15	1	0-27	10YR 4/2	DK GR BR	LO	NCM
11.15	2	27-39	10YR 5/6	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.16	1	0-25	10YR 4/2	DK GR BR	LO	NCM
11.16	2	25-35	10YR 5/6	YL BR	SA LO	NCM
11.17	1	0-26	10YR 4/2	DK GR BR	LO	NCM
11.17	2	26-40	10YR 5/6	YL BR	SA LO	NCM
11.18	1	0-25	10YR 4/2	DK GR BR	LO	NCM
11.18	2	25-37	10YR 5/6	YL BR	SA LO	NCM
12.1	1	0-13	10YR 4/4	DK YL BR	SI LO	NCM
12.1	2	13-20	10YR 5/6	YL BR	CL LO	NCM; water
12.2	1	0-21	10YR 4/4	DK YL BR	SI LO	NCM
12.2	2	21-30	10YR 5/6	YL BR	CL LO	NCM; water
12.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	30-41	10YR 5/6	YL BR	CL LO	NCM
12.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	28-38	10YR 5/4	YL BR	CL LO	NCM
12.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	30-38	10YR 5/4	YL BR	CL LO	NCM
12.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; natural chert
12.7	2	30-40	10YR 5/4	YL BR	CL LO	NCM; natural chert
12.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	30-39	10YR 5/4	YL BR	CL LO	NCM
12.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	30-34	10YR 5/4	YL BR	CL LO	NCM; water
12.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	30-38	10YR 5/4	YL BR	CL LO	NCM
12.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	30-43	10YR 5/4	YL BR	CL LO	NCM
12.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	28-38	10YR 5/4	YL BR	CL LO	NCM
12.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.14	2	30-42	10YR 5/4	YL BR	CL LO	NCM
12.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.15	2	32-42	10YR 5/4	YL BR	CL LO	NCM
12.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	26-36	10YR 5/4	YL BR	CL LO	NCM
12.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	25-35	10YR 5/4	YL BR	CL LO	NCM
12.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	23-35	10YR 5/4	YL BR	CL LO	NCM
13.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	25-36	10YR 4/4	DK YL BR	CL LO	NCM; water filled bottom 5cm of pit
13.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	27-39	10YR 5/4	YL BR	CL LO	NCM; water filled bottom 5cm of pit
13.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	30-41	10YR 5/4	YL BR	CL LO	NCM; water filled bottom 5cm of pit
13.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	30-42	10YR 5/4	YL BR	CL LO	NCM
13.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	32-43	10YR 5/4	YL BR	CL LO	NCM
13.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	30-43	10YR 5/4	YL BR	CL LO	NCM
13.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	28-40	10YR 5/4	YL BR	CL LO	NCM; natural chert
13.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; natural chert

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.8	2	27-40	10YR 5/4	YL BR	CL LO	NCM
13.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	25-37	10YR 5/4	YL BR	CL LO	NCM
13.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	27-39	10YR 5/4	YL BR	CL LO	NCM
13.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	29-41	10YR 5/4	YL BR	CL LO	NCM
13.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	31-44	10YR 5/4	YL BR	CL LO	NCM
13.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	31-42	10YR 5/4	YL BR	CL LO	NCM
13.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	33-45	10YR 5/4	YL BR	CL LO	NCM
13.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	29-40	10YR 5/4	YL BR	CL LO	NCM
13.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	27-37	10YR 5/4	YL BR	CL LO	NCM
13.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	29-40	10YR 5/4	YL BR	CL LO	NCM
13.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	25-38	10YR 5/4	YL BR	CL LO	NCM
14.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	30-41	10YR 4/4	DK YL BR	CL LO	NCM
14.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	28-40	10YR 4/4	DK YL BR	CL LO	NCM
14.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	29-41	10YR 4/4	DK YL BR	CL LO	NCM
14.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	27-39	10YR 4/4	DK YL BR	CL LO	NCM
14.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	28-39	10YR 4/4	DK YL BR	CL LO	NCM
14.6	1	0-27	10YR 4/3	BR	SI LO	NCM
14.6	2	27-40	7.5YR 4/4	BR	SI LO	NCM
14.7	1	0-30	10YR 4/3	BR	SI LO	NCM
14.7	2	30-41	7.5YR 4/4	BR	SI LO	NCM
14.8	1	0-30	10YR 4/3	BR	SI LO	NCM
14.8	2	30-42	7.5YR 4/4	BR	SI LO	NCM
14.9	1	0-26	10YR 4/3	BR	SI LO	NCM
14.9	2	26-37	7.5YR 4/4	BR	SI LO	NCM
14.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	29-40	10YR 5/4	YL BR	SI LO	NCM
14.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	28-32	10YR 3/1	V DK GR	SI LO	NCM
14.11	3	32-44	10YR 5/4	YL BR	SI LO	NCM
14.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	27-31	10YR 3/1	V DK GR	SI LO	NCM
14.12	3	31-43	10YR 5/4	YL BR	SI LO	NCM
14.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.13	2	29-40	10YR 5/4	YL BR	SI LO	NCM
14.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.14	2	31-42	10YR 5/4	YL BR	SI LO	NCM
14.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	30-41	10YR 5/4	YL BR	SI LO	NCM
14.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	32-44	10YR 4/4	DK YL BR	SI LO	NCM
14.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	31-43	10YR 4/4	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	33-44	10YR 4/4	DK YL BR	SI LO	NCM
15.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	24-34	10YR 5/4	YL BR	SI LO	NCM
15.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	27-37	10YR 5/4	YL BR	SI LO	NCM
15.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	24-39	10YR 5/4	YL BR	SI LO	NCM
15.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	24-34	10YR 5/4	YL BR	SI LO	NCM
15.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	24-34	10YR 5/4	YL BR	SI LO	NCM
15.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	27-39	10YR 5/4	YL BR	SI LO	NCM
15.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	24-34	10YR 5/4	YL BR	SI LO	NCM
15.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	29-39	10YR 5/4	YL BR	SI LO	NCM
15.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	25-35	10YR 5/4	YL BR	SI LO	NCM
15.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	24-34	10YR 5/4	YL BR	SI LO	NCM
15.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	29-39	10YR 5/4	YL BR	SI LO	NCM
15.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	26-39	10YR 5/4	YL BR	SI LO	NCM
15.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	27-37	10YR 5/4	YL BR	SI LO	NCM
15.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	25-35	10YR 5/4	YL BR	SI LO	NCM
15.15	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	24-36	10YR 5/4	YL BR	SI LO	NCM
15.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	29-39	10YR 4/4	DK YL BR	SA SI LO	NCM
15.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	32-42	10YR 4/4	DK YL BR	SA SI LO	NCM
15.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	25-32	10YR 4/4	DK YL BR	SA SI LO	NCM
16.1	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	21-31	10YR 5/4	YL BR	SI LO	NCM
16.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	24-36	10YR 5/4	YL BR	SI LO	NCM
16.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	28-38	10YR 5/4	YL BR	SI LO	NCM
16.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	25-35	10YR 5/4	YL BR	SI LO	NCM
16.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	25-35	10YR 5/4	YL BR	SI LO	NCM
16.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	29-40	10YR 5/4	YL BR	SI LO	NCM
16.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.7	2	29-40	10YR 5/4	YL BR	SI LO	NCM
16.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
16.8	2	23-33	10YR 5/4	YL BR	SI LO	NCM
16.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.9	2	24-34	10YR 5/4	YL BR	SI LO	NCM
16.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.10	2	26-36	10YR 5/4	YL BR	SI LO	NCM
16.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.11	2	28-40	10YR 5/4	YL BR	SI LO	NCM
16.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	27-37	10YR 5/4	YL BR	SI LO	NCM
16.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.13	2	29-40	10YR 5/4	YL BR	SI LO	NCM
16.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	27-37	10YR 5/4	YL BR	SI LO	NCM
16.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.15	2	29-39	10YR 5/4	YL BR	SI LO	NCM
16.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	25-40	10YR 5/4	YL BR	SI LO	NCM
16.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	30-40	10YR 5/4	YL BR	SI LO	NCM
16.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	24-34	10YR 5/4	YL BR	SI LO	NCM
17.1	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; water at 15cm
17.2	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; water at 20cm
17.3	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	43-53	10YR 4/4	DK YL BR	SI LO	NCM
17.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	27-38	10YR 4/4	DK YL BR	SI LO	NCM
17.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	28-46	10YR 4/4	DK YL BR	SI LO	NCM
17.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	27-37	10YR 4/4	DK YL BR	SI LO	NCM
17.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	25-37	10YR 4/4	DK YL BR	SI LO	NCM
17.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	22-35	10YR 4/4	DK YL BR	SI LO	NCM
17.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	32-42	10YR 4/4	DK YL BR	SI LO	NCM
17.10	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	23-35	10YR 4/4	DK YL BR	SI LO	NCM
17.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	24-37	10YR 4/4	DK YL BR	SI LO	NCM
17.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	24-36	10YR 5/4	YL BR	SI LO	NCM
17.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	22-36	10YR 5/4	YL BR	SI LO	NCM
17.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	22-37	10YR 5/4	YL BR	SI LO	NCM
17.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.15	2	26-36	10YR 5/4	YL BR	SI LO	NCM
17.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	26-40	10YR 5/4	YL BR	SI LO	NCM
17.17	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	37-47	10YR 5/4	YL BR	SI LO	NCM
17.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	27-37	10YR 5/4	YL BR	SI LO	NCM
18.1	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; water at 10cm
18.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	30-40	10YR 4/4	DK YL BR	SI LO	NCM
18.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	28-38	10YR 4/4	DK YL BR	SI LO	NCM
18.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.4	2	26-36	10YR 4/4	DK YL BR	SI LO	NCM
18.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
18.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	28-32	10YR 4/4	DK YL BR	SI LO	NCM; water at 32cm
18.7	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	34-45	10YR 4/4	DK YL BR	SI LO	NCM
18.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	29-39	10YR 4/4	DK YL BR	SI LO	NCM
18.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	34-47	10YR 4/4	DK YL BR	SI LO	NCM
18.10	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	36-46	10YR 4/4	DK YL BR	SI LO	NCM
18.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	25-38	10YR 4/4	DK YL BR	SI LO	NCM
18.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	33-43	10YR 4/4	DK YL BR	SI LO	NCM
18.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	27-42	10YR 4/4	DK YL BR	SI LO	NCM
18.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	29-40	10YR 4/4	DK YL BR	SI LO	NCM
18.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	26-36	10YR 5/4	YL BR	SI LO	NCM
18.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.16	2	30-40	10YR 5/4	YL BR	SI LO	NCM
18.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.17	2	30-40	10YR 5/4	YL BR	SI LO	NCM
18.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	27-37	10YR 5/4	YL BR	SI LO	NCM
Turbine 4						
1.1	1	0-27	10YR 4/1	DK GR	SI LO	NCM
1.1	2	27-39	10YR 6/1	GR	SI LO	NCM
1.2	1	0-30	10YR 4/1	DK GR	SI LO	NCM
1.2	2	30-40	10YR 5/6	YL BR	SI LO	NCM
1.3	1	0-26	10YR 4/1	DK GR	SI LO	NCM
1.3	2	26-36	10YR 5/6	YL BR	SI LO	NCM
1.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	32-35	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	29-39	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	27-37	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	29-39	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	31-41	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	30-40	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	32-42	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	28-39	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.12	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; water at 15cm
1.13	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; water at 10cm
1.14	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; water at 15cm
1.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	30-40	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	28-40	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	29-39	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
1.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	30-40	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	29-40	10YR 4/4	DK YL BR	SI LO	NCM
2.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	22-37	10YR 4/4	DK YL BR	SI LO	NCM
2.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	22-34	10YR 4/4	DK YL BR	SI LO	NCM
2.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	33-43	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	27-37	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	26-37	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	25-37	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	22-32	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	25-35	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.10	1	0-25	10YR 4/2	DK GR BR	SI CL	NCM
2.10	2	25-35	10YR 5/4	YL BR	SI CL	NCM
2.11	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM; water at 12cm
2.12	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	22-35	10YR 5/4	YL BR	SI LO	NCM
2.13	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; water at 20cm
2.14	1	0-28	10YR 4/2	DK GR BR	SI CL	NCM
2.14	2	28-40	10YR 5/4	YL BR	SI CL	NCM
2.15	1	0-29	10YR 4/2	DK GR BR	SI CL	NCM
2.15	2	29-40	10YR 5/4	YL BR	SI CL	NCM
2.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	25-35	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.17	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.17	2	17-33	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
2.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	27-40	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SI LO	NCM
3.1	1	0-28	10YR 4/3	BR	SI LO	NCM; cobble
3.1	2	28-38	10YR 6/8 10YR 5/2	BR YL GR BR	SI CL	NCM; cobble
3.2	1	0-27	10YR 4/3	BR	SI LO	NCM; seepage
3.2	2	27-37	10YR 6/8 10YR 5/2	BR YL GR BR	SI CL	NCM; seepage
3.3	1	0-29	10YR 4/3	BR	SI LO	NCM
3.3	2	29-40	10YR 6/8 10YR 5/2	BR YL GR BR	SI CL	NCM
3.4	1	0-34	10YR 3/2	V DK GR BR	SI	NCM
3.4	2	34-44	10YR 5/4	YL BR	SI LO	NCM
3.5	1	0-15	10YR 3/2	V DK GR BR	SI	NCM; seepage at 15cm
3.6	1	0-14	10YR 3/2	V DK GR BR	SI	NCM; seepage at 14cm
3.7	1	0-32	10YR 3/2	V DK GR BR	SI	NCM; seepage at 32cm
3.8	1	0-36	10YR 3/2	V DK GR BR	SI LO	NCM
3.8	2	36-46	10YR 5/2 10YR 6/8	GR BR BR YL	SI LO	NCM
3.9	1	0-14	10YR 3/2	V DK GR BR	SI	NCM; seepage at 14cm
3.10	1	0-38	10YR 3/2	V DK GR BR	SI	NCM
3.10	2	38-50	10YR 5/4	YL BR	SI LO	NCM
3.11	1	0-10	10YR 3/2	V DK GR BR	SI	NCM; seepage at 10cm
3.12	1	0-34	10YR 3/2	V DK GR BR	SI	NCM
3.12	2	34-44	10YR 5/4	YL BR	SI LO	NCM
3.13	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
3.13	2	31-41	10YR 5/6	YL BR	SI LO	NCM
3.14	1	0-35	10YR 3/2	V DK GR BR	SI	NCM; water at 35cm
3.15	1	0-32	10YR 4/2	DK GR BR	SI	NCM
3.15	2	32-42	10YR 5/6	YL BR	SI LO	NCM
3.16	1	0-31	10YR 3/2	V DK GR BR	SI	NCM; rock impasse
3.17	1	0-31	10YR 4/2	DK GR BR	SI	NCM
3.17	2	31-41	10YR 5/6	YL BR	SI LO	NCM
3.18	1	0-22	10YR 3/2	V DK GR BR	SI	NCM; seepage at 22cm
4.1	1	0-32	10YR 4/2	DK GR BR	SI	NCM
4.1	2	32-42	10YR 6/8 10YR 5/2	BR YL GR BR	SI LO	NCM
4.2	1	0-36	10YR 4/2	DK GR BR	SI	NCM
4.2	2	36-46	10YR 6/8 10YR 5/2	BR YL GR BR	SI LO	NCM
4.3	1	0-29	10YR 4/2	DK GR BR	SI	NCM
4.3	2	29-39	10YR 6/8 10YR 5/2	BR YL GR BR	SI LO	NCM
4.4	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
4.4	2	28-38	10YR 5/6	YL BR	SI LO	NCM
4.5	1	0-16	10YR 4/2	DK GR BR	SI	NCM; seepage at 16cm
4.6	1	0-18	10YR 3/2	V DK GR BR	SI	NCM; seepage at 18cm
4.7	1	0-20	10YR 3/2	V DK GR BR	SI	NCM; water at 20cm
4.8	1	0-34	10YR 3/2	V DK GR BR	SI	NCM
4.8	2	34-44	10YR 5/4	YL BR	SI LO	NCM
4.9	1	0-30	10YR 3/2	V DK GR BR	SI	NCM; seepage
4.9	2	30-40	10YR 5/4	YL BR	SI LO	NCM; seepage
4.10	1	0-24	10YR 3/2	V DK GR BR	SI	NCM; seepage at 24cm
4.11	1	0-15	10YR 3/2	V DK GR BR	SI	NCM; seepage at 15cm

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.12	1	0-15	10YR 3/2	V DK GR BR	SI	NCM; seepage at 15cm
4.13	1	0-19	10YR 3/2	V DK GR BR	SI	NCM; seepage at 19cm
4.14	1	0-25	10YR 3/2	V DK GR BR	SI	NCM
4.14	2	25-35	10YR 5/6	YL BR	SI LO	NCM
4.15	1	0-18	10YR 3/2	V DK GR BR	SI	NCM; seepage at 18cm
4.16	1	0-30	10YR 3/2	V DK GR BR	SI	NCM
4.16	2	30-41	10YR 5/6	YL BR	SI LO	NCM
4.17	1	0-27	10YR 3/2	V DK GR BR	SI	NCM
4.17	2	27-37	10YR 5/6	YL BR	SI LO	NCM
4.18	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
4.18	2	28-38	10YR 5/6	YL BR	SI LO	NCM
5.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.4	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
5.4	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.5	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
5.5	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.6	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
5.6	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition
5.7	1	0-46	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.7	2	46-56	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.8	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.8	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.9	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.9	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.10	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.10	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.11	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.11	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.12	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.12	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.13	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.13	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.14	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.14	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.15	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.15	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.16	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.16	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.17	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.17	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
5.18	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM; cobbles
5.18	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at transition; cobbles
6.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	26-39	10YR 5/4	YL BR	SI LO	NCM
6.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	28-38	10YR 5/4	YL BR	SI LO	NCM
6.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	28-38	10YR 5/4	YL BR	SI LO	NCM
6.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	28-40	10YR 5/4	YL BR	SI LO	NCM
6.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	26-36	10YR 5/4	YL BR	SI LO	NCM
6.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
6.6	2	24-35	10YR 5/4	YL BR	SI LO	NCM
6.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	26-36	10YR 5/4	YL BR	SI LO	NCM
6.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	31-41	10YR 5/4	YL BR	SI LO	NCM
6.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	25-35	10YR 5/4	YL BR	SI LO	NCM
6.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	29-39	10YR 5/4	YL BR	SI LO	NCM
6.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	26-36	10YR 5/4	YL BR	SI LO	NCM
6.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	31-41	10YR 5/4	YL BR	SI LO	NCM
6.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 28cm
6.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	26-39	10YR 5/4	YL BR	SI LO	NCM
6.15	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 22cm
6.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 21 cm
6.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
6.17	2	34-44	10YR 5/4	YL BR	SI LO	NCM
6.18	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 19cm
7.1	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	18-30	10YR 5/4	YL BR	SA SI	NCM
7.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
7.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
7.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
7.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	30-40	10YR 5/4	YL BR	SA SI	NCM
7.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	30-40	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	30-40	10YR 5/4	YL BR	SA SI	NCM
7.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	30-40	10YR 5/4	YL BR	SA SI	NCM
7.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.14	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
7.14	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	31-41	10YR 5/4	YL BR	SA SI	NCM
7.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	26-36	10YR 5/4	YL BR	SA SI	NCM
7.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	28-38	10YR 5/4	YL BR	SA SI	NCM
7.18	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	21-31	10YR 5/4	YL BR	SA SI	NCM
8.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	29-40	10YR 4/6 10YR 6/3	DK YL BR PALE BR	SI LO	NCM
8.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	29-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
8.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	27-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
8.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; small rocks/stones
8.4	2	28-40	10YR 5/4	YL BR	SA LO	NCM; small rocks/stones
8.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM; small rocks/stones
8.5	2	29-41	10YR 5/4	YL BR	SA LO	NCM; small rocks/stones
8.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; small rocks/stones
8.6	2	27-40	10YR 5/4	YL BR	SA LO	NCM; small rocks/stones
8.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; small rocks/stones
8.7	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM; small rocks/stones
8.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; small rocks/stones
8.8	2	32-42	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM; small rocks/stones
8.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	24-36	10YR 5/4	YL BR	SA CL	NCM
8.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	26-40	10YR 6/3 10YR 4/6	PALE BR DK YL BR	SA LO	NCM
8.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	28-40	10YR 6/3 10YR 4/6	PALE BR DK YL BR	SA LO	NCM
8.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	25-38	10YR 6/3 10YR 4/6	PALE BR DK YL BR	SA LO	NCM
8.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 25cm
8.13	2	29-41	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
8.14	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.14	2	20-32	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
8.15	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
8.15	2	27-38	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
8.16	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
8.16	2	35-45	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
8.17	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
8.17	2	26-36	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM; water at 34cm
8.18	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
8.18	2	30-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM; water at 32cm
9.1	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM
9.1	2	31-41	10YR 5/4	YL BR	SI LO	NCM
9.2	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
9.2	2	29-39	10YR 5/4	YL BR	SI LO	NCM
9.3	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
9.3	2	30-40	10YR 6/2	LT BR GR	SA LO	NCM
9.4	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
9.4	2	27-37	10YR 6/2	LT BR GR	SA LO	NCM
9.5	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM; gravel
9.5	2	30-40	10YR 6/2	LT BR GR	SA LO	NCM; gravel
9.6	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM
9.6	2	31-41	10YR 6/2	LT BR GR	SA LO	NCM
9.7	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
9.7	2	26-36	10YR 5/4	YL BR	SA LO	NCM
9.8	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
9.8	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.9	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
9.9	2	29-39	10YR 5/4	YL BR	SA LO	NCM
9.10	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
9.10	2	27-37	10YR 5/4	YL BR	SA LO	NCM
9.11	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
9.11	2	28-38	10YR 5/4	YL BR	SA LO	NCM
9.12	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
9.12	2	30-40	10YR 5/4	YL BR	SA LO	NCM; gravel
9.13	1	0-17	10YR 4/4	DK YL BR	SI LO	NCM; water at 17cm
9.14	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
9.14	2	28-38	10YR 5/4	YL BR	SA LO	NCM
9.15	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
9.15	2	29-39	10YR 5/4	YL BR	SA LO	NCM
9.16	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
9.16	2	30-40	10YR 5/4	YL BR	SA LO	NCM
9.17	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
9.17	2	31-41	10YR 5/4	YL BR	SA LO	NCM
9.18	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
9.18	2	28-38	10YR 5/4	YL BR	SA LO	NCM
10.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	31-42	10YR 5/4	YL BR	SA LO	NCM
10.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	29-40	10YR 5/4	YL BR	SA LO	NCM
10.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	32-43	10YR 5/4	YL BR	SA LO	NCM
10.4	1	0-29	10YR 4/2	DK GR BR	LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.4	2	29-39	10YR 5/6	YL BR	SA LO	NCM
10.5	1	0-31	10YR 4/2	DK GR BR	LO	NCM
10.5	2	31-43	10YR 5/6	YL BR	SA LO	NCM
10.6	1	0-33	10YR 4/2	DK GR BR	LO	NCM
10.6	2	33-45	10YR 5/6	YL BR	SA LO	NCM
10.7	1	0-28	10YR 4/1	DK GR	LO	NCM
10.7	2	28-40	10YR 5/6	YL BR	SA LO	NCM
10.8	1	0-30	10YR 4/1	DK GR	LO	NCM
10.8	2	30-42	10YR 5/6	YL BR	SA LO	NCM
10.9	1	0-32	10YR 4/1	DK GR	LO	NCM
10.9	2	32-43	10YR 5/6	YL BR	SA LO	NCM
10.10	1	0-29	10YR 4/2	DK GR BR	LO	NCM
10.10	2	29-40	10YR 5/6	YL BR	SA LO	NCM
10.11	1	0-31	10YR 4/2	DK GR BR	LO	NCM
10.11	2	31-43	10YR 5/6	YL BR	SA LO	NCM
10.12	1	0-30	10YR 4/2	DK GR BR	LO	NCM
10.12	2	30-42	10YR 5/6	YL BR	SA LO	NCM
10.13	1	0-30	10YR 4/2	DK GR BR	LO	NCM
10.13	2	30-42	10YR 5/6	YL BR	SA LO	NCM
10.14	1	0-30	10YR 4/2	DK GR BR	LO	NCM
10.14	2	30-41	10YR 5/6	YL BR	SA LO	NCM
10.15	1	0-29	10YR 4/2	DK GR BR	LO	NCM
10.15	2	29-39	10YR 5/6	YL BR	SA LO	NCM
10.16	1	0-27	10YR 4/2	DK GR BR	LO	NCM
10.16	2	27-39	10YR 5/6	YL BR	SA LO	NCM
10.17	1	0-26	10YR 4/2	DK GR BR	LO	NCM
10.17	2	26-38	10YR 5/6	YL BR	SA LO	NCM
10.18	1	0-28	10YR 4/2	DK GR BR	LO	NCM
10.18	2	28-40	10YR 5/6	YL BR	SA LO	NCM
11.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 27cm
11.1	2	30-40	10YR 5/6	YL BR	SI LO	NCM
11.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	27-40	10YR 5/6	YL BR	SI LO	NCM
11.3	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM; water at 35cm
11.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM; water at 29cm
11.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; water at 31cm
11.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; water at 27cm
11.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; water at 30cm
11.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM; water at 29cm
11.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; water at 30cm
11.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; water at 27cm
11.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; water at 32cm
11.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; water at 28cm
11.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	28-38	10YR 5/6	YL BR	SI LO	NCM; water
11.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	28-38	10YR 5/6	YL BR	SI LO	NCM
11.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	26-37	10YR 5/6	YL BR	SI LO	NCM
11.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; water at 32cm
11.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	28-38	10YR 5/6	YL BR	SI LO	NCM
11.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	28-38	10YR 5/6	YL BR	SI LO	pull tab (discarded)
12.1	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	18-33	10YR 5/4	YL BR	SI LO	NCM
12.2	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.2	2	19-35	10YR 5/4	YL BR	SI LO	NCM; seepage at 33cm
12.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	27-44	10YR 5/4	YL BR	SI LO	NCM
12.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	29-40	10YR 5/4	YL BR	SI LO	NCM; seepage at 38cm
12.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	22-42	10YR 5/4	YL BR	SI LO	NCM
12.6	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	20-36	10YR 5/4	YL BR	SI LO	NCM
12.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.7	2	27-40	10YR 5/4	YL BR	SI LO	NCM
12.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	24-38	10YR 5/4	YL BR	SI LO	NCM
12.9	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	20-34	10YR 5/4	YL BR	SI LO	NCM; seepage at 30cm
12.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	24-34	10YR 5/4	YL BR	SI LO	NCM
12.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	20-30	10YR 5/4	YL BR	SI LO	NCM; seepage at 22cm
12.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	23-35	10YR 5/4	YL BR	SI LO	NCM; seepage at 33cm
12.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	30-42	10YR 5/4	YL BR	SI LO	NCM
12.14	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
12.14	2	21-36	10YR 5/4	YL BR	SI LO	NCM
12.15	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.15	2	20-30	10YR 5/4	YL BR	SI LO	NCM
12.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	26-36	10YR 5/4	YL BR	SI LO	NCM
12.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	24-36	10YR 5/4	YL BR	SI LO	NCM
12.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	26-37	10YR 5/4	YL BR	SI LO	NCM
13.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	31-43	10YR 5/4	YL BR	CL LO	NCM
13.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	29-40	10YR 5/4	YL BR	CL LO	NCM; seepage at transition
13.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	27-39	10YR 5/4	YL BR	CL LO	NCM
13.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	28-40	10YR 5/4	YL BR	CL LO	NCM
13.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	26-37	10YR 5/4	YL BR	CL LO	NCM; slight seepage at transition
13.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	29-42	10YR 5/4	YL BR	CL LO	NCM
13.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	27-38	10YR 5/4	YL BR	CL LO	NCM
13.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	26-38	10YR 5/4	YL BR	CL LO	NCM
13.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	28-41	10YR 5/4	YL BR	CL LO	NCM; slight seepage at transition
13.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	27-37	10YR 5/4	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	26-38	10YR 5/4	YL BR	CL LO	NCM
13.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	28-40	10YR 5/4	YL BR	CL LO	NCM
13.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	25-36	10YR 5/4	YL BR	CL LO	NCM
13.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	28-41	10YR 5/4	YL BR	CL LO	NCM
13.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	27-38	10YR 5/4	YL BR	CL LO	NCM
14.1	1	0-30	10YR 3/3	DK BR	SI LO	NCM
14.1	2	30-38	10YR 5/4	YL BR	CL LO	NCM
14.2	1	0-30	10YR 2/2	V DK BR	SI LO	NCM
14.2	2	30-38	10YR 5/3	BR	CL LO	NCM; water at 35cm
14.3	1	0-30	10YR 2/2	V DK BR	SI LO	NCM
14.3	2	30-35	10YR 5/3	BR	CL LO	NCM
14.4	1	0-24	10YR 3/3	DK BR	SI LO	NCM; seepage
14.4	2	24-30	10YR 5/6	YL BR	CL LO	NCM
14.5	1	0-28	10YR 3/3	DK BR	SI LO	NCM
14.5	2	28-40	10YR 5/6	YL BR	SA LO	NCM
14.6	1	0-27	10YR 3/3	DK BR	SI LO	NCM
14.6	2	27-37	10YR 5/6	YL BR	SA LO	NCM
14.7	1	0-27	10YR 2/2	V DK BR	SI LO	NCM
14.7	2	27-35	10YR 5/3	BR	CL LO	NCM
14.8	1	0-25	10YR 2/2	V DK BR	SI LO	NCM
14.8	2	25-35	10YR 5/3	BR	CL LO	NCM
14.9	1	0-25	10YR 2/2	V DK BR	SI LO	NCM
14.9	2	25-35	10YR 5/3	BR	CL LO	NCM
14.10	1	0-25	10YR 2/2	V DK BR	SI LO	NCM
14.10	2	25-37	10YR 5/3	BR	SA LO	NCM
14.11	1	0-24	10YR 2/2	V DK BR	SI LO	NCM
14.11	2	24-36	10YR 5/3	BR	SA LO	NCM; water at 32cm
14.12	1	0-30	10YR 2/2	V DK BR	SI LO	NCM
14.12	2	30-40	10YR 4/3	BR	SA LO	NCM
14.13	1	0-29	10YR 2/2	V DK BR	SI LO	NCM
14.13	2	29-39	10YR 5/3	BR	CL LO	NCM
14.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.14	2	30-40	10YR 5/4	YL BR	CL LO	NCM
14.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	28-38	10YR 5/4	YL BR	CL LO	NCM
14.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	27-38	10YR 5/3	BR	CL LO	NCM
14.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	30-40	10YR 5/3	BR	CL LO	NCM
14.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	30-40	10YR 5/3	BR	CL LO	NCM
15.1	1	0-25	10YR 3/3	DK BR	SI LO	NCM
15.1	2	25-39	10YR 5/6	YL BR	SA LO	NCM
15.2	1	0-25	10YR 3/3	DK BR	SI LO	NCM
15.2	2	25-35	10YR 5/6	YL BR	SA LO	NCM
15.3	1	0-26	10YR 3/3	DK BR	SI LO	NCM
15.3	2	26-37	10YR 5/2	GR BR	SI CL	NCM
15.4	1	0-29	10YR 3/3	DK BR	SI	NCM
15.4	2	29-41	10YR 6/4	LT YL BR	SA LO CL	NCM
15.5	1	0-28	10YR 3/3	DK BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.5	2	28-38	10YR 5/6	YL BR	SA LO CL	NCM
15.6	1	0-26	10YR 3/3	DK BR	SI	NCM
15.6	2	26-37	10YR 5/6	YL BR	SA LO CL	NCM
15.7	1	0-28	10YR 3/3	DK BR	SI LO	NCM
15.7	2	28-38	10YR 5/6	YL BR	CL LO	NCM
15.8	1	0-24	10YR 3/4	DK YL BR	SI LO	NCM
15.8	2	24-37	10YR 5/6	YL BR	CL LO	NCM
15.9	1	0-27	10YR 3/3	DK BR	SI LO	NCM; seepage at 27cm
15.10	1	0-27	10YR 3/3	DK BR	SI LO	NCM; seepage at 27cm
15.11	1	0-25	10YR 3/3	DK BR	SA LO	NCM
15.11	2	25-35	10YR 5/4	YL BR	SA LO	NCM
15.12	1	0-27	10YR 3/3	DK BR	SA LO	NCM
15.12	2	27-39	10YR 5/4	YL BR	SA LO	NCM
15.13	1	0-22	10YR 3/3	DK BR	SA LO	NCM
15.13	2	22-36	10YR 5/4	YL BR	SA LO	NCM
15.14	1	0-24	10YR 3/3	DK BR	SA LO	NCM
15.14	2	24-34	10YR 5/4	YL BR	SA LO	NCM
15.15	1	0-26	10YR 3/3	DK BR	SA LO	NCM
15.15	2	26-37	10YR 5/4	YL BR	SA LO	NCM
15.16	1	0-28	10YR 3/3	DK BR	SA LO	NCM
15.16	2	28-38	10YR 5/4	YL BR	SA LO	NCM
15.17	1	0-27	10YR 3/3	DK BR	SA LO	NCM
15.17	2	27-39	10YR 5/5	YL BR	SA LO	NCM
15.18	1	0-27	10YR 3/3	DK BR	SA LO	NCM
15.18	2	27-38	10YR 5/5	YL BR	SA LO	NCM
16.1	1	0-20	10YR 3/3	DK BR	SI LO	NCM; water at 20cm
16.2	1	0-26	10YR 3/3	DK BR	SI LO	NCM
16.2	2	26-37	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM; seepage at 25cm
16.3	1	0-28	10YR 3/3	DK BR	SI LO	NCM
16.3	2	28-38	10YR 5/2	GR BR	SA LO	NCM seepage at 36cm
16.4	1	0-12	10YR 3/3	DK BR	SI LO	NCM; water at 12cm
16.5	1	0-29	10YR 3/3	DK BR	SI LO	NCM
16.5	2	29-40	10YR 5/4	YL BR	LO	NCM
16.6	1	0-20	10YR 3/3	DK BR	SI LO	NCM
16.6	2	20-26	10YR 5/4	YL BR	LO	NCM; seepage at 26cm
16.7	1	0-27	10YR 3/3	DK BR	SI LO	NCM
16.7	2	27-40	10YR 5/4	YL BR	SA LO	NCM
16.8	1	0-19	10YR 3/3	DK BR	SI LO	NCM
16.8	2	19-31	10YR 5/4	YL BR	SA LO	NCM
16.9	1	0-30	10YR 3/3	DK BR	SI LO	NCM; seepage at 30cm
16.10	1	0-30	10YR 3/3	DK BR	SI LO	NCM; water at 30cm
16.11	1	0-20	10YR 3/3	DK BR	SI LO	NCM
16.11	2	20-39	10YR 5/4	YL BR	SA LO	NCM
16.12	1	0-25	10YR 3/3	DK BR	SI LO	NCM
16.12	2	25-31	10YR 5/4	YL BR	SA LO	NCM; water at 31cm
16.13	1	0-24	10YR 3/3	DK BR	SI LO	NCM
16.13	2	24-35	10YR 5/4	YL BR	SA LO	NCM
16.14	1	0-24	10YR 3/3	DK BR	SI LO	NCM
16.14	2	24-34	10YR 5/4	YL BR	SA LO	NCM
16.15	1	0-29	10YR 3/3	DK BR	SI LO	NCM
16.15	2	29-39	10YR 5/4	YL BR	SA LO	NCM
16.16	1	0-24	10YR 3/3	DK BR	SI LO	NCM
16.16	2	24-35	10YR 5/4	YL BR	SA LO	NCM
16.17	1	0-19	10YR 3/3	DK BR	SI LO	NCM
16.17	2	19-32	10YR 5/4	YL BR	SA LO	NCM
16.18	1	0-21	10YR 3/3	DK BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.18	2	21-32	10YR 5/4	YL BR	SA LO	NCM
17.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	27-35	10YR 5/4	YL BR	SA SI	NCM; seepage at 35cm
17.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	26-39	10YR 5/4	YL BR	SA CL	NCM
17.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	30-44	10YR 5/4	YL BR	SA CL	NCM
17.4	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 14cm
17.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	31-42	10YR 5/1 GR 10YR 5/4	YL BR	SA CL	NCM
17.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	25-38	10YR 5/1 GR 10YR 5/4	YL BR	SA CL	NCM
17.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	24-40	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	28-39	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	25-37	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	27-40	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	30-41	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	27-42	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	27-37	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	28-45	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.15	2	28-41	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	26-45	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	29-42	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
17.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	31-42	10YR 5/1 GR 10YR 5/4	YL BR	SA LO	NCM
18.1	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.1	2	25-36	10YR 5/1 GR 10YR 5/4	YL BR	SA SI	NCM; seepage; rocks
18.2	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.2	2	26-36	10YR 5/1 GR 10YR 5/4	YL BR	SA SI	NCM; seepage; rocks
18.3	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.3	2	30-42	10YR 5/1 10YR 5/4	GR YL BR	SA SI	NCM; seepage; rocks
18.4	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
18.4	2	31-41	10YR 5/1 10YR 5/4	GR YL BR	SA SI	NCM
18.5	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM; water at 12cm
18.6	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; water at 10cm
18.7	1	0-51	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.7	2	51-61	10YR 5/1	GR	SA LO	NCM; seepage; rocks
18.8	1	0-19	10YR 3/2	V DK GR BR	SI LO	NCM; water at 19cm
18.9	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.9	2	24-36	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.10	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.10	2	32-43	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.11	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.11	2	26-36	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.12	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.12	2	27-37	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.13	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.13	2	22-37	10YR 5/6 10YR 5/4	YL BR YL BR	SA LO	NCM; seepage; rocks
18.14	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.14	2	25-47	10YR 5/6 10YR 5/4	YL BR YL BR	SA LO	NCM; seepage; rocks
18.15	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.15	2	26-40	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.16	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.16	2	28-40	10YR 5/6	YL BR	SA LO	NCM; seepage; rocks
18.17	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM; seepage; rocks
18.17	2	25-36	10YR 5/4 10YR 5/1	YL BR GR	SA LO	NCM; seepage; rocks
18.18	1	0-11	10YR 3/2	V DK GR BR	SI LO	NCM; water at 11cm
Turbine 6						
1.1	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	16-26	10YR 5/4	YL BR	SA LO	NCM
1.2	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	14-24	10YR 5/4	YL BR	SA LO	NCM
1.3	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	16-27	10YR 5/3	BR	SA LO	NCM
1.4	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	13-28	10YR 5/3	BR	SA LO	NCM
1.5	1	0-17	10YR 4/3	BR	SI LO	NCM
1.5	2	17-29	10YR 5/4	YL BR	SA LO	NCM
1.6	1	0-15	10YR 4/3	BR	SI LO	NCM
1.6	2	15-28	10YR 5/4	YL BR	SA LO	NCM
1.7	1	0-12	10YR 4/3	BR	SI LO	NCM
1.7	2	12-25	10YR 5/3	BR	SA LO	NCM
1.8	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
1.8	2	29-39	10YR 5/4	YL BR	SA LO	NCM
1.9	1	0-19	10YR 4/3	BR	SI LO	NCM
1.9	2	19-24	10YR 5/3	BR	SA LO	NCM; rock impasse
1.10	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	20-31	10YR 5/2	GR BR	SA LO	NCM
1.11	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	16-28	10YR 5/3	BR	SA LO	NCM
1.12	1	0-17		GRAVEL		gravel impasse; gravel road
1.13	1	0-17	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.13	2	17-30	10YR 5/3	BR	SA LO	NCM
1.14	1	0-22	10YR 4/3	BR	SI LO	NCM
1.14	2	22-32	10YR 5/2	GR BR	SA LO	NCM
1.15	1	0-5	10YR 4/3	BR	LO	NCM; rock impasse
1.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
1.17	1	0-29	10YR 4/3	BR	SI LO	NCM
1.17	2	29-40	10YR 5/4	YL BR	SA LO	NCM
1.18	1	0-30	10YR 4/3	BR	SI LO	NCM
1.18	2	30-40	10YR 5/4	YL BR	SA LO	NCM
2.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	27-40	10YR 5/4	YL BR	SA SI	NCM
2.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	25-35	10YR 5/4	YL BR	SA SI	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	27-37	10YR 5/4	YL BR	SA SI	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	29-39	10YR 5/4	YL BR	SA SI	NCM
2.11	1	0-7		GRAVEL		gravel impasse; gravel road
2.12	1	0-6		GRAVEL		gravel impasse; gravel road
2.13	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	19-29	10YR 5/4	YL BR	SA SI	NCM
2.14	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	23-33	10YR 5/4	YL BR	SA SI	NCM
2.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	25-35	10YR 5/4	YL BR	SA SI	NCM
2.16	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
2.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	32-42	10YR 5/4	YL BR	SA SI	NCM
2.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	29-39	10YR 5/4	YL BR	SA SI	NCM
3.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.1	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.2	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.3	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.4	2	22-32	10YR 5/4	YL BR	SA SI	NCM
3.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.5	2	24-35	10YR 5/4	YL BR	SA SI	NCM
3.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.6	2	26-36	10YR 5/4	YL BR	SA SI	NCM
3.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.7	2	24-34	10YR 5/4	YL BR	SA SI	NCM
3.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.8	2	23-33	10YR 5/4	YL BR	SA SI	NCM
3.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	23-33	10YR 5/4	YL BR	SA SI	NCM
3.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.10	2	24-34	10YR 5/4	YL BR	SA SI	NCM
3.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
3.12	1	0-6		GRAVEL		gravel impasse; gravel road
3.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM; rocky
3.13	2	22-32	10YR 5/4	YL BR	SA SI	NCM; rocky
3.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.14	2	22-33	10YR 5/4	YL BR	SA SI	NCM
3.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.15	2	23-33	10YR 5/4	YL BR	SA SI	NCM
3.16	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM
3.16	2	12-30	10YR 5/4	YL BR	SA SI	NCM
3.17	1	0-5	10YR 4/2	DK GR BR	SI LO	terminated due to rock impasse
3.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.18	2	26-36	10YR 5/4	YL BR	SA SI	NCM
4.1	1	0-24	10YR 4/3	BR	SI LO	NCM
4.1	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
4.2	1	0-23	10YR 4/3	BR	SI LO	NCM
4.2	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
4.3	1	0-38	10YR 4/3	BR	SI LO	NCM
4.3	2	38-48	10YR 5/6	YL BR	SI CL	NCM; seepage at 40cm
4.4	1	0-29	10YR 4/3	BR	SI LO	NCM
4.4	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
4.5	1	0-30	10YR 4/3	BR	SI LO	NCM
4.5	2	30-36	10YR 4/3 10YR 3/2	BR V DK GR BR	SI CL	NCM
4.5	3	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; seepage at 36cm
4.6	1	0-25	10YR 4/3	BR	SI LO	NCM; cobbles
4.6	2	25-37	10YR 5/4	YL BR	SI CL	NCM; cobbles
4.7	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
4.7	2	27-37	10YR 5/4	YL BR	SI CL	NCM
4.8	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM
4.8	2	31-41	10YR 5/4	YL BR	SI CL	NCM
4.9	1	0-17	10YR 4/4	DK YL BR	SI LO	NCM; gravel
4.9	2	17-27	10YR 5/4	YL BR	SI CL	NCM; gravel
4.10	1	0-10		GRAVEL		gravel impasse; gravel road
4.11	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM; gravel
4.11	2	14-24	10YR 5/4	YL BR	SI CL	NCM; gravel
4.12	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	17-27	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.13	1	0-21	10YR 4/4	DK YL BR	SI LO	NCM; gravel
4.13	2	21-31	10YR 5/4	YL BR	SI CL	NCM; gravel
4.14	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM; gravel
4.14	2	27-37	10YR 5/4	YL BR	SI CL	NCM; gravel
4.15	1	0-24	10YR 4/4	DK YL BR	SI LO	NCM; gravel
4.15	2	24-34	10YR 5/4	YL BR	SI CL	NCM; gravel
4.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; gravel
4.16	2	31-41	10YR 5/4	YL BR	SI CL	NCM; gravel
4.17	1	0-5	10YR 4/3	BR	SI LO	NCM; boulder impasse
4.18	1	0-21	10YR 4/3	BR	SI LO	NCM
4.18	2	21-31	10YR 5/4	YL BR	SI CL	NCM
5.1	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	19-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	22-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	22-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.5	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	20-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.7	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.8	1	0-5	10YR 4/2	DK GR BR	SI LO	gravel impasse/road
5.9	1	0-3	10YR 4/2	DK GR BR	SI LO	gravel impasse/ road
5.10	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	13-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.11	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	19-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.12	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	13-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.13	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	20-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.14	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	17-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.15	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	18-28	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.16	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	17-27	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.17	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.17	2	21-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; rocks
6.1	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM; rocks
6.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
6.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
6.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; very rocky
6.4	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM; very rocky
6.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; very rocky
6.5	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM; very rocky
6.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; very gravely
6.6	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM; very gravely
6.7	1	0-8	10YR 4/2	DK GR BR	SI LO	gravel; rock impasse
6.8	1	0-3	10YR 4/2	DK GR BR	SI LO	gravel impasse/ road
6.9	1	0-9	10YR 4/3	BR	SI LO	NCM; gravel
6.9	2	9-19	10YR 5/4	YL BR	SI CL	NCM; gravel
6.10	1	0-8	10YR 4/3	BR	SI LO	NCM; gravel
6.10	2	8-18	10YR 5/4	YL BR	SI CL	NCM; gravel
6.11	1	0-11	10YR 4/3	BR	SI LO	NCM; gravel
6.11	2	11-21	10YR 5/4	YL BR	SI CL	NCM; gravel
6.12	1	0-10	10YR 4/3	BR	SI LO	NCM; gravel
6.12	2	10-20	10YR 5/4	YL BR	SI CL	NCM; gravel
6.13	1	0-11	10YR 4/3	BR	SI LO	NCM; gravel
6.13	2	11-21	10YR 5/4	YL BR	SI CL	NCM; gravel
6.14	1	0-9	10YR 4/3	BR	SI LO	NCM; gravel
6.14	2	9-19	10YR 5/4	YL BR	SI CL	NCM; gravel
6.15	1	0-12	10YR 4/3	BR	SI LO	NCM; gravel
6.15	2	12-22	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; gravel
6.16	1	0-13	10YR 4/3	BR	SI LO	NCM; gravel
6.16	2	13-23	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; gravel
6.17	1	0-15	10YR 4/3	BR	SI LO	NCM
6.17	2	15-25	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.18	1	0-12	10YR 4/3	BR	SI LO	NCM
6.18	2	12-22	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.1	1	0-27	10YR 5/4	YL BR	SA LO	NCM; stones
7.1	2	27-34	10YR 6/2	LT BR GR	SA LO	NCM; stones; rock impasse
7.2	1	0-30	10YR 5/4	YL BR	SA LO	NCM
7.2	2	30-40	10YR 6/2	LT BR GR	SA LO	NCM
7.3	1	0-27	10YR 5/4	YL BR	SA LO	NCM; stones
7.3	2	27-37	10YR 6/2	LT BR GR	SA LO	NCM; stones
7.4	1	0-28	10YR 5/4	YL BR	SA LO	NCM; stones
7.4	2	28-40	10YR 6/2	LT BR GR	SA LO	NCM; stones

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.5	1	0-27	10YR 5/4	YL BR	SA LO	NCM; rock impasse
7.6	1	0-25	10YR 5/4	YL BR	SA LO	NCM; rock impasse
7.7	1	0-4	10YR 4/2	DK GR BR	SI LO	gravel impasse/road
7.8	1	0-17	10YR 4/3	BR	SA LO	NCM; gravel
7.8	2	17-27	10YR 5/6	YL BR	SA LO	NCM; gravel
7.9	1	0-15	10YR 4/3	BR	SA LO	NCM
7.9	2	15-25	10YR 5/6	YL BR	SA LO	NCM
7.10	1	0-14	10YR 4/3	BR	SA LO	NCM; gravel
7.10	2	14-25	10YR 5/6	YL BR	SA LO	NCM; gravel
7.11	1	0-15	10YR 4/3	BR	SA LO	NCM; gravel
7.11	2	15-25	10YR 5/6	YL BR	SA LO	NCM; gravel
7.12	1	0-17	10YR 4/3	BR	SA LO	NCM; gravel
7.12	2	17-27	10YR 5/6	YL BR	SA LO	NCM; gravel
7.13	1	0-12	10YR 4/2	DK GR BR	SA LO	NCM; gravel
7.13	2	12-22	10YR 5/6	YL BR	SA LO	NCM; gravel
7.14	1	0-10	10YR 4/2	DK GR BR	SA LO	NCM; gravel
7.14	2	10-20	10YR 5/6	YL BR	SA LO	NCM; gravel
7.15	1	0-5	10YR 4/2	DK GR BR	SA LO	NCM; gravel impasse
7.16	1	0-15	10YR 4/2	DK GR BR	SA LO	NCM
7.16	2	15-25	10YR 5/6	YL BR	SA LO	NCM
7.17	1	0-20	10YR 4/2	DK GR BR	SA LO	NCM
7.17	2	20-30	10YR 5/6	YL BR	SA LO	NCM
7.18	1	0-15	10YR 4/2	DK GR BR	SA LO	NCM
7.18	2	15-25	10YR 5/6	YL BR	SA LO	NCM
8.1	1	0-26	10YR 3/2	V DK GR BR	SI	NCM
8.1	2	26-27	10YR 5/4	YL BR	SI	NCM
8.2	1	0-20	10YR 3/2	V DK GR BR	SA LO	NCM
8.2	2	20-31	10YR 5/4	YL BR	SA LO	NCM
8.3	1	0-24	10YR 3/2	V DK GR BR	SA LO	NCM
8.3	2	24-36	10YR 5/4	YL BR	SA LO	NCM; gravel
8.4	1	0-22	10YR 3/3	DK BR	SA LO	NCM; gravel
8.4	2	22-35	10YR 5/4	YL BR	SA LO	NCM; gravel
8.5	1	0-4		GRAVEL		gravel impasse; gravel road
8.6	1	0-15	10YR 3/3	DK BR	SA LO	NCM
8.6	2	15-26	10YR 5/4	YL BR	SA LO	NCM
8.7	1	0-12	10YR 3/2	V DK GR BR	SA LO	NCM
8.7	2	12-22	10YR 5/4	YL BR	SA LO	NCM
8.8	1	0-12	10YR 4/3	BR	SA LO	NCM
8.8	2	12-23	10YR 5/4	YL BR	SA LO	NCM
8.9	1	0-19	10YR 4/3	BR	SA LO	NCM
8.9	2	19-32	10YR 5/3	BR	SA LO	NCM
8.10	1	0-20	10YR 3/3	DK BR	SA LO	NCM
8.10	2	20-33	10YR 5/4	YL BR	SA LO	NCM
8.11	1	0-18	10YR 3/3	DK BR	SA LO	NCM
8.11	2	18-32	10YR 5/4	YL BR	SA LO	NCM
8.12	1	0-19	10YR 3/3	DK BR	SA LO	NCM
8.12	2	19-29	10YR 5/4	YL BR	SA LO	NCM
8.13	1	0-21	10YR 3/3	DK BR	SA LO	NCM
8.13	2	21-32	10YR 5/4	YL BR	SA LO	NCM
8.14	1	0-15	10YR 3/2	V DK GR BR	SA LO	NCM
8.14	2	15-29	10YR 5/3	BR	SA LO	NCM
8.15	1	0-19	10YR 3/2	V DK GR BR	SA LO	NCM
8.15	2	19-29	10YR 5/3	BR	SA LO	NCM
8.16	1	0-5	10YR 3/3	DK BR	SA LO	NCM; rock/gravel impasse
8.17	1	0-22	10YR 3/3	DK BR	SA LO	NCM
8.17	2	22-42	10YR 5/4	YL BR	SA LO	NCM
8.18	1	0-23	10YR 3/3	DK BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.18	2	23-35	10YR 5/3	BR	SA LO	NCM
9.1	1	0-25	10YR 4/3	BR	LO	NCM
9.1	2	25-37	10YR 5/4	YL BR	SA LO	NCM
9.2	1	0-24	10YR 4/3	BR	LO	NCM
9.2	2	24-35	10YR 5/4	YL BR	SA LO	NCM
9.3	1	0-27	10YR 4/3	BR	LO	NCM; disturbed
9.3	2	27-38	10YR 5/4	YL BR	SA LO	NCM; disturbed
9.4	1	0-10	10YR 4/2	DK GR BR	LO	NCM; gravel impasse; road
9.5	1	0-23	10YR 4/3	BR	LO	NCM
9.5	2	23-36	10YR 4/6	DK YL BR	SA LO	NCM
9.6	1	0-24	10YR 4/3	BR	LO	NCM
9.6	2	24-36	10YR 4/6	DK YL BR	SA LO	NCM
9.7	1	0-18	10YR 4/3	BR	LO	NCM
9.7	2	18-30	10YR 4/6	DK YL BR	SA LO	NCM
9.8	1	0-19	10YR 4/3	BR	LO	NCM
9.8	2	19-30	10YR 4/6	DK YL BR	SA LO	NCM
9.9	1	0-24	10YR 4/3	BR	LO	NCM
9.9	2	24-35	10YR 4/6	DK YL BR	SA LO	NCM
9.10	1	0-24	10YR 4/3	BR	LO	NCM
9.10	2	24-35	10YR 5/6	YL BR	SA LO	NCM
9.11	1	0-19	10YR 4/3	BR	LO	NCM
9.11	2	19-32	10YR 5/6	YL BR	SA LO	NCM
9.12	1	0-20	10YR 4/3	BR	LO	NCM
9.12	2	20-32	10YR 5/6	YL BR	SA LO	NCM
9.13	1	0-17	10YR 4/3	BR	LO	NCM
9.13	2	17-31	10YR 5/4	YL BR	SA LO	NCM
9.14	1	0-17	10YR 4/3	BR	LO	NCM
9.14	2	17-30	10YR 5/4	YL BR	SA LO	NCM
9.15	1	0-16	10YR 4/3	BR	LO	NCM
9.15	2	16-32	10YR 5/4	YL BR	SA LO	NCM
9.16	1	0-15	10YR 4/3	BR	LO	NCM
9.16	2	15-30	10YR 5/4	YL BR	SA LO	NCM
9.17	1	0-22	10YR 4/3	BR	LO	NCM
9.17	2	22-33	10YR 5/4	YL BR	SA LO	NCM
9.18	1	0-21	10YR 4/3	BR	LO	NCM
9.18	2	21-33	10YR 5/4	YL BR	SA LO	NCM
10.1	1	0-17	10YR 4/3	BR	LO	NCM
10.1	2	17-28	10YR 5/4	YL BR	SA LO	NCM
10.2	1	0-13	10YR 4/3	BR	LO	NCM; gravel impasse
10.3	1	0-28	10YR 4/3	BR	LO	NCM
10.3	2	28-39	10YR 5/4	YL BR	SA LO	NCM
10.4	1	0-23	10YR 4/3	BR	LO	NCM
10.4	2	23-40	10YR 5/4	YL BR	SA LO	NCM
10.5	1	0-21	10YR 4/3	BR	LO	NCM
10.5	2	21-35	10YR 5/4	YL BR	SA LO	NCM
10.6	1	0-26	10YR 4/3	BR	LO	NCM
10.6	2	26-40	10YR 5/6	YL BR	SA LO	NCM
10.7	1	0-27	10YR 4/3	BR	LO	NCM
10.7	2	27-40	10YR 4/6	DK YL BR	SA LO	NCM
10.8	1	0-26	10YR 4/3	BR	LO	NCM
10.8	2	26-40	10YR 5/4	YL BR	SA LO	NCM
10.9	1	0-24	10YR 4/3	BR	LO	NCM
10.9	2	24-37	10YR 5/4	YL BR	SA LO	NCM
10.10	1	0-21	10YR 4/3	BR	LO	NCM
10.10	2	21-38	10YR 5/4	YL BR	SA LO	NCM
10.11	1	0-26	10YR 4/3	BR	LO	NCM
10.11	2	26-38	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.12	1	0-26	10YR 4/3	BR	LO	NCM
10.12	2	26-39	10YR 5/4	YL BR	SA LO	NCM
10.13	1	0-25	10YR 4/3	BR	LO	NCM
10.13	2	25-37	10YR 4/6	DK YL BR	SA LO	NCM
10.14	1	0-24	10YR 4/3	BR	LO	NCM
10.14	2	24-37	10YR 4/6	DK YL BR	SA LO	NCM
10.15	1	0-28	10YR 4/3	BR	LO	NCM
10.15	2	28-38	10YR 4/6	DK YL BR	SA LO	NCM
10.16	1	0-29	10YR 4/3	BR	LO	NCM
10.16	2	29-40	10YR 4/6	DK YL BR	SA LO	NCM
10.17	1	0-22	10YR 4/3	BR	LO	NCM
10.17	2	22-36	10YR 4/6	DK YL BR	SA LO	NCM
10.18	1	0-23	10YR 4/3	BR	LO	NCM
10.18	2	23-35	10YR 4/6	DK YL BR	SA LO	NCM
11.1	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	22-32	10YR 5/4	YL BR	SI LO	NCM
11.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones; natural chert
11.2	2	25-35	10YR 5/4	YL BR	SI LO	NCM; rocks/stones; natural chert
11.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	27-40	10YR 5/4	YL BR	SI LO	NCM
11.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM; stones/rocks
11.4	2	29-41	10YR 5/4	YL BR	SI LO	NCM; stones/rocks
11.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	24-34	10YR 5/4	YL BR	SI LO	NCM
11.6	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	20-30	10YR 4/6	DK YL BR	SI LO	NCM
11.7	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones; natural chert
11.7	2	23-35	10YR 5/4	YL BR	SI LO	NCM; rocks/stones; natural chert
11.8	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones; natural chert
11.8	2	20-30	10YR 5/4	YL BR	SI LO	NCM; rocks/stones; natural chert
11.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones; natural chert
11.9	2	23-33	10YR 5/4	YL BR	SI LO	NCM; rocks/stones; natural chert
11.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones
11.10	2	28-40	10YR 5/4	YL BR	SI LO	NCM; rocks/stones
11.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	24-36	10YR 5/4	YL BR	SI LO	NCM
11.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	23-36	10YR 5/4	YL BR	SI LO	NCM
11.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM; rocks/stones
11.13	2	22-33	10YR 5/4	YL BR	SI LO	NCM; rocks/stones
11.14	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	18-30	10YR 4/6	DK YL BR	SI CL	NCM
11.15	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	19-30	10YR 4/6	DK YL BR	SI CL	NCM
11.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	25-35	10YR 4/6	DK YL BR	SI LO	NCM
11.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
11.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	28-40	10YR 4/6	DK YL BR	SI LO	NCM
12.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	35-45	10YR 5/4	YL BR	CL LO	NCM
12.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	33-43	10YR 5/4	YL BR	CL LO	NCM
12.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.4	2	25-30	10YR 5/4	YL BR	CL LO	NCM
12.5	1	0-30	10YR 4/3	BR	SI LO	NCM
12.5	2	30-40	10YR 5/8	YL BR	CL LO	NCM
12.6	1	0-24	10YR 4/3	BR	SI LO	NCM
12.6	2	24-34	10YR 5/8	YL BR	CL LO	NCM
12.7	1	0-30	10YR 4/3	BR	SI LO	NCM; natural chert
12.7	2	30-40	10YR 5/8	YL BR	CL LO	NCM; natural chert
12.8	1	0-25	10YR 4/3	BR	SI LO	NCM; natural chert
12.8	2	25-35	10YR 5/8	YL BR	CL LO	NCM; natural chert
12.9	1	0-29	10YR 4/3	BR	SI LO	NCM; natural chert
12.9	2	29-39	10YR 5/8	YL BR	CL LO	NCM; natural chert
12.10	1	0-30	10YR 4/3	BR	SI LO	NCM
12.10	2	30-40	10YR 5/8	YL BR	CL LO	NCM
12.11	1	0-27	10YR 4/3	BR	SI LO	NCM
12.11	2	27-37	10YR 5/8	YL BR	CL LO	NCM
12.12	1	0-30	10YR 4/3	BR	SI LO	NCM
12.12	2	30-40	10YR 5/8	YL BR	CL LO	NCM
12.13	1	0-25	10YR 4/3	BR	SI LO	NCM
12.13	2	25-35	10YR 5/8	YL BR	CL LO	NCM
12.14	1	0-25	10YR 4/3	BR	SI LO	NCM; disturbed
12.14	2	25-39	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM; disturbed
12.15	1	0-25	10YR 4/3	BR	SI LO	NCM
12.15	2	25-35	10YR 5/8	YL BR	CL LO	NCM
12.16	1	0-13	10YR 4/3	BR	SI LO	NCM
12.17	1	0-30	10YR 4/3	BR	SI LO	NCM; root impasse
12.17	2	30-38	10YR 5/8	YL BR	CL LO	NCM
12.18	1	0-29	10YR 4/3	BR	SI LO	NCM
12.18	2	29-40	10YR 5/8	YL BR	CL LO	NCM
13.1	1	0-33	10YR 4/3	BR	SI LO	NCM
13.1	2	33-45	10YR 5/4	YL BR	CL LO	NCM
13.2	1	0-34	10YR 4/3	BR	SI LO	NCM
13.2	2	34-47	10YR 5/4	YL BR	CL LO	NCM
13.3	1	0-31	10YR 4/3	BR	SI LO	NCM
13.3	2	31-45	10YR 5/4	YL BR	CL LO	NCM
13.4	1	0-29	10YR 4/3	BR	SI LO	NCM
13.4	2	29-41	10YR 5/6	YL BR	CL LO	NCM
13.5	1	0-27	10YR 4/3	BR	SI LO	NCM
13.5	2	27-39	10YR 5/6	YL BR	CL LO	NCM
13.6	1	0-26	10YR 4/3	BR	SI LO	NCM
13.6	2	26-39	10YR 5/6	YL BR	CL LO	NCM
13.7	1	0-30	10YR 4/3	BR	SI LO	NCM
13.7	2	30-41	10YR 5/6	YL BR	CL LO	NCM
13.8	1	0-32	10YR 4/3	BR	SI LO	NCM
13.8	2	32-44	10YR 5/6	YL BR	CL LO	NCM
13.9	1	0-29	10YR 4/3	BR	SI LO	NCM
13.9	2	29-41	10YR 5/6	YL BR	CL LO	NCM
13.10	1	0-27	10YR 4/3	BR	SI LO	NCM
13.10	2	27-37	10YR 5/6	YL BR	CL LO	NCM
13.11	1	0-28	10YR 4/3	BR	SI LO	NCM
13.11	2	28-42	10YR 5/6	YL BR	CL LO	NCM
13.12	1	0-26	10YR 4/3	BR	SI LO	NCM
13.12	2	26-39	10YR 5/6	YL BR	CL LO	NCM
13.13	1	0-28	10YR 4/3	BR	SI LO	NCM
13.13	2	28-40	10YR 5/6	YL BR	CL LO	NCM
13.14	1	0-22	10YR 4/3	BR	SI LO	NCM; slight seepage

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.14	2	2-35	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM; slight seepage
13.15	1	0-20	10YR 4/3	BR	SI LO	NCM
13.15	2	20-33	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM
13.16	1	0-26	10YR 4/3	BR	SI LO	NCM
13.16	2	26-40	10YR 5/6	YL BR	CL LO	NCM
13.17	1	0-25	10YR 4/3	BR	SI LO	NCM
13.17	2	25-37	10YR 5/6	YL BR	CL LO	NCM
13.18	1	0-26	10YR 4/3	BR	SI LO	NCM
13.18	2	26-38	10YR 5/6	YL BR	CL LO	NCM
14.1	1	0-27	10YR 4/3	BR	SI LO	NCM
14.1	2	27-38	7.5YR 4/4	STRONG BR	SA LO	NCM
14.2	1	0-29	10YR 4/3	BR	SI LO	NCM
14.2	2	29-39	7.5YR 4/4	STRONG BR	SA LO	NCM
14.3	1	0-16	10YR 4/3	BR	SI LO	NCM
14.3	2	16-30	7.5YR 4/4	STRONG BR	SA LO	NCM
14.4	1	0-30	10YR 4/3	BR	SI LO	NCM
14.4	2	30-50	7.5YR 4/4	STRONG BR	SA LO	NCM
14.5	1	0-22	10YR 4/3	BR	SI LO	NCM
14.5	2	22-33	7.5YR 4/4	STRONG BR	SA LO	NCM
14.6	1	0-26	10YR 4/3	BR	SI LO	NCM
14.6	2	26-36	7.5YR 4/4	STRONG BR	SA LO	NCM
14.7	1	0-22	10YR 4/3	BR	SI LO	NCM
14.7	2	22-33	7.5YR 4/4	STRONG BR	SA LO	NCM
14.8	1	0-24	10YR 4/3	BR	SI LO	NCM
14.8	2	24-34	10YR 5/8	YL BR	SA LO	NCM
14.9	1	0-24	10YR 4/3	BR	SI LO	NCM
14.9	2	24-35	10YR 5/8	YL BR	SA LO	NCM
14.10	1	0-26	10YR 4/3	BR	SI LO	NCM
14.10	2	26-36	10YR 5/8	YL BR	SA LO	NCM
14.11	1	0-24	10YR 4/3	BR	SI LO	NCM
14.11	2	24-37	10YR 5/8	YL BR	SA LO	NCM
14.12	1	0-29	10YR 4/3	BR	SI LO	NCM
14.12	2	29-39	10YR 5/8	YL BR	SA LO	NCM
14.13	1	0-15	10YR 4/3	BR	SI LO	NCM
14.13	2	15-29	10YR 5/8	YL BR	SA LO	NCM
14.14	1	0-10	10YR 4/3	BR	SI LO	NCM; disturbed
14.14	2	10-12	10YR 5/8	YL BR	SA LO	NCM; disturbed
14.15	1	0-12	10YR 4/3	BR	SI LO	NCM
14.15	2	12-30	10YR 5/8	YL BR	SA LO	NCM
14.16	1	0-8	10YR 4/3	BR	SI LO	NCM; seepage
14.16	2	8-25	10YR 5/1 10YR 5/4	GR YL BR	SA SI	NCM; seepage
14.17	1	0-12	10YR 4/3	BR	SI LO	NCM; rock impasse
14.18	1	0-22	10YR 4/3	BR	SI LO	NCM
14.18	2	22-35	10YR 5/4	YL BR	SA SI	NCM
15.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	27-37	10YR 5/4	YL BR	SA CL	NCM
15.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	31-41	10YR 5/4	YL BR	SA CL	NCM
15.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	24-34	10YR 5/4	YL BR	SA CL	NCM
15.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	29-39	10YR 6/4	LT YL BR	SI CL	NCM
15.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	30-40	10YR 6/4	LT YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	32-42	10YR 6/4	LT YL BR	SA CL	NCM
15.7	1	0-28	10YR 4/3	BR	SI LO	NCM
15.7	2	28-38	10YR 5/4	YL BR	SA LO	NCM
15.8	1	0-27	10YR 4/3	BR	SI LO	NCM
15.8	2	27-37	10YR 5/4	YL BR	SA LO	NCM
15.9	1	0-29	10YR 4/3	BR	SI LO	NCM
15.9	2	29-39	10YR 5/4	YL BR	SA LO	NCM
15.10	1	0-31	10YR 4/3	BR	SI LO	NCM
15.10	2	31-41	10YR 5/6	YL BR	SI CL	NCM
15.11	1	0-28	10YR 4/3	BR	SI LO	NCM
15.11	2	28-38	10YR 5/6	YL BR	SI CL	NCM
15.12	1	0-34	10YR 4/3	BR	SI LO	NCM
15.12	2	34-44	10YR 5/6	YL BR	SI CL	NCM
15.13	1	0-31	10YR 4/3	BR	SI LO	NCM
15.13	2	31-41	10YR 5/4	YL BR	SA CL	NCM
15.14	1	0-10	10YR 4/3	BR	SI LO	NCM; disturbed
15.14	2	10-26	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; disturbed
15.15	1	0-7	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
15.15	2	7-22	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; disturbed
15.16	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
15.16	2	14-26	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; disturbed
15.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
15.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
16.1	1	0-26	10YR 4/3	BR	SI LO	NCM
16.1	2	26-38	10YR 5/6	YL BR	SA LO	NCM
16.2	1	0-32	10YR 4/3	BR	SI LO	NCM; rock impasse
16.3	1	0-24	10YR 4/3	BR	SI LO	NCM
16.3	2	24-34	10YR 4/6	DK YL BR	SA LO	NCM
16.4	1	0-24	10YR 4/3	BR	SI LO	NCM
16.4	2	24-36	7.5YR 4/4	BR	SA LO	NCM
16.5	2	0-25	10YR 4/3	BR	SI LO	NCM
16.5	2	25-36	7.5YR 4/4	BR	SA LO	NCM
16.6	1	0-23	10YR 4/3	BR	SI LO	NCM
16.6	2	23-35	7.5YR 4/4	BR	SA LO	NCM
16.7	1	0-22	10YR 4/3	BR	SI LO	NCM
16.7	2	22-33	7.5YR 4/4	BR	SA LO	NCM
16.8	1	0-23	10YR 4/3	BR	SI LO	NCM
16.8	2	23-35	7.5YR 4/4	BR	SA LO	NCM
16.9	1	0-24	10YR 4/3	BR	SI LO	NCM
16.9	2	24-34	7.5YR 4/4	BR	SA LO	NCM
16.10	1	0-27	10YR 4/3	BR	SI LO	NCM
16.10	2	27-39	7.5YR 4/4	BR	SA LO	NCM
16.11	1	0-23	10YR 4/3	BR	SI LO	NCM
16.11	2	23-34	7.5YR 4/4	BR	SA LO	NCM
16.12	1	0-20	10YR 4/3	BR	SI LO	NCM
16.12	2	20-31	7.5YR 4/4	BR	SA LO	NCM
16.13	1	0-22	10YR 4/3	BR	SI LO	NCM
16.13	2	22-27	7.5YR 4/4	BR	SA LO	NCM; rock impasse
16.14	1	0-23	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.14	2	23-34	7.5YR 4/4	BR	SA LO	NCM
16.15	1	0-10	10YR 4/3	BR	SI LO	NCM
16.15	2	10-25	7.5YR 4/4	BR	SA LO	NCM
16.16	1	0-23	10YR 4/3	BR	SI LO	NCM
16.16	2	23-34	7.5YR 4/4	BR	SA LO	NCM
16.17	1	0-25	10YR 4/3	BR	SI LO	NCM
16.17	2	25-36	10YR 5/6	YL BR	SA LO	NCM
16.18	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; root impasse
17.1	1	0-29	10YR 4/3	BR	SI LO	NCM
17.1	2	29-39	10YR 5/4	YL BR	SI CL	NCM
17.2	1	0-19	10YR 4/3	BR	SI LO	NCM
17.2	2	19-32	10YR 5/4	YL BR	SI CL	NCM
17.3	1	0-26	10YR 4/3	BR	SI LO	NCM
17.3	2	26-36	10YR 4/2	DK GR BR	SI LO	NCM
17.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	22-32	10YR 5/4	YL BR	SI CL	NCM
17.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	22-32	10YR 5/4	YL BR	SI CL	NCM
17.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	25-35	10YR 5/4	YL BR	SI CL	NCM
17.7	1	0-13	10YR 4/3	BR	SI LO	NCM; disturbed
17.7	2	13-33	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.8	1	0-14	10YR 4/3	BR	SI LO	NCM; disturbed
17.8	2	14-24	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.9	1	0-12	10YR 4/3	BR	SI LO	NCM; disturbed
17.9	2	12-24	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.10	1	0-13	10YR 4/3	BR	SI LO	NCM; disturbed
17.10	2	13-26	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.11	1	0-10	10YR 4/3	BR	SI LO	NCM; disturbed
17.11	2	10-21	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.12	1	0-16	10YR 4/3	BR	SI LO	NCM; disturbed
17.12	2	16-27	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.13	1	0-12	10YR 4/3	BR	SI LO	NCM; disturbed
17.13	2	12-28	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.14	1	0-15	10YR 4/3	BR	SI LO	NCM; disturbed
17.14	2	15-25	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.15	1	0-16	10YR 4/3	BR	SI LO	NCM; disturbed
17.15	2	16-37	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.16	1	0-12	10YR 4/3	BR	SI LO	NCM; disturbed
17.16	2	12-22	10YR 5/4	YL BR	SI CL	NCM; disturbed
17.17	1	0-22	10YR 6/3 10YR 6/8	PALE BR BR YL	SI LO	NCM; disturbed; gravel/fill
17.18	1	0-24	10YR 6/3 10YR 6/8	PALE BR BR YL	SI LO	NCM; disturbed; gravel/fill
18.1	1	0-30	10YR 4/3	BR	SI LO	NCM
18.1	2	30-41	10YR 5/4	YL BR	SA LO	NCM
18.2	1	0-30	10YR 4/3	BR	SI LO	NCM
18.2	2	30-40	10YR 5/4	YL BR	SA LO	NCM
18.3	1	0-16	10YR 4/3	BR	SI LO	NCM
18.3	2	16-28	10YR 5/4	YL BR	SA LO	NCM
18.4	1	0-22	10YR 4/3	BR	SI LO	NCM
18.4	2	22-36	10YR 4/6	DK YL BR	SA SI	NCM
18.5	1	0-30	10YR 5/4 10YR 4/2	YL BR DK GR BR	SI LO	NCM; disturbed; gravel impasse
18.6	1	0-6	10YR 5/4 10YR 4/2	YL BR DK GR BR	SI LO	NCM; disturbed; gravel impasse
18.7	1	0-23	10YR 4/3	BR	SA LO	NCM; disturbed; gravel impasse

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.8	1	0-20	10YR 5/1 10YR 4/2 10YR 5/4	GR DK GR BR YL BR	SA LO	NCM; stripped top soil
18.9	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	10-25	10YR 6/4	LT YL BR	SA LO	NCM
18.10	1	0-10	10YR 4/3	BR	SI LO	NCM; disturbed; stripped topsoil
18.11	1	0-12	10YR 5/1 10YR 5/4	GR YL BR	CL SI	NCM; disturbed
18.12	1	0-8	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
18.12	2	8-20	10YR 5/1 10YR 5/4	GR YL BR	CL SI	NCM; disturbed
18.13	1	0-10	10YR 4/3	BR	SI LO	NCM
18.13	2	10-22	10YR 5/1 10YR 5/4	GR YL BR	CL SI	NCM
18.14	1	0-10	10YR 4/3	BR	SI LO	NCM
18.14	2	10-20	10YR 5/1 10YR 5/4	GR YL BR	CL SI	NCM
18.15	1	0-30	10YR 4/3	BR	SI LO	NCM
18.15	2	30-34	10YR 5/1 10YR 5/4	GR YL BR	CL SI	NCM; seepage; water filled
18.16	1	0-18	10YR 4/3	BR	SI LO	NCM
18.16	2	18-30	10YR 5/4 10YR 5/1	YL BRGR	CL SI	NCM
18.17	1	0-22	10YR 4/3	BR	SI LO	NCM
18.17	2	22-32	10YR 5/1 10YR 5/4	YL BR GR	CL SI	NCM
18.18	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	14-24	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL SI	NCM; gravel
Turbine 8						
1.1	1	0-26	10YR 3/3	DK BR	SI LO	NCM
1.1	2	26-36	10YR 5/4	YL BR	SI LO	NCM
1.2	1	0-24	10YR 3/3	DK BR	SI LO	NCM
1.2	2	24-36	10YR 5/4	YL BR	SI LO	NCM
1.3	1	0-24	10YR 3/3	DK BR	SI LO	NCM
1.3	2	24-34	10YR 5/4	YL BR	SI LO	NCM
1.4	1	0-26	10YR 3/3	DK BR	SI LO	NCM
1.4	2	26-36	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-27	10YR 3/3	DK BR	SI LO	NCM
1.5	2	27-39	10YR 6/2	LT BR GR	CL	NCM
1.6	1	0-20	10YR 3/3	DK BR	SI LO	NCM
1.6	2	20-32	10YR 5/4	YL BR	CL	NCM
1.7	1	0-21	10YR 3/3	DK BR	SI LO	NCM
1.7	2	21-33	10YR 6/2	LT BR GR	CL LO	NCM
1.8	1	0-23	10YR 3/3	DK BR	SI LO	NCM
1.8	2	23-35	10YR 6/2	LT BR GR	CL LO	NCM
1.9	1	0-25	10YR 3/3	DK BR	SI LO	NCM
1.9	2	25-37	10YR 6/2	LT BR GR	CL LO	NCM
1.10	1	0-24	10YR 3/3	DK BR	SI LO	NCM
1.10	2	24-36	10YR 5/4	YL BR	SI LO	NCM
1.11	1	0-27	10YR 3/3	DK BR	SI LO	NCM
1.11	2	27-38	10YR 5/4	YL BR	SI LO	NCM
1.12	1	0-25	10YR 3/3	DK BR	SI LO	NCM
1.12	2	25-37	10YR 5/4	YL BR	SI LO	NCM
1.13	1	0-17	10YR 3/3	DK BR	SI LO	NCM
1.13	2	17-29	10YR 5/4	YL BR	SI LO	NCM
1.14	1	0-17	10YR 3/3	DK BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.14	2	17-27	10YR 6/2	LT BR GR	SI LO	NCM
1.15	1	0-21	10YR 3/3	DK BR	SI LO	NCM
1.15	2	21-34	10YR 6/2	LT BR GR	SI LO	NCM
1.16	1	0-23	10YR 3/3	DK BR	SI LO	NCM
1.16	2	23-35	10YR 6/2	LT BR GR	SI LO CL	NCM
1.17	1	0-28	10YR 3/3	DK BR	SI LO	NCM
1.17	2	28-38	10YR 6/2	LT BR GR	CL	NCM
1.18	1	0-22	10YR 3/3	DK BR	SI LO	NCM
1.18	2	22-38	10YR 6/2	LT BR GR	CL	NCM
2.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	30-42	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	25-35	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	27-39	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	26-36	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	28-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	30-42	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	27-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	29-40	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	26-36	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	28-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	26-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	25-37	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	23-35	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	25-35	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	27-39	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	28-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	26-38	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
2.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	32-43	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
3.1	1	0-36	10YR 3/2	V DK GR BR	SI LO	NCM
3.1	2	36-46	10YR 5/3	BR	SI LO	NCM
3.2	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM
3.2	2	23-43	10YR 5/3	BR	SI LO	NCM
3.3	1	0-25	10YR 3/3	DK BR	SI LO	NCM
3.3	2	25-35	10YR 5/4	YL BR	SI LO	NCM
3.4	1	0-32	10YR 3/3	DK BR	SI LO	NCM
3.4	2	32-42	10YR 5/4	YL BR	SI LO	NCM
3.5	1	0-34	10YR 3/3	DK BR	SI LO	NCM
3.5	2	34-44	10YR 5/4	YL BR	SI LO	NCM
3.6	1	0-30	10YR 3/3	DK BR	SI LO	NCM
3.6	2	30-42	10YR 5/4	YL BR	SI LO	NCM
3.7	1	0-29	10YR 3/3	DK BR	SI LO	NCM
3.7	2	29-40	10YR 5/4	YL BR	SI LO	NCM
3.8	1	0-28	10YR 3/3	DK BR	SI LO	NCM
3.8	2	28-40	10YR 5/4	YL BR	SI LO	NCM
3.9	1	0-34	10YR 3/3	DK BR	SI LO	NCM
3.9	2	34-44	10YR 5/4	YL BR	SI LO	NCM
3.10	1	0-35	10YR 3/3	DK BR	SI LO	NCM
3.10	2	35-46	10YR 5/4	YL BR	SI LO	NCM
3.11	1	0-31	10YR 3/3	DK BR	SI LO	NCM
3.11	2	31-41	10YR 5/4	YL BR	SI LO	NCM
3.12	1	0-27	10YR 3/3	DK BR	SI LO	NCM
3.12	2	27-40	10YR 5/4	YL BR	SI LO	NCM
3.13	1	0-24	10YR 3/3	DK BR	SI LO	NCM
3.13	2	24-39	10YR 5/4	YL BR	SI LO	NCM
3.14	1	0-19	10YR 3/3	DK BR	SI LO	NCM
3.14	2	19-29	10YR 5/4	YL BR	SI LO	NCM
3.15	1	0-27	10YR 3/3	DK BR	SI LO	NCM
3.15	2	27-39	10YR 5/4	YL BR	SI LO	NCM
3.16	1	0-23	10YR 3/3	DK BR	SI LO	NCM
3.16	2	23-33	10YR 5/4	YL BR	SI LO	NCM
3.17	1	0-19	10YR 3/3	DK BR	SI LO	NCM
3.17	2	19-29	10YR 5/4	YL BR	SI LO	NCM
3.18	1	0-31	10YR 3/3	DK BR	SI LO	NCM
3.18	2	31-41	10YR 5/4	YL BR	SI LO	NCM
4.1	1	0-36	10YR 3/3	DK BR	SI LO	NCM
4.1	2	36-46	10YR 5/2	GR BR	CL LO	NCM
4.2	1	0-32	10YR 3/3	DK BR	SI LO	NCM
4.2	2	32-42	10YR 5/2	GR BR	CL LO	NCM
4.3	1	0-30	10YR 3/3	DK BR	SI LO	NCM
4.3	2	30-40	10YR 5/2	GR BR	CL LO	NCM
4.4	1	0-27	10YR 3/3	DK BR	SI LO	NCM
4.4	2	27-37	10YR 5/2	GR BR	CL LO	NCM
4.5	1	0-28	10YR 3/3	DK BR	SI LO	NCM
4.5	2	28-38	10YR 5/2	GR BR	CL LO	NCM
4.6	1	0-21	10YR 3/3	DK BR	SI LO	NCM
4.6	2	21-31	10YR 5/2	GR BR	CL LO	NCM
4.7	1	0-22	10YR 3/3	DK BR	SI LO	NCM
4.7	2	22-32	10YR 5/2	GR BR	CL LO	NCM
4.8	1	0-21	10YR 3/3	DK BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.8	2	21-31	10YR 5/2	GR BR	CL LO	NCM
4.9	1	0-18	10YR 3/3	DK BR	SI LO	NCM
4.9	2	18-28	10YR 5/2	GR BR	CL LO	NCM
4.10	1	0-21	10YR 3/3	DK BR	SI LO	NCM
4.10	2	21-32	10YR 5/2	GR BR	CL LO	NCM
4.11	1	0-23	10YR 3/3	DK BR	SI LO	NCM
4.11	2	23-33	10YR 5/2	GR BR	CL LO	NCM
4.12	1	0-25	10YR 3/3	DK BR	SI LO	NCM
4.12	2	25-35	10YR 5/2	GR BR	CL LO	NCM
4.13	1	0-16	10YR 3/3	DK BR	SI LO	NCM
4.13	2	16-26	10YR 5/2	GR BR	CL LO	NCM
4.14	1	0-14	10YR 3/3	DK BR	SI LO	NCM
4.14	2	14-24	10YR 5/2	GR BR	CL LO	NCM
4.15	1	0-17	10YR 3/3	DK BR	SI LO	NCM
4.15	2	17-27	10YR 5/2	GR BR	CL LO	NCM
4.16	1	0-18	10YR 3/3	DK BR	SI LO	NCM
4.16	2	18-28	10YR 5/2	GR BR	CL LO	NCM
4.17	1	0-24	10YR 3/3	DK BR	SI LO	NCM
4.17	2	24-34	10YR 5/2	GR BR	CL LO	NCM
4.18	1	0-28	10YR 3/3	DK BR	SI LO	NCM
4.18	2	28-38	10YR 5/2	GR BR	CL LO	NCM
5.1	1	0-31	10YR 3/3	DK BR	SI LO	NCM
5.1	2	31-42	10YR 5/2	GR BR	SI LO	NCM
5.2	1	0-27	10YR 3/3	DK BR	SI LO	NCM
5.2	2	27-40	10YR 5/2	GR BR	SI LO	NCM
5.3	1	0-27	10YR 3/3	DK BR	SI LO	NCM
5.3	2	27-39	10YR 5/2	GR BR	SI LO	NCM
5.4	1	0-24	10YR 3/3	DK BR	SI LO	NCM
5.4	2	24-42	10YR 5/2	GR BR	SA CL	NCM
5.5	1	0-29	10YR 3/3	DK BR	SI LO	NCM
5.5	2	29-40	10YR 5/2	GR BR	SA CL	NCM
5.6	1	0-31	10YR 3/3	DK BR	SI LO	NCM
5.6	2	31-41	10YR 5/2	GR BR	SA CL	NCM
5.7	1	0-32	10YR 3/3	DK BR	SI LO	NCM
5.7	2	32-45	10YR 5/2	GR BR	SA CL	NCM
5.8	1	0-28	10YR 3/3	DK BR	SI LO	NCM
5.8	2	28-42	10YR 5/2	GR BR	SA CL	NCM
5.9	1	0-37	10YR 3/3	DK BR	SI LO	NCM
5.9	2	37-48	10YR 5/2	GR BR	SA CL	NCM
5.10	1	0-29	10YR 3/3	DK BR	SI LO	NCM
5.10	2	29-43	10YR 5/2	GR BR	SA CL	NCM
5.11	1	0-35	10YR 3/3	DK BR	SI LO	NCM
5.11	2	35-45	10YR 5/2	GR BR	SA CL	NCM
5.12	1	0-36	10YR 3/3	DK BR	SI LO	NCM
5.12	2	36-47	10YR 5/2	GR BR	SA CL	NCM
5.13	1	0-27	10YR 3/3	DK BR	SI LO	NCM
5.13	2	27-40	10YR 5/2	GR BR	SA CL	NCM
5.14	1	0-26	10YR 3/3	DK BR	SI LO	NCM
5.14	2	26-42	10YR 5/2	GR BR	SA CL	NCM
5.15	1	0-31	10YR 3/3	DK BR	SI LO	NCM
5.15	2	31-41	10YR 5/2	GR BR	SA CL	NCM
5.16	1	0-38	10YR 3/3	DK BR	SI LO	NCM
5.16	2	38-49	10YR 5/2	GR BR	SA CL	NCM
5.17	1	0-34	10YR 3/3	DK BR	SI LO	NCM
5.17	2	34-45	10YR 5/2	GR BR	SA CL	NCM
5.18	1	0-29	10YR 3/3	DK BR	SI LO	NCM
5.18	2	29-40	10YR 5/2	GR BR	SA CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	26-38	10YR 5/2 10YR 4/6	GR BR DK YL BR	SI LO	NCM
6.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	28-38	10YR 5/2 10YR 4/6	GR BR DK YL BR	SI LO	NCM
6.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	30-40	10YR 5/4	YL BR	SA LO	NCM
6.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	28-38	10YR 5/4	YL BR	SA LO	NCM
6.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	29-39	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
6.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.6	2	29-40	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
6.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	30-42	10YR 5/4	YL BR	SA CL	NCM
6.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	24-35	10YR 5/4	YL BR	SA CL	NCM
6.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	28-39	10YR 5/4	YL BR	SA CL	NCM
6.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	26-36	10YR 5/4	YL BR	SA CL	NCM
6.11	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	21-35	10YR 5/4	YL BR	SA CL	NCM
6.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	23-33	10YR 5/4	YL BR	SA CL	NCM
6.13	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	18-29	7.5YR 4/6	STRONG BR	SA CL	NCM
6.14	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	34-45	10YR 4/4	DK YL BR	SA LO	NCM
6.15	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	16-29	10YR 4/4	DK YL BR	SA LO	NCM
6.16	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
6.16	2	24-34	10YR 4/4	DK YL BR	SA LO	NCM
6.17	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
6.17	2	20-32	10YR 4/4	DK YL BR	SA LO	NCM
6.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.18	2	26-37	10YR 4/4	DK YL BR	SA LO	NCM
7.1	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	22-33	10YR 5/2 10YR 5/6	GR BR YL BR	SI LO	NCM
7.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	26-38	10YR 5/2 10YR 5/6	GR BR YL BR	SI LO	NCM
7.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	28-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
7.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	26-36	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
7.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	30-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
7.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.6	2	31-43	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
7.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	26-38	10YR 5/4 10YR 6/3	YL BR PALE BR	SI LO	NCM
7.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	28-40	10YR 5/4 10YR 6/3	YL BR PALE BR	SI LO	NCM
7.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	28-41	10YR 5/4 10YR 6/3	YL BR PALE BR	SI LO	NCM
7.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	30-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
7.11	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	22-35	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
7.12	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	18-30	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
7.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	26-38	7.5YR 4/6	STRONG BR	SI LO	NCM
7.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	24-36	7.5YR 4/6	STRONG BR	SI LO	NCM
7.15	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	22-32	10YR 4/6	DK YL BR	SA LO	NCM
7.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	26-38	10YR 4/6	DK YL BR	SI L0	NCM
7.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	28-41	10YR 4/6	DK YL BR	SI LO	NCM
7.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	27-37	10YR 4/6	DK YL BR	SI LO	NCM
8.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	28-40	10YR 5/2 10YR 5/6	GR BR YL BR	SI LO	NCM
8.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	27-38	10YR 5/2 10YR 5/6	GR BR YL BR	SI LO	NCM
8.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	25-36	10YR 5/2 10YR 5/6	GR BR YL BR	SA LO	NCM
8.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	26-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
8.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	25-38	10YR 4/3 10YR 6/8	BR BR YL	SA LO	NCM
8.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	27--39	10YR 4/3 10YR 6/8	BR BR YL	SA LO	NCM
8.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	28-40	10YR 4/3	BR	SA CL	NCM
8.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	26-36	10YR 4/3	BR	SA CL	NCM
8.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	25-38	10YR 4/3	BR	SA CL	NCM
8.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.10	2	28-42	10YR 4/3	BR	SA CL	NCM
8.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	26-40	10YR 4/3	BR	SA CL	NCM
8.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	27-38	10YR 4/3	BR	SA CL	NCM
8.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	24-36	10YR 4/3	BR	SA CL	NCM
8.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.14	2	28-41	10YR 4/3	BR	SA CL	NCM
8.15	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
8.15	2	21-33	10YR 4/3	BR	SA CL	NCM
8.16	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.16	2	24-37	10YR 4/3	BR	SA CL	NCM
8.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.17	2	26-38	10YR 4/3	BR	SA CL	NCM
8.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.18	2	25-38	10YR 4/3	BR	SA CL	NCM
9.1	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	35-46	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
9.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	30-42	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
9.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	31-42	10YR 5/6 10YR 6/2	YL BR LR BR GR	SI LO	NCM
9.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	31-42	10YR 5/4	YL BR	SA LO	NCM
9.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	33-45	10YR 6/1 10YR 5/6	GR YL BR	SA CL	NCM
9.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	29-40	10YR 6/1 10YR 5/6	GR YL BR	SA CL	NCM
9.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	31-43	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
9.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	32-44	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
9.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	32-43	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
9.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	31-44	10YR 4/4	DK YL BR	SI LO	NCM
9.11	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	33-45	10YR 4/4	DK YL BR	SI LO	NCM
9.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	34-44	10YR 4/4	DK YL BR	SI LO	NCM
9.13	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	32-43	7.5YR 5/6	STRONG BR	SI LO	NCM
9.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	31-42	7.5YR 5/6	STRONG BR	SI LO	NCM
9.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	29-41	7.5YR 5/6	STRONG BR	SI LO	NCM
9.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	33-45	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	34-44	10YR 5/4	YL BR	SI LO	NCM
9.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	33-45	10YR 5/4	YL BR	SI LO	NCM
10.1	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	39-50	10YR 5/4 10YR 6/2	YL BR LR BR GR	SI LO	NCM
10.2	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	36-46	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	29-39	10YR 5/6 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.4	2	32-45	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
10.5	2	31-42	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.6	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
10.6	2	33-43	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
10.7	2	26-36	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.8	2	29-39	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.9	2	28-38	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.10	2	30-40	10YR 5/4 10YR 6/2	YL BR LR BR GR	SA LO	NCM
10.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
10.11	2	31-41	10YR 4/4	DK YL BR	SA LO	NCM
10.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.12	2	29-39	10YR 4/4	DK YL BR	SA LO	NCM
10.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.13	2	30-41	10YR 5/4	YL BR	SA LO	NCM
10.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.14	2	27-37	10YR 5/4	YL BR	SA LO	NCM
10.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.15	2	29-39	10YR 5/4	YL BR	SA LO	NCM
10.16	1	0-34	10YR 4/3	BR	SI LO	NCM
10.16	2	34-44	10YR 5/4	YL BR	SA LO	NCM
10.17	1	0-33	10YR 4/3	BR	SI LO	NCM
10.17	2	33-43	10YR 5/4	YL BR	SA LO	NCM
10.18	1	0-30	10YR 4/3	BR	SI LO	NCM
10.18	2	30-42	10YR 5/4	YL BR	SA LO	NCM
11.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	27-37	10YR 5/4	YL BR	SI LO	NCM
11.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	25-35	10YR 5/6	YL BR	SI LO	NCM
11.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.4	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.6	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	23-33	10YR 5/6	YL BR	SI LO	NCM
11.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	27-37	10YR 5/6	YL BR	SI LO	NCM
11.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	24-34	10YR 5/6	YL BR	SI LO	NCM
11.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	27-37	10YR 5/6	YL BR	SI LO	NCM
11.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	24-34	10YR 5/6	YL BR	SI LO	NCM
11.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	24-34	10YR 5/6	YL BR	SI LO	NCM
11.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	25-35	10YR 5/6	YL BR	SI LO	NCM
11.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	23-33	10YR 5/6	YL BR	SI LO	NCM
11.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	28-40	10YR 5/6	YL BR	SI LO	NCM
11.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	27-37	10YR 5/6	YL BR	SI LO	NCM
11.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	23-33	10YR 5/6	YL BR	SI LO	NCM
12.1	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
12.1	2	27-37	10YR 5/4	YL BR	CL LO	NCM
12.2	1	2086-30+C	10YR 4/4	DK YL BR	SI LO	NCM
12.2	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.3	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
12.3	2	27-37	10YR 5/4	YL BR	CL LO	NCM
12.4	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.4	2	28-32	10YR 5/4	YL BR	CL LO	NCM
12.5	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
12.5	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.6	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
12.6	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.7	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
12.7	2	27-32	10YR 5/4	YL BR	CL LO	NCM
12.8	1	0-32	10YR 4/4	DK YL BR	SI LO	NCM
12.8	2	32-42	10YR 5/4	YL BR	CL LO	NCM
12.9	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.9	2	28-39	10YR 5/4	YL BR	CL LO	NCM
12.10	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
12.10	2	30-42	10YR 5/4	YL BR	CL LO	NCM
12.11	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.11	2	28-38	10YR 5/4	YL BR	CL LO	NCM
12.12	1	0-21	10YR 4/4	DK YL BR	SI LO	NCM
12.12	2	21-38	10YR 5/4	YL BR	CL LO	NCM
12.13	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
12.13	2	27-39	10YR 5/4	YL BR	CL LO	NCM
12.14	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
12.14	2	29-40	10YR 5/4	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.15	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
12.15	2	29-39	10YR 5/4	YL BR	CL LO	NCM
12.16	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.16	2	28-40	10YR 5/4	YL BR	CL LO	NCM
12.17	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
12.17	2	25-38	10YR 5/4	YL BR	CL LO	NCM
12.18	1	0-34	10YR 4/4	DK YL BR	SI LO	NCM
12.18	2	34-44	10YR 5/4	YL BR	CL LO	NCM
13.1	1	0-30	10YR 4/3	BR	SI LO	NCM
13.1	2	30-42	10YR 5/4	YL BR	CL LO	NCM
13.2	1	0-28	10YR 4/3	BR	SI LO	NCM
13.2	2	28-41	10YR 5/4	YL BR	CL LO	NCM
13.3	1	0-26	10YR 4/3	BR	SI LO	NCM
13.3	2	26-37	10YR 5/4	YL BR	CL LO	NCM
13.4	1	0-25	10YR 4/3	BR	SI LO	NCM
13.4	2	25-35	10YR 5/4	YL BR	CL LO	NCM
13.5	1	0-27	10YR 4/3	BR	SI LO	NCM
13.5	2	27-39	10YR 5/4	YL BR	CL LO	NCM
13.6	1	0-26	10YR 4/3	BR	SI LO	NCM
13.6	2	26-36	10YR 5/4	YL BR	CL LO	NCM
13.7	1	0-29	10YR 4/3	BR	SI LO	NCM
13.7	2	29-43	10YR 5/4	YL BR	CL LO	NCM
13.8	1	0-28	10YR 4/3	BR	SI LO	NCM
13.8	2	28-42	10YR 5/4	YL BR	CL LO	NCM
13.9	1	0-30	10YR 4/3	BR	SI LO	NCM
13.9	2	30-41	10YR 5/4	YL BR	CL LO	NCM
13.10	1	0-27	10YR 4/3	BR	SI LO	NCM
13.10	2	27-40	10YR 5/4	YL BR	CL LO	NCM
13.11	1	0-28	10YR 4/3	BR	SI LO	NCM
13.11	2	28-40	10YR 5/4	YL BR	CL LO	NCM
13.12	1	0-27	10YR 4/3	BR	SI LO	NCM
13.12	2	27-42	10YR 5/4	YL BR	CL LO	NCM
13.13	1	0-28	10YR 4/3	BR	SI LO	NCM
13.13	2	28-41	10YR 5/4	YL BR	CL LO	NCM
13.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	27-38	10YR 5/4	YL BR	CL LO	NCM
13.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	29-39	10YR 5/4	YL BR	CL LO	NCM
13.16	1	0-28	10YR 4/3	BR	SI LO	NCM
13.16	2	28-40	10YR 5/4	YL BR	CL LO	NCM
13.17	1	0-29	10YR 4/3	BR	SI LO	NCM
13.17	2	29-42	10YR 5/4	YL BR	CL LO	NCM
13.18	1	0-27	10YR 4/3	BR	SI LO	NCM
13.18	2	27-41	10YR 5/4	YL BR	CL LO	NCM
14.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	32-42	10YR 5/4	YL BR	CL LO	NCM
14.2	1	0-27	10YR 4/3	BR	SI LO	NCM
14.2	2	27-37	10YR 5/4	YL BR	CL LO	NCM
14.3	1	0-30	10YR 4/3	BR	SI LO	NCM
14.3	2	30-40	10YR 5/4	YL BR	CL LO	NCM
14.4	1	0-31	10YR 4/3	BR	SI LO	NCM
14.4	2	31-41	10YR 5/4	YL BR	CL LO	NCM
14.5	1	0-30	10YR 4/3	BR	SI LO	NCM
14.5	2	30-40	10YR 5/4	YL BR	CL LO	NCM
14.6	1	0-33	10YR 4/3	BR	SI LO	NCM
14.6	2	33-43	10YR 5/4	YL BR	CL LO	NCM
14.7	1	0-28	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.7	2	28-38	10YR 5/4	YL BR	CL LO	NCM
14.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
14.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
14.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	28-380	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
14.11	1	)+C2489-2	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
14.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
14.13	1	0-30	10YR 4/3	BR	SI LO	NCM
14.13	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
14.14	1	0-32	10YR 4/3	BR	SI LO	NCM
14.14	2	32-42	10YR 5/4	YL BR	SI CL LO	NCM
14.15	1	0-26	10YR 4/3	BR	SI LO	NCM
14.15	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
14.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM
14.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	28-38	10YR 5/4	YL BR	SI CL LO	NCM
14.18	1	0-30	10YR 4/3	BR	SI LO	NCM
14.18	2	30-40	10YR 5/4	YL BR	SI CL	NCM
15.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	34-44	10YR 5/4	YL BR	CL LO	NCM
15.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	33-43	10YR 5/4	YL BR	CL LO	NCM
15.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	27-37	10YR 5/4	YL BR	CL LO	NCM
15.4	1	0-34	10YR 4/4	DK YL BR	SI LO	NCM
15.4	2	34-44	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.5	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
15.5	2	26-36	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.6	1	0-24	10YR 4/4	DK YL BR	SI LO	NCM
15.6	2	24-34	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.7	1	0-22	10YR 4/4	DK YL BR	SI LO	NCM
15.7	2	22-32	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.8	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
15.8	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.9	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
15.9	2	30-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
15.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
15.10	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; cobbles
15.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; cobbles

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.11	2	31-41	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; cobbles
15.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
15.12	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; cobbles
15.13	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM; cobbles
15.13	2	26-36	10YR 5/6	YL BR	SI CL	NCM; cobbles
15.14	1	0-22	10YR 4/4	DK YL BR	SI LO	NCM; cobbles
15.14	2	22-32	10YR 5/6	YL BR	SI CL	NCM; cobbles
15.15	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM; cobbles
15.15	2	28-38	10YR 5/6	YL BR	SI CL	NCM; cobbles
15.16	1	0-37	10YR 4/4	DK YL BR	SI LO	NCM; cobbles
15.16	2	37-47	7.5YR 4/4	STRONG BR	SI CL	NCM; cobbles
15.17	1	0-34	10YR 4/4	DK YL BR	SI LO	NCM
15.17	2	34-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM
15.18	1	0-22	10YR 4/6	DK YL BR	SI LO	NCM
15.18	2	22-32	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
16.1	1	0-27	10YR 4/2	DK GR BR	LO	NCM
16.1	2	27-38	10YR 5/4	YL BR	CL LO	NCM
16.2	1	0-30	10YR 4/2	DK GR BR	LO	NCM
16.2	2	30-42	10YR 5/4	YL BR	CL LO	NCM
16.3	1	0-32	10YR 4/2	DK GR BR	LO	NCM
16.3	2	32-430	10YR 5/4	YL BR	CL LO	NCM
16.4	1	0-30	10YR 4/2	DK GR BR	LO	NCM
16.4	2	30-41	10YR 5/4	YL BR	CL LO	NCM
16.5	1	0-28	10YR 4/2	DK GR BR	LO	NCM
16.5	2	28-39	10YR 5/4	YL BR	CL LO	NCM
16.6	1	0-28	10YR 4/2	DK GR BR	LO	NCM
16.6	2	28-40	10YR 5/4	YL BR	CL LO	NCM
16.7	1	0-23	10YR 4/2	DK GR BR	LO	clear window glass (discarded)
16.7	2	23-34	10YR 5/4	YL BR	CL LO	NCM
16.8	1	0-26	10YR 4/2	DK GR BR	LO	NCM
16.8	2	26-38	10YR 5/4	YL BR	CL LO	NCM
16.9	1	0-29	10YR 4/2	DK GR BR	LO	NCM
16.9	2	29-40	10YR 5/4	YL BR	CL LO	NCM
16.10	1	0-29	10YR 4/2	DK GR BR	LO	NCM
16.10	2	29-40	10YR 5/4	YL BR	CL LO	NCM
16.11	1	0-17	10YR 4/2	DK GR BR	LO	NCM
16.11	2	17-31	10YR 5/4	YL BR	CL LO	NCM
16.12	1	0-28	10YR 4/2	DK GR BR	LO	NCM
16.12	2	28-40	10YR 5/4	YL BR	CL LO	NCM
16.13	1	0-32	10YR 4/2	DK GR BR	LO	NCM
16.13	2	32-42	10YR 5/6	YL BR	CL LO	NCM
16.14	1	0-18	10YR 4/2	DK GR BR	LO	NCM
16.14	2	18-32	10YR 5/6	YL BR	CL LO	NCM
16.15	1	0-30	10YR 4/2	DK GR BR	LO	NCM
16.15	2	30-41	10YR 5/6	YL BR	CL LO	NCM
16.16	1	0-28	10YR 4/2	DK GR BR	LO	NCM
16.16	2	28-40	10YR 5/4	YL BR	CL LO	NCM
16.17	1	0-20	10YR 5/4	YL BR	LO	NCM
16.17	2	20-32	10YR 5/1 10YR 5/6	GR YL BR	CL LO	NCM
16.18	1	0-28	10YR 4/2	DK GR BR	LO	NCM
16.18	2	28-39	10YR 5/4 10YR 2/1	YL BR BL	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.1	1	0-23	10YR 4/2	DK GR BR	SI	NCM
17.1	2	23-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
17.2	1	0-22	10YR 4/2	DK GR BR	SI	NCM
17.2	2	22-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
17.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
17.3	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
17.4	1	0-19	10YR 4/2	DK GR BR	SI	NCM
17.4	2	19-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
17.5	1	0-19	10YR 4/2	DK GR BR	SI	NCM
17.5	2	19-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
17.6	1	0-23	10YR 4/2	DK GR BR	SI	NCM
17.6	2	23-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
17.7	1	0-20	10YR 4/2	DK GR BR	SI	NCM
17.7	2	20-31	10YR 5/4	YL BR	SI LO	NCM
17.8	1	012	10YR 4/2	DK GR BR	SI	NCM
17.8	2	12-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
17.9	1	0-22	10YR 4/2	DK GR BR	SI	NCM
17.9	2	22-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
17.10	1	0-18	10YR 4/2	DK GR BR	SI	NCM
17.10	2	18-34	10YR 4/4	DK YL BR	CL LO	NCM
17.11	1	0-19	10YR 4/2	DK GR BR	SI	NCM
17.11	2	19-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
17.12	1	0-30	10YR 4/2	DK GR BR	SI	NCM
17.12	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
17.13	1	0-23	10YR 4/2	DK GR BR	SI	NCM
17.13	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
17.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM
17.14	2	27-40	10YR 3/2	V DK GR BR	SI LO	NCM; seepage
17.15	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM; water filled pit at 6cm
17.16	1	0-15	10YR 3/2	V DK GR BR	SI	NCM
17.16	2	15-30	10YR 6/2	LT BR GR	CL	NCM; seepage at 15cm
17.17	1	0-19	2.5YR 5/4	RD BR	SI	NCM
17.17	2	19-23	10YR 3/1	V DK GR	SI LO	NCM
17.17	3	23-34	10YR 6/2	LT BR GR	CL	NCM
17.18	1	0-20	10YR 4/4 10YR 5/4	DK YL BR YL BR	SI LO	NCM
17.18	2	20-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
18.1	1	0-22	10YR 4/3	BR	SI LO	NCM
18.1	2	22-32	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.2	1	0-28	10YR 4/3	BR	SI LO	NCM
18.2	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.3	1	0-27	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.3	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.4	1	0-33	10YR 4/3	BR	SI LO	NCM
18.4	2	33-43	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.5	1	0-24	10YR 4/3	BR	SI LO	NCM
18.5	2	24-34	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.6	1	0-27	10YR 4/3	BR	SI LO	NCM
18.6	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.7	1	0-27	10YR 4/3	BR	SI LO	NCM
18.7	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.8	1	0-27	10YR 4/3	BR	SI LO	NCM
18.8	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.9	1	0-28	10YR 4/3	BR	SI LO	NCM
18.9	2	28-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.10	1	0-28	10YR 4/3	BR	SI LO	NCM
18.10	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.11	1	0-31	10YR 4/3	BR	SI LO	NCM
18.11	2	31-420	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.12	1	0-31	10YR 4/3	BR	SI LO	NCM
18.12	2	31-50	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.13	1	0-24	10YR 4/3	BR	SI LO	NCM
18.13	2	24-36	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.14	1	0-4	10YR 4/3	BR	SI LO	NCM
18.14	2	4-20	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
18.15	1	0-6	10YR 6/2	LT BR GR	SI CL	NCM
18.15	2	6-20	10YR 5/6	YL BR	SI LO	NCM; disturbed
18.16	1	0-50	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
18.17	1	0-50	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
18.18	1	0-36	10YR 4/4	DK YL BR	SI LO	NCM
18.18	2	36-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM
Turbine 17						
1.1	1	0-34	10YR 4/3	BR	SI LO	NCM
1.1	2	34-45	10YR 5/6	YL BR	SI LO	NCM
1.2	1	0-35	10YR 4/3	BR	SI LO	NCM
1.2	2	35-45	10YR 5/6	YL BR	SI LO	NCM
1.3	1	0-36	10YR 4/3	BR	SI LO	NCM
1.3	2	36-40	10YR 5/6	YL BR	SI LO	NCM; rock impasse
1.4	1	0-25	10YR 4/3	BR	SI LO	NCM
1.4	2	25-37	10YR 4/6	DK YL BR	SI LO	NCM
1.5	1	0-38	10YR 4/3	BR	SI LO	NCM
1.5	2	38-48	10YR 4/6	DK YL BR	SI LO	NCM
1.6	1	0-26	10YR 4/3	BR	SI LO	NCM
1.6	2	26-37	10YR 5/1 10YR 5/4	GR YL BR	SI LO	NCM
1.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.7	2	24-34	10YR 5/1 10YR 5/4	GR YL BR	SI LO	NCM
1.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	31-44	10YR 4/6	DK YL BR	CL SI	NCM
1.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	28-40	10YR 4/6	DK YL BR	CL SI	NCM
1.10	1	0-27	10YR 4/3	BR	SI LO	NCM
1.10	2	27-38	10YR 5/4	YL BR	SI LO	NCM
1.11	1	0-36	10YR 4/3	BR	SI LO	NCM; rocks
1.11	2	36-46	10YR 5/4	YL BR	SI LO	NCM; rocks
1.12	1	0-34	10YR 4/3	BR	SI LO	NCM
1.12	2	34-47	10YR 5/4	YL BR	SI LO	NCM
1.13	1	0-21	10YR 4/3	BR	SI LO	NCM
1.13	2	21-35	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM
1.14	1	0-12	10YR 4/3	BR	SI LO	NCM
1.14	2	12-28	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM
1.15	1	0-17	10YR 4/3	BR	SI LO	NCM
1.15	2	17-29	10YR 4/6	DK YL BR	SA LO	NCM
1.16	1	0-32	10YR 4/3	BR	SI LO	NCM
1.16	2	32-47	10YR 4/6	DK YL BR	SA LO	NCM
1.17	1	0-35	10YR 4/3	BR	SI LO	NCM
1.17	2	35-46	10YR 4/6	DK YL BR	SA LO	NCM
1.18	1	0-38	10YR 4/3	BR	SI LO	NCM
1.18	2	38-49	10YR 4/6	DK YL BR	SA LO	NCM
2.1	1	0-27	10YR 4/3	BR	SI LO	NCM
2.1	2	27-39	10YR 5/2	GR BR	SI LO	NCM
2.2	1	0-31	10YR 4/3	BR	SI LO	NCM
2.2	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-34	10YR 4/3	BR	SI LO	NCM
2.3	2	34-45	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-16	10YR 3/3	DK BR	SI LO	NCM
2.4	2	16-29	10YR 5/2	GR BR	SI LO	NCM
2.5	1	0-25	10YR 3/3	DK BR	SI LO	NCM
2.5	2	25-37	10YR 5/2	GR BR	SI LO	NCM
2.6	1	0-19	10YR 3/3	DK BR	SI LO	NCM
2.6	2	19-34	10YR 5/2	GR BR	SI LO	NCM
2.7	1	0-23	10YR 3/3	DK BR	SI LO	NCM
2.7	2	23-38	10YR 6/4	LT YL BR	SI LO	NCM
2.8	1	0-27	10YR 3/3	DK BR	SI LO	NCM
2.8	2	27-37	10YR 6/4	LT YL BR	SI LO	NCM; with charcoal
2.9	1	0-16	10YR 3/3	DK BR	SI LO	NCM
2.9	2	16-36	10YR 6/4	LT YL BR	SI LO	NCM
2.10	1	0-21	10YR 3/3	DK BR	SI LO	NCM
2.10	2	21-31	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-25	10YR 3/3	DK BR	SI LO	NCM
2.11	2	25-31	10YR 6/4	LT YL BR	SI LO	NCM
2.12	1	0-40	10YR 3/3	DK BR	SI LO	NCM
2.12	2	40-51	10YR 4/4	DK YL BR	SI LO	NCM
2.13	1	0-60	10YR 3/3	DK BR	SI LO	NCM; excavation limit reached
2.14	1	0-26	10YR 3/3	DK BR	SI LO	NCM
2.14	2	26-37	10YR 4/4	DK YL BR	SI LO	NCM
2.15	1	0-31	10YR 3/3	DK BR	SI LO	NCM
2.15	2	31-43	10YR 4/6	DK YL BR	SI LO	NCM
2.16	1	0-38	10YR 4/3	BR	SA LO	NCM
2.16	2	38-48	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.17	1	0-30	10YR 4/3	BR	SA LO	NCM
2.17	2	30-40	10YR 5/4	YL BR	SA LO	NCM
2.18	1	0-31	10YR 4/3	BR	SI LO	NCM
2.18	2	31-41	10YR 5/4	YL BR	SI LO	NCM
3.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
3.1	2	34-45	10YR 4/3	BR	SI LO	NCM
3.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.2	2	33-45	10YR 4/6	DK YL BR	SI LO	NCM
3.3	1	0-28	10YR 4/3	BR	SI LO	NCM
3.3	2	28-38	10YR 4/6	DK YL BR	SI LO	NCM
3.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.4	2	27-39	10YR 4/6	DK YL BR	SI LO	NCM
3.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.5	2	25-36	10YR 5/4	YL BR	SI LO	NCM
3.6	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.6	2	23-33	10YR 4/6	DK YL BR	SI LO	NCM
3.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.7	2	24-37	10YR 4/6	DK YL BR	SI LO	NCM
3.8	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
3.8	2	37-49	10YR 4/4	DK YL BR	SI LO	NCM
3.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	29-41	10YR 4/4	DK YL BR	SI LO	NCM
3.10	1	0-39	10YR 3/3	DK BR	SI LO	NCM
3.10	2	39-52	10YR 4/6	DK YL BR	SI LO	NCM
3.11	1	0-42	10YR 3/3	DK BR	SI LO	NCM
3.11	2	42-55	10YR 4/6	DK YL BR	SI LO	NCM
3.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.12	2	33-46	10YR 4/6	DK YL BR	SI LO	NCM
3.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
3.13	2	30-42	10YR 4/4	DK YL BR	SI LO	NCM
3.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.14	2	29-40	10YR 4/4	DK YL BR	SI LO	NCM
3.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.15	2	28-41	10YR 4/4	DK YL BR	SI LO	NCM
3.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.16	2	26-38	10YR 4/6	DK YL BR	SA LO	NCM
3.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.17	2	25-38	10YR 4/6	DK YL BR	SA LO	NCM
3.18	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.18	2	22-34	10YR 4/6	DK YL BR	SA LO	NCM
4.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; large stones
4.1	2	30-40	10YR 5/4	YL BR	SI LO	NCM; large stones
4.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.2	2	28-40	10YR 5/4	YL BR	SI LO	NCM
4.3	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	38-50	10YR 5/4	YL BR	SI LO	NCM
4.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	26-38	10YR 5/4	YL BR	SI LO	NCM
4.5	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	18-30	10YR 5/4	YL BR	SI LO	NCM
4.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	30-40	10YR 5/4	YL BR	SI LO	NCM
4.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	27-40	10YR 5/4	YL BR	SI LO	NCM
4.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	28-39	10YR 5/4	YL BR	SI LO	NCM
4.9	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.9	2	20-30	10YR 5/4	YL BR	SI LO	NCM
4.10	1	0-60	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	60-70	10YR 5/4	YL BR	SI LO	NCM
4.11	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	37-48	10YR 5/4	YL BR	SI LO	NCM
4.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	26-38	10YR 5/4	YL BR	SI LO	NCM
4.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	29-40	10YR 4/6 10YR 5/4	DK YL BR YL BR	SI LO	NCM
4.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; large rocks
4.14	2	30-40	10YR 4/6 10YR 5/4	DK YL BR YL BR	SI LO	NCM; large rocks
4.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	30-41	10YR 5/4	YL BR	SI LO	NCM
4.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	21-33	10YR 5/4	YL BR	SI LO	NCM
4.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	28-40	10YR 5/4	YL BR	SI LO	NCM
4.18	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	21-31	10YR 5/4	YL BR	SI LO	NCM
5.1	1	0-38	10YR 3/2	V DK GR BR	SI LO	NCM
5.1	2	38-48	10YR 5/4	YL BR	SI LO	NCM
5.2	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
5.2	2	30-43	10YR 5/4	YL BR	SI LO	NCM
5.3	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
5.3	2	30-40	10YR 5/4	YL BR	SI LO	NCM
5.4	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
5.4	2	32-44	10YR 5/4	YL BR	SI LO	NCM
5.5	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM; rock impasse
5.6	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM
5.6	2	22-32	10YR 5/4	YL BR	SI LO	NCM
5.7	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM
5.7	2	21-33	10YR 5/4	YL BR	SI LO	NCM
5.8	1	0-38	10YR 3/2	V DK GR BR	SI LO	NCM
5.8	2	38-48	10YR 5/4	YL BR	SI LO	NCM
5.9	1	0-59	10YR 3/2	V DK GR BR	SI LO	NCM; excavation limit reached
5.10	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
5.10	2	26-40	10YR 5/4	YL BR	SI LO	NCM
5.11	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
5.11	2	31-42	10YR 5/4	YL BR	SI LO	NCM
5.12	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
5.12	2	30-40	10YR 6/2	LT BR GR	SI LO	NCM
5.13	1	0-19	10YR 3/2	V DK GR BR	SI LO	NCM
5.13	2	19-29	10YR 6/2	LT BR GR	SI LO	NCM
5.14	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
5.14	2	29-40	10YR 6/2	LT BR GR	SI LO	NCM
5.15	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
5.15	2	28-38	10YR 6/2	LT BR GR	SI LO	NCM
5.16	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
5.16	2	27-39	10YR 6/2	LT BR GR	SI LO	NCM
5.17	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
5.17	2	32-43	10YR 6/2	LT BR GR	SI LO	NCM
5.18	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
5.18	2	34-44	10YR 6/2	LT BR GR	SI LO	NCM
6.1	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	36-47	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	28-40	10YR 5/4	YL BR	SI LO	NCM
6.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	26-37	10YR 5/4	YL BR	SI LO	NCM
6.4	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	15-30	10YR 5/4	YL BR	SI LO	NCM
6.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	26-36	10YR 5/4	YL BR	SI LO	NCM
6.6	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
6.6	2	42-52	10YR 5/4	YL BR	SI LO	NCM
6.7	1	0-46	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	46-56	10YR 5/4	YL BR	SI LO	NCM
6.8	1	0-48	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	48-58	10YR 5/4	YL BR	SI LO	NCM
6.9	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	33-45	10YR 5/4	YL BR	SI LO	NCM
6.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	26-38	10YR 5/4	YL BR	SI LO	NCM
6.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	25-35	10YR 5/4	YL BR	SI LO	NCM
6.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	26-36	10YR 6/2 10YR 6/8	LT BR GR BR YL	SI LO	NCM
6.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	24-36	10YR 6/2 10YR 6/8	LT BR GR BR YL	SI LO	NCM
6.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	25-35	10YR 6/2 10YR 6/8	LT BR GR BR YL	SI LO	NCM
6.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	23-35	10YR 6/2 10YR 6/8	LT BR GR BR YL	SI LO	NCM
6.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.16	2	29-40	10YR 5/4	YL BR	SI LO	NCM
6.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.17	2	32-43	10YR 5/4	YL BR	SI LO	NCM
6.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.18	2	30-40	10YR 5/4	YL BR	SI LO	NCM
7.1	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	22-32	10YR 5/4	YL BR	SI LO	NCM
7.2	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
7.2	2	43-53	10YR 5/4	YL BR	SI LO	NCM; disturbed
7.3	1	0-50	10YR 4/2	DK GR BR	SI LO	NCM; disturbed; excavation stopped
7.4	1	0-50	10YR 4/2	DK GR BR	SI LO	NCM; disturbed; excavation stopped
7.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
7.5	2	27-57	10YR 5/4	YL BR	SI LO	NCM; disturbed
7.6	1	0-50	10YR 4/2	DK GR BR	SI LO	NCM; disturbed; excavation stopped
7.7	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	43-53	10YR 5/4	YL BR	SI LO	NCM
7.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	32-42	10YR 5/4	YL BR	SI LO	NCM
7.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	30-40	10YR 5/4	YL BR	SI LO	NCM
7.10	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	17-30	10YR 5/4	YL BR	SI LO	NCM
7.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	29-39	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	25-36	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
7.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	25-35	10YR 5/4 10YR 6/4	YL BR LT YL BR	SI LO	NCM
7.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
7.15	1	0-31	10YR 4/3	BR	SI LO	NCM
7.15	2	31-41	10YR 5/6 10YR 6/8	YL BR	SI LO	NCM
7.16	1	0-34	10YR 4/4	DK YL BR	SI LO	NCM
7.16	2	34-46	10YR 4/6	DK YL BR	SI LO	NCM
7.17	1	0-33	10YR 4/3	BR	SI LO	NCM
7.17	2	33-45	10YR 5/2	GR BR	SI LO	NCM
7.18	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	40-45	10YR 4/6	DK YL BR	SI LO	NCM; rock impasse
8.1	1	0-53	10YR 4/3	BR	SI LO	NCM
8.1	2	53-63	10YR 5/4	YL BR	SA LO	NCM
8.2	1	0-47	10YR 4/3	BR	SI LO	NCM
8.2	2	47-57	10YR 5/4	YL BR	SA LO	NCM
8.3	1	0-40	10YR 4/3	BR	SI LO	NCM
8.3	2	40-50	10YR 5/4	YL BR	SA LO	NCM
8.4	1	0-30	10YR 4/3	BR	SI LO	NCM
8.4	2	30-45	10YR 5/4	YL BR	SA LO	NCM
8.5	1	0-27	10YR 4/3	BR	SI LO	NCM
8.5	2	27-40	10YR 5/4	YL BR	SA LO	NCM
8.6	1	0-29	10YR 4/3	BR	SI LO	NCM
8.6	2	29-42	10YR 5/4	YL BR	SA LO	NCM
8.7	1	0-26	10YR 4/3	BR	SI LO	NCM
8.7	2	26-40	10YR 5/4	YL BR	SA LO	NCM
8.8	1	0-28	10YR 4/3	BR	SI LO	NCM
8.8	2	28-42	10YR 5/4	YL BR	SA LO	NCM
8.9	1	0-30	10YR 4/3	BR	SI LO	NCM
8.9	2	30-44	10YR 5/4	YL BR	SA LO	NCM
8.10	1	0-28	10YR 4/3	BR	SI LO	NCM
8.10	2	28-39	10YR 5/4	YL BR	SA LO	NCM
8.11	1	0-28	10YR 4/3	BR	SI LO	NCM
8.11	2	28-42	10YR 5/4	YL BR	SA LO	NCM
8.12	1	0-29	10YR 4/3	BR	SI LO	NCM
8.12	2	29-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
8.13	1	0-33	10YR 4/3	BR	SI LO	NCM
8.13	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
8.14	1	0-35	10YR 4/3	BR	SI LO	NCM
8.14	2	35-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
8.15	1	0-51	10YR 4/3	BR	SI LO	NCM
8.15	2	51-61	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
8.16	1	0-41	10YR 4/3	BR	SI LO	NCM
8.16	2	41-52	10YR 4/6	DK YL BR	CL LO	NCM
8.17	1	0-38	10YR 4/3	BR	SI LO	NCM
8.17	2	38-50	10YR 5/4	YL BR	SA LO	NCM
8.18	1	0-33	10YR 4/3	BR	SI LO	NCM
8.18	2	33-45	10YR 5/4	YL BR	SA LO	NCM
9.1	1	0-36	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.1	2	36-46	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
9.2	1	0-29	10YR 4/3	BR	SI LO	NCM
9.2	2	29-39	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
9.3	1	0-27	10YR 4/3	BR	SI LO	NCM
9.3	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL LO	NCM
9.4	1	0-29	10YR 4/3	BR	SI LO	NCM
9.4	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM
9.5	1	0-31	10YR 4/3	BR	SI LO	NCM
9.5	2	31-41	10YR 5/4	YL BR	SI CL LO	NCM
9.6	1	0-30	10YR 4/3	BR	SI LO	NCM
9.6	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
9.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	31-41	10YR 5/4	YL BR	SI CL LO	NCM
9.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	32-42	10YR 5/4	YL BR	SI CL LO	NCM
9.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM
9.10	1	0-31	10YR 4/3	BR	SI LO	NCM
9.10	2	31-41	10YR 5/4	YL BR	SI CL LO	NCM
9.11	1	0-30	10YR 4/3	BR	SI LO	NCM
9.11	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
9.12	1	0-32	10YR 4/3	BR	SI LO	NCM
9.12	2	32-42	10YR 5/4	YL BR	SI CL LO	NCM
9.13	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	36-46	10YR 5/4	YL BR	SI CL LO	NCM
9.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	33-43	10YR 5/4	YL BR	SI CL LO	NCM
9.15	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	38-48	10YR 5/4	YL BR	SI CL LO	NCM
9.16	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	34-44	10YR 5/4	YL BR	SI CL LO	NCM
9.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	31-41	10YR 5/4	YL BR	SI CL	NCM
9.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	34-44	10YR 5/4	YL BR	SI CL	NCM
10.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	28-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI	NCM
10.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	29-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI	NCM
10.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	27-39	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI	NCM
10.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.4	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.5	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.6	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.7	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.8	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.9	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA	NCM
10.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.10	2	28-40	10YR 5/4	YL BR	SA LO	NCM
10.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
10.11	2	31-43	10YR 5/4	YL BR	SA LO	NCM
10.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
10.12	2	34-45	10YR 5/4	YL BR	SA LO	NCM
10.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
10.13	2	34-45	10YR 5/4	YL BR	SA	NCM
10.14	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
10.14	2	35-45	10YR 5/4	YL BR	SA	NCM
10.15	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
10.15	2	34-45	10YR 5/4	YL BR	SA	NCM
10.16	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
10.16	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
10.17	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
10.17	2	38-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
10.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
10.18	2	36-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
11.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	27-37	10YR 5/6	YL BR	SI LO	NCM
11.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	28-38	10YR 5/6	YL BR	SI LO	NCM
11.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	23-33	10YR 5/6	YL BR	SI LO	NCM
11.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	28-38	10YR 5/6	YL BR	SI LO	NCM
11.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	22-32	10YR 5/6	YL BR	SI LO	NCM
11.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	25-35	10YR 5/6	YL BR	SI LO	NCM
11.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	27-37	10YR 5/6	YL BR	SI LO	NCM
11.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	26-36	10YR 5/6	YL BR	SI LO	NCM
11.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	24-34	10YR 5/6	YL BR	SA LO	NCM
11.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	25-35	10YR 5/6	YL BR	SA LO	NCM
11.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	23-33	10YR 5/6	YL BR	SA LO	NCM
11.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	25-35	10YR 5/6	YL BR	SA LO	NCM
11.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	26-36	10YR 5/6	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	23-33	10YR 5/6	YL BR	SA LO	NCM
11.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	26-36	10YR 5/6	YL BR	SA LO	NCM
11.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	28-38	10YR 5/6	YL BR	SA LO	NCM
11.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	27-37	10YR 5/6	YL BR	SA LO	NCM
12.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	29-40	10YR 5/6	YL BR	SA SI	NCM
12.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	28-40	10YR 5/6	YL BR	SA SI	NCM
12.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	27-39	10YR 5/6	YL BR	SA SI	NCM
12.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	27-39	10YR 5/4	YL BR	SA SI	NCM
12.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	28-39	10YR 5/4	YL BR	SA SI	NCM
12.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	29-39	10YR 5/4	YL BR	SA SI	NCM
12.7	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
12.7	2	28-39	10YR 4/6	DK GR BR	SI SA	NCM
12.8	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
12.8	2	27-39	10YR 4/6	DK GR BR	SI SA	NCM
12.9	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
12.9	2	28-40	10YR 4/6	DK GR BR	SI SA	NCM
12.10	1	0-42	10YR 4/2	DK GR BR	LO	NCM
12.10	2	42-52	10YR 5/6	YL BR	SA CL	NCM
12.11	1	0-33	10YR 4/2	DK GR BR	LO	NCM
12.11	2	33-44	10YR 5/6	YL BR	SA CL	NCM
12.12	1	0-34	10YR 4/2	DK GR BR	LO	NCM
12.12	2	34-41	10YR 5/6	YL BR	SA CL	NCM
12.13	1	0-30	10YR 4/2	DK GR BR	CL LO	NCM
12.13	2	30-42	10YR 4/4	DK YL BR	SA CL	NCM
12.14	1	0-33	10YR 4/2	DK GR BR	CL LO	NCM
12.14	2	33-45	10YR 4/4	DK YL BR	SA CL	NCM
12.15	1	0-34	10YR 4/2	DK GR BR	CL LO	NCM
12.15	2	34-46	10YR 4/4	DK YL BR	SA CL	NCM
12.16	1	0-34	10YR 4/2	DK GR BR	LO	NCM
12.16	2	34-45	10YR 5/4	YL BR	LO SA	NCM
12.17	1	0-28	10YR 4/2	DK GR BR	LO	NCM
12.17	2	28-40	10YR 5/4	YL BR	LO SA	NCM
12.18	1	0-29	10YR 4/2	DK GR BR	LO	NCM
12.18	2	29-41	10YR 5/4	YL BR	LO SA	NCM
13.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	29-39	10YR 5/6	YL BR	SA SI	NCM
13.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	27-37	10YR 5/6	YL BR	SA SI	NCM
13.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	28-38	10YR 5/6	YL BR	SA SI	NCM
13.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; boulder impasse
13.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	27-37	10YR 5/6	YL BR	SA SI	NCM
13.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	26-36	10YR 5/6	YL BR	SA SI	NCM
13.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	30-40	10YR 5/6	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.8	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	36-46	10YR 5/6	YL BR	SA SI	NCM
13.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	32-42	10YR 5/6	YL BR	SA SI	NCM
13.10	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
13.10	2	37-47	10YR 5/6	YL BR	SA CL	NCM; cobbles
13.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	30-40	10YR 5/6	YL BR	SA CL	NCM
13.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	33-43	10YR 5/6	YL BR	SA CL	NCM
13.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	29-39	10YR 5/6	YL BR	SI CL	NCM
13.14	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	34-44	10YR 5/6	YL BR	SI CL	NCM
13.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
13.15	2	31-43	10YR 5/6	YL BR	SI CL	NCM; cobbles
13.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
13.16	2	33-43	10YR 5/6	YL BR	SA SI	NCM; cobbles
13.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	27-37	10YR 5/6	YL BR	SA SI	NCM
13.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	29-39	10YR 5/6	YL BR	SA SI	NCM
14.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	31-43	10YR 5/6	YL BR	CL LO	NCM
14.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	29-41	10YR 5/6	YL BR	CL LO	NCM
14.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	27-39	10YR 5/6	YL BR	CL LO	NCM
14.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	29-43	10YR 5/6	YL BR	CL LO	NCM
14.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	30-41	10YR 5/6	YL BR	CL LO	NCM
14.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	27-39	10YR 5/6	YL BR	CL LO	NCM
14.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	31-43	10YR 5/6	YL BR	CL LO	NCM
14.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	33-44	10YR 5/6	YL BR	CL LO	NCM
14.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	30-41	10YR 5/6	YL BR	CL LO	NCM
14.10	1	0-31	10YR 4/3	BR	SI LO	NCM
14.10	2	31-43	10YR 5/6	YL BR	CL LO	NCM
14.11	1	0-30	10YR 4/3	BR	SI LO	NCM
14.11	2	30-41	10YR 5/6	YL BR	CL LO	NCM
14.12	1	0-33	10YR 4/3	BR	SI LO	NCM
14.12	2	33-45	10YR 5/6	YL BR	CL LO	NCM
14.13	1	0-29	10YR 4/3	BR	SI LO	NCM
14.13	2	29-42	10YR 5/6	YL BR	CL LO	NCM
14.14	1	0-31	10YR 4/3	BR	SI LO	NCM
14.14	2	31-41	10YR 5/6	YL BR	CL LO	NCM
14.15	1	0-28	10YR 4/3	BR	SI LO	NCM
14.15	2	28-40	10YR 5/6	YL BR	CL LO	NCM
14.16	1	0-31	10YR 4/3	BR	SI LO	NCM
14.16	2	31-42	10YR 5/6	YL BR	CL LO	NCM
14.17	1	0-32	10YR 4/3	BR	SI LO	NCM
14.17	2	32-43	10YR 5/6	YL BR	CL LO	NCM
14.18	1	0-30	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.18	2	30-43	10YR 5/6	YL BR	CL LO	NCM
15.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	30-42	10YR 5/6	YL BR	CL LO	NCM
15.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	27-38	10YR 5/6	YL BR	CL LO	NCM
15.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	27-37	10YR 5/6	YL BR	CL LO	NCM
15.4	1	0-2	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	32-45	10YR 5/6	YL BR	CL LO	NCM
15.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	30-40	10YR 5/6	YL BR	CL LO	NCM
15.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	30-45	10YR 5/6	YL BR	CL LO	NCM
15.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	28-38	10YR 5/6	YL BR	CL LO	NCM
15.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	30-42	10YR 5/6	YL BR	CL LO	NCM
15.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	32-42	10YR 5/6	YL BR	CL LO	NCM
15.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	28-38	10YR 5/6	YL BR	CL LO	NCM
15.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	25-38	10YR 5/6	YL BR	CL LO	NCM
15.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	28-40	10YR 5/6	YL BR	CL LO	NCM
15.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	29-39	10YR 5/6	YL BR	CL LO	NCM
15.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	30-42	10YR 5/6	YL BR	CL LO	NCM
15.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	25-38	10YR 5/6	YL BR	CL LO	NCM
15.16	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	18-28	10YR 5/6	YL BR	CL LO	NCM
15.17	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	20-31	10YR 5/6	YL BR	CL LO	NCM
15.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	25-38	10YR 5/6	YL BR	CL LO	NCM
16.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	31-41	10YR 5/6	YL BR	SI LO	NCM
16.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	35-45	10YR 5/6	YL BR	SI LO	NCM
16.3	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	36-46	10YR 5/6	YL BR	SI LO	NCM
16.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	31-41	10YR 5/6	YL BR	SI LO	NCM
16.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	30-40	10YR 5/6	YL BR	SI LO	NCM
16.6	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	34-44	10YR 5/6	YL BR	SI LO	NCM
16.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.7	2	32-42	10YR 5/6	YL BR	SI LO	NCM
16.8	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
16.8	2	38-48	10YR 5/6	YL BR	SI LO	NCM
16.9	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.9	2	36-45	10YR 5/6	YL BR	SI LO	NCM
16.10	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
16.10	2	37-47	10YR 5/6	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	36-46	10YR 5/6	YL BR	SI LO	NCM
16.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.13	2	34-43	10YR 5/6	YL BR	SI LO	NCM
16.13	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	32-42	10YR 5/6	YL BR	SI LO	NCM
16.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.15	2	31-41	10YR 5/6	YL BR	SI LO	NCM
16.15	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	33-43	10YR 5/6	YL BR	SI LO	NCM
16.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	32-42	10YR 5/6	YL BR	SI LO	NCM
16.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	34-44	10YR 5/6	YL BR	SI LO	NCM
17.1	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	33-43	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
17.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	26-36	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
17.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	26-36	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
17.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	31-44	10YR 5/1 10YR 5/4	GR YL BR	SA LO	NCM
17.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	22-38	10YR 5/6	YL BR	SA LO	NCM
17.6	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	33-45	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM
17.7	1	0-38	10YR 4/3	BR	SI LO	NCM
17.7	2	38-48	10YR 5/6	YL BR	SA LO	NCM
17.8	1	0-28	10YR 4/3	BR	SI LO	NCM
17.8	2	28-40	10YR 5/6	YL BR	SA LO	NCM
17.9	1	0-29	10YR 4/3	BR	SI LO	NCM
17.9	2	29-40	10YR 5/6	YL BR	SA LO	NCM
17.10	1	0-29	10YR 4/3	BR	SI LO	NCM
17.10	2	29-39	10YR 5/6	YL BR	SA LO	NCM
17.11	1	0-32	10YR 4/3	BR	SI LO	NCM
17.11	2	32-44	10YR 5/6	YL BR	SA LO	NCM
17.12	1	0-31	10YR 4/3	BR	SI LO	NCM
17.12	2	31-46	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM
17.13	1	0-30	10YR 4/3	BR	SI LO	NCM
17.13	2	30-42	10YR 5/2 10YR 6/8	GR BR BR YL	SA LO	NCM
17.14	1	0-23	10YR 4/3	BR	SI LO	NCM
17.14	2	23-33	10YR 5/4	YL BR	SA LO	NCM
17.15	1	0-22	10YR 4/3	BR	SI LO	NCM
17.15	2	22-35	10YR 4/6	DK YL BR	SA LO	NCM
17.16	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	34-44	10YR 4/6	DK YL BR	SI LO	NCM
17.17	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	19-30	10YR 4/6	DK YL BR	SI LO	NCM
17.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	23-34	10YR 4/6	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.1	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.4	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.13	1	0-28	10YR 4/3	BR	SI LO	NCM
18.13	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.14	1	0-32	10YR 4/3	BR	SI LO	NCM
18.14	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	29-40	10YR 5/4	YL BR	SI LO	NCM
18.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.16	2	33-43	10YR 5/4	YL BR	SI LO	NCM
18.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.17	2	32-43	10YR 5/4	YL BR	SI LO	NCM
18.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	29-40	10YR 5/4	YL BR	SI LO	NCM
Turbine 18						
1.1	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	36-46	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
1.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	32-44	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	29-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
1.4	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	40-50	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
1.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	26-43	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
1.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	35-45	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
1.7	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	26-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.10	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.17	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	33-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.1	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	20-30	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
2.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	30-42	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
2.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	25-35	10YR 5/1 10YR 4/6	GR DK YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	31-42	10YR 5/1 10YR 4/6	GR DK YL BR	SA SI	NCM
2.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	25-38	10YR 5/1 10YR 4/6	GR DK YL BR	SA SI	NCM
2.6	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	36-46	10YR 5/3	BR	SI CL	NCM
2.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	32-42	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	32-45	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	34-44	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.10	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	23-43	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	29-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	24-34	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI CL	NCM
2.13	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	19-30	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA SI	NCM
2.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	22-35	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA SI	NCM
2.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	25-30	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA SI	NCM
2.16	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	37-47	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
2.17	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	33-44	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
2.18	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	40-50	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
3.1	1	0-27	10YR 4/2	DK GR BR	LO	NCM
3.1	2	27-38	10YR 5/4	YL BR	CL LO	NCM
3.2	1	0-30	10YR 4/2	DK GR BR	LO	NCM
3.2	2	30-42	10YR 5/4	YL BR	CL LO	NCM
3.3	1	0-30	10YR 4/2	DK GR BR	LO	NCM
3.3	2	30-40	10YR 5/4	YL BR	CL LO	NCM
3.4	1	0-20	10YR 4/2	DK GR BR	LO	NCM
3.4	2	20-31	10YR 5/4	YL BR	CL LO	NCM
3.5	1	0-28	10YR 4/2	DK GR BR	LO	NCM
3.5	2	28-39	10YR 5/4	YL BR	CL LO	NCM
3.6	1	0-28	10YR 4/2	DK GR BR	LO	NCM
3.6	2	28-40	10YR 5/4	YL BR	CL LO	NCM
3.7	1	0-26	10YR 4/2	DK GR BR	LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.7	2	26-38	10YR 5/6	YL BR	CL LO	NCM
3.8	1	0-27	10YR 4/2	DK GR BR	LO	NCM
3.8	2	27-38	10YR 5/6	YL BR	CL LO	NCM
3.9	1	0-25	10YR 4/2	DK GR BR	LO	NCM
3.9	2	25-36	10YR 5/6	YL BR	CL LO	NCM
3.10	1	0-24	10YR 4/2	DK GR BR	LO	NCM
3.10	2	24-36	10YR 5/4	YL BR	CL LO	NCM
3.11	1	0-28	10YR 4/2	DK GR BR	LO	NCM
3.11	2	28-39	10YR 5/4	YL BR	CL LO	NCM
3.12	1	0-21	10YR 4/2	DK GR BR	LO	NCM
3.12	2	21-32	10YR 5/4	YL BR	CL LO	NCM
3.13	1	0-22	10YR 4/2	DK GR BR	LO	NCM
3.13	2	22-33	10YR 5/6	YL BR	CL LO	NCM
3.14	1	0-30	10YR 4/2	DK GR BR	LO	NCM
3.14	2	30-41	10YR 5/6	YL BR	CL LO	NCM
3.15	1	0-31	10YR 4/2	DK GR BR	LO	NCM
3.15	2	31-42	10YR 5/6	YL BR	CL LO	NCM
3.16	1	0-32	10YR 4/2	DK GR BR	LO	NCM
3.16	2	32-45	10YR 5/4	YL BR	CL LO	NCM
3.17	1	0-36	10YR 4/2	DK GR BR	LO	NCM
3.17	2	36-47	10YR 5/4	YL BR	CL LO	NCM
3.18	1	0-38	10YR 4/2	DK GR BR	LO	NCM
3.18	2	38-49	10YR 5/4	YL BR	CL LO	NCM
4.1	1	0-24	10YR 3/3	DK BR	SA LO	NCM
4.1	2	24-34	10YR 6/2	LT BR GR	SA LO	NCM
4.2	1	0-18	10YR 3/3	DK BR	SI LO	NCM
4.2	2	18-32	10YR 6/2	LT BR GR	SI LO	NCM
4.3	1	0-28	10YR 3/3	DK BR	SI LO	NCM
4.3	2	28-38	10YR 6/2	LT BR GR	CL LO	NCM
4.4	1	0-22	10YR 3/3	DK BR	SI LO	NCM
4.4	2	22-32	10YR 6/2	LT BR GR	CL LO	NCM
4.5	1	0-36	10YR 3/3	DK BR	SI LO	NCM
4.5	2	36-48	10YR 6/2	LT BR GR	SI LO	NCM
4.6	1	0-26	10YR 3/3	DK BR	SI LO	NCM
4.6	2	26-36	10YR 6/2	LT BR GR	SI LO	NCM
4.7	1	0-25	10YR 3/3	DK BR	SA LO	NCM
4.7	2	25-35	10YR 6/2	LT BR GR	SI LO	NCM
4.8	1	0-22	10YR 3/3	DK BR	SA LO	NCM
4.8	2	22-32	10YR 6/2	LT BR GR	SI LO	NCM
4.9	1	0-22	10YR 3/3	DK BR	SI LO	NCM
4.9	2	22-33	10YR 6/2	LT BR GR	SI LO	NCM
4.10	1	0-34	10YR 3/3	DK BR	SA LO	NCM
4.10	2	34-46	10YR 5/4	YL BR	SI LO	NCM
4.11	1	0-29	10YR 4/2	DK GR BR	SA LO	NCM
4.11	2	29-40	10YR 5/3	BR	SI LO	NCM
4.12	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
4.12	2	25-37	10YR 6/2	LT BR GR	SI LO	NCM
4.13	1	0-22	10YR 4/2	DK GR BR	SA LO	NCM
4.13	2	22-32	10YR 5/4	YL BR	SI LO	NCM
4.14	1	0-33	10YR 4/2	DK GR BR	SA LO	NCM
4.14	2	33-47	10YR 5/2 10YR 6/2	GR BR LT BR GR	SI LO	NCM
4.15	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
4.15	2	25-35	10YR 5/3 10YR 5/4	BR YL BR	SI LO	NCM
4.16	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
4.16	2	27-37	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.17	1	0-41	10YR 4/2	DK GR BR	SA LO	NCM
4.17	2	41-52	10YR 5/4	YL BR	SI LO	NCM
4.18	1	0-29	10YR 4/2	DK GR BR	SA LO	NCM
4.18	2	29-39	10YR 5/4 10YR 5/2	YL BR GR BR	SI LO	NCM
5.1	1	0-32	10YR 3/1	V DK GR	SI LO	NCM
5.1	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
5.2	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
5.2	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.3	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
5.3	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.4	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
5.4	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.5	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
5.5	2	29-40	10YR 5/4	YL BR	SI CL	NCM
5.6	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
5.6	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	30-40	10YR 5/4	YL BR	SI CL	NCM
5.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	29-49	10YR 5/4	YL BR	SI CL	NCM
5.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	27-38	10YR 5/4	YL BR	SI CL	NCM
5.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	26-36	10YR 5/4	YL BR	SI CL	NCM
5.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	20-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	26-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.15	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.16	1	0-37	10YR 3/2	V DK GR BR	SI LO	NCM
5.16	2	37-50	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
5.17	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
5.17	2	31-41	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
5.18	1	0-39	10YR 3/2	V DK GR BR	SI LO	NCM
5.18	2	39-50	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
6.1	1	0-12	10YR 3/2	V DK GR BR	SI LO	NCM
6.1	2	12-25	10YR 5/2 10YR 6/8	GR BR BR YL	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.2	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
6.2	2	20-32	10YR 5/2 10YR 6/8	GR BR BR YL	CL SI	NCM
6.3	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
6.3	2	27-40	10YR 5/2 10YR 6/3	GR BR PALE BR	CL SI	NCM
6.4	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
6.4	2	24-36	10YR 5/2 10YR 6/3	GR BR PALE BR	CL SI	NCM
6.5	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
6.5	2	25-37	10YR 4/4	DK YL BR	SI LO	NCM
6.6	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
6.6	2	26-38	10YR 4/4	DK YL BR	SI LO	NCM
6.7	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
6.7	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
6.8	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
6.8	2	28-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
6.9	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
6.9	2	24-35	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
6.10	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
6.10	2	25-37	10YR 5/4 10YR 6/3	YL BR PALE BR	SI LO	NCM
6.11	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM
6.11	2	22-34	10YR 5/4 10YR 6/3	YL BR PALE BR	SA LO	NCM
6.12	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
6.12	2	32-43	10YR 5/4 10YR 6/3	YL BR PALE BR	SA LO	NCM
6.13	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
6.13	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
6.14	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
6.14	2	29-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
6.15	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
6.15	2	28-38	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
6.16	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
6.16	2	31-43	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
6.17	1	0-31	10YR 4/1	DK GR BR	SI LO	NCM
6.17	2	31-42	10YR 4/3	BR	SA LO	NCM
6.18	1	0-30	10YR 4/1	DK GR BR	SI LO	NCM
6.18	2	30-40	10YR 4/3	BR	SA LO	NCM
7.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	27-37	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.2	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	34-44	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.3	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	36-46	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.4	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.4	2	39-49	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.5	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	36-46	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.6	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	41-50	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.7	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	34-44	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	31-41	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	30-40	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	26-36	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	28-38	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	27-37	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	30-40	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.14	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	15-30	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	25-35	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.16	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	38-48	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	32-42	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
7.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	34-44	10YR 6/2 10YR 5/4	LT GR BR YL BR	CL LO	NCM
8.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	28-38	10YR 5/4 10YR 6/2	YL BR LT GR BR	CL LO	NCM
8.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	24-38	10YR 5/4	YL BR	CL LO	NCM
8.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	30-41	10YR 5/4 10YR 6/2	YL BR LT GR BR	CL LO	NCM
8.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	25-38	10YR 5/4	YL BR	CL LO	NCM
8.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	29-39	10YR 5/4	YL BR	CL LO	NCM
8.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.6	2	35-45	10YR 5/4	YL BR	CL LO	NCM
8.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	30-40	10YR 5/4	YL BR	CL LO	NCM
8.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	33-43	10YR 5/4	YL BR	CL LO	NCM
8.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	28-38	10YR 5/4	YL BR	CL LO	NCM
8.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	30-40	10YR 5/4	YL BR	CL LO	NCM
8.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	28-38	10YR 5/4	YL BR	CL LO	NCM
8.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	25-35	10YR 5/4	YL BR	CL LO	NCM
8.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	34-44	10YR 5/4	YL BR	CL LO	NCM
8.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
8.14	2	22-35	10YR 5/4	YL BR	CL LO	NCM
8.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.15	2	25-35	10YR 5/4	YL BR	CL LO	NCM
8.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.16	2	28-38	10YR 5/4	YL BR	CL LO	NCM
8.17	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
8.17	2	38-48	10YR 5/4	YL BR	CL LO	NCM
8.18	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM
8.18	2	41-51	10YR 5/4	YL BR	CL LO	NCM
9.1	1	0-38	10YR 3/3	DK BR	SI LO	NCM
9.1	2	38-48	10YR 5/6	YL BR	SA LO	NCM
9.2	1	0-37	10YR 3/3	DK BR	SI LO	NCM
9.2	2	37-47	10YR 5/6	YL BR	SA LO	NCM
9.3	1	0-39	10YR 3/3	DK BR	SI LO	NCM
9.3	2	39-49	10YR 5/6	YL BR	SA LO	NCM
9.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	35-45	10YR 5/4	YL BR	SA LO	NCM
9.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	32-42	10YR 5/4	YL BR	SA LO	NCM
9.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	29-40	10YR 5/4	YL BR	SA LO	NCM
9.7	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	43-53	10YR 5/4	YL BR	SA LO	NCM
9.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	33-43	10YR 5/4	YL BR	SA LO	NCM
9.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	26-36	10YR 5/4	YL BR	SA LO	NCM
9.10	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	34-44	10YR 5/4	YL BR	SA LO	NCM
9.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	27-38	10YR 5/4	YL BR	SA LO	NCM
9.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	29-40	10YR 5/4	YL BR	SA LO	NCM
9.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	34-44	10YR 5/4	YL BR	SA LO	NCM
9.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	28-38	10YR 5/4	YL BR	SA LO	NCM
9.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	30-40	10YR 5/4	YL BR	SA LO	NCM
9.16	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	38-48	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.17	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	41-51	10YR 5/4	YL BR	SA LO	NCM
9.18	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	39-50	10YR 5/4	YL BR	SA LO	NCM
10.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	28-38	10YR 4/4	DK YL BR	SI CL	NCM
10.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	25-35	10YR 4/6	DK YL BR	SI CL	NCM
10.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	30-41	10YR 4/4	DK YL BR	SI CL	NCM
10.4	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
10.4	2	32-42	10YR 5/6	YL BR	SI CL	NCM
10.5	1	0-34	10YR 3/1 10YR 3/3	V DK GR DK BR	SI LO	NCM
10.5	2	34-44	10YR 4/4	DK YL BR	SI CL	NCM
10.6	1	0-40	10YR 3/1 10YR 3/3	V DK GR DK BR	SI LO	NCM
10.6	2	40-50	10YR 4/4	DK YL BR	SI CL	NCM
10.7	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
10.7	2	35-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
10.8	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
10.8	2	33-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
10.9	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
10.9	2	34-44	10YR 4/4 10YR 6/3 10YR 6/8	DK YL BR PALE BR BR YL	SI CL	NCM
10.10	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
10.10	2	26-36	10YR 4/4	DK YL BR	SI CL	NCM
10.11	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
10.11	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
10.12	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
10.12	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
10.13	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
10.13	2	31-41	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
10.14	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
10.14	2	26-36	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
10.15	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
10.15	2	28-40	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
10.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.16	2	29-40	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
10.17	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
10.17	2	38-48	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
10.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
10.18	2	36-46	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
11.1	1	0-24	10YR 4/2	DK GR BR	LO	NCM
11.1	2	24-35	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.2	1	0-32	10YR 4/2 10YR 3/1	DK GR BR V DK GR	LO	NCM
11.2	2	32-43	10YR 5/4	YL BR	CL LO	NCM
11.3	1	0-25	10YR 4/2 10YR 3/1	DK GR BR V DK GR	LO	NCM
11.3	2	25-35	10YR 5/4	YL BR	CL LO	NCM
11.4	1	0-24	10YR 4/2	DK GR BR	LO	NCM
11.4	2	24-35	10YR 5/4	YL BR	CL LO	NCM
11.5	1	0-29	10YR 4/2	DK GR BR	LO	NCM
11.5	2	29-40	10YR 5/4	YL BR	CL LO	NCM
11.6	1	0-31	10YR 4/2	DK GR BR	LO	NCM
11.6	2	31-42	10YR 5/4	YL BR	CL LO	NCM
11.7	1	0-27	10YR 4/2	DK GR BR	LO	NCM
11.7	2	27-39	10YR 5/4	YL BR	CL LO	NCM
11.8	1	0-28	10YR 4/2	DK GR BR	LO	NCM
11.8	2	28-39	10YR 5/4	YL BR	CL LO	NCM
11.9	1	0-40	10YR 4/2	DK GR BR	LO	NCM
11.9	2	40-50	10YR 5/4	YL BR	CL LO	NCM
11.10	1	0-39	10YR 4/2	DK GR BR	LO	NCM
11.10	2	39-52	10YR 5/4	YL BR	CL LO	NCM
11.11	1	0-29	10YR 4/2	DK GR BR	LO	NCM
11.11	2	29-40	10YR 5/4	YL BR	CL LO	NCM
11.12	1	0-25	10YR 4/2	DK GR BR	LO	NCM
11.12	2	25-36	10YR 5/4	YL BR	CL LO	NCM
11.13	1	0-29	10YR 4/2	DK GR BR	LO	NCM
11.13	2	29-40	10YR 5/6	YL BR	CL LO	NCM
11.14	1	0-32	10YR 4/2	DK GR BR	LO	NCM
11.14	2	32-42	10YR 5/6	YL BR	CL LO	NCM
11.15	1	0-35	10YR 4/2	DK GR BR	LO	NCM
11.15	2	35-46	10YR 5/6	YL BR	CL LO	NCM
11.16	1	0-35	10YR 4/2	DK GR BR	LO	NCM
11.16	2	35-45	10YR 5/8	YL BR	CL LO	NCM
11.17	1	0-37	10YR 4/2	DK GR BR	LO	NCM
11.17	2	37-50	10YR 5/8	YL BR	CL LO	NCM
11.18	1	0-38	10YR 4/2	DK GR BR	LO	NCM
11.18	2	38-49	10YR 5/8	YL BR	CL LO	NCM
12.1	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	20-34	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SA LO	NCM
12.2	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	23-34	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SA LO	NCM
12.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	25-37	10YR 4/4 10YR 6/2	DK YL BR LT BR GR	SA LO	NCM
12.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	23-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	25-27	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM; rock impasse
12.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
12.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.14	2	25-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.15	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
12.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
13.1	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	37-50	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.2	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	36-46	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	28-38	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	33-43	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	27-37	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	32-42	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	24-35	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.8	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	19-33	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	32-45	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.10	1	0-32	10YR 4/4	DK YL BR	SI LO	NCM
13.10	2	32-45	10YR 5/4	YL BR	SA CL	NCM
13.11	1	0-35	10YR 4/4	DK YL BR	SI LO	NCM
13.11	2	35-45	10YR 5/4	YL BR	SA CL	NCM
13.12	1	0-36	10YR 4/4	DK YL BR	SI LO	NCM
13.12	2	36-49	10YR 5/4	YL BR	SA CL	NCM
13.13	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
13.13	2	27-40	10YR 5/4	YL BR	SA CL	NCM
13.14	1	0-33	10YR 4/4	DK YL BR	SI LO	NCM
13.14	2	33-45	10YR 5/4	YL BR	SA CL	NCM; seepage at interface
13.15	1	0-35	10YR 4/4	DK YL BR	SI LO	NCM
13.15	2	35-48	10YR 5/4	YL BR	SA CL	NCM
13.16	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM
13.16	2	31-45	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.17	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
13.17	2	28-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
13.18	1	0-20	10YR 4/4	DK YL BR	SI LO	NCM
13.18	2	20-33	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA CL	NCM
14.1	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	39-50	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	31-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.3	1	0-7	10YR 4/2	DK GR BR	SI LO	NCM; disturbed; gravel impasse
14.4	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	43-55	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	31-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.7	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	36-48	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.8	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	36-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.9	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	39-50	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.10	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	21-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	36-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.12	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.13	2	31-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.14	2	32-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	32-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.17	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	35-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.1	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.3	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	35-47	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM; disturbed; excavation stopped
15.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	25-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.6	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.7	1	0-31	10YR 4/3	BR	SI LO	NCM
15.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.8	1	0-25	10YR 4/3	BR	SI LO	NCM
15.8	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	24-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	24-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.12	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	38-48	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	24-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	27-37	10YR 5/6	YL BR	SA LO	NCM
15.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	27-38	10YR 5/6	YL BR	SA LO	NCM
15.16	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	36-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	34-47	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.2	1	0-44	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	44-54	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	34-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.7	2	32-42	10YR 6/6 10YR 6/2	BR YL LT BR GR	CL LO	NCM
16.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.8	2	29-41	10YR 6/6 10YR 6/2	BR YL LT BR GR	CL LO	NCM
16.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
16.9	2	23-35	10YR 6/6 10YR 6/2	BR YL LT BR GR	CL LO	NCM
16.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.10	2	27-37	10YR 6/8 10YR 6/2	BR YL LT BR GR	CL LO	NCM
16.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.11	2	31-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	24-35	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.13	2	29-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	28-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.15	2	26-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.16	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	41-53	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.17	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	33-45	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
16.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	36-47	10YR 6/8 10YR 6/2	BR YL LT BR GR	SI LO	NCM
17.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
17.1	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM; disturbed
17.2	1	0-18	10YR 4/1	DK GR	SI LO	NCM; disturbed
17.2	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM; disturbed
17.3	1	0-30	10YR 4/1	DK GR	SI LO	NCM
17.3	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.4	1	0-14	10YR 4/1	DK GR	SI LO	NCM
17.4	2	14-23	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; roadbed; gravel; rock impasse
17.5	1	0-7	10YR 4/1	DK GR	SI LO	NCM; disturbed
17.5	2	7-20	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM; disturbed
17.6	1	0-37	10YR 4/1	DK GR	SI LO	NCM
17.6	2	37-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.7	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.8	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.9	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
17.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
17.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
17.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
17.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
17.15	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
17.15	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.16	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
17.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
17.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
18.1	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.2	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	15-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.3	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	18-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.4	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.7	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	39-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.8	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	37-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	29-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	29-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	29-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.15	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.16	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.17	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	31-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
Turbine 31						
1.1	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	33-45	10YR 5/4	YL BR	CL LO	NCM
1.2	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	20-33	10YR 5/4	YL BR	CL LO	NCM
1.3	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	17-28	10YR 5/4	YL BR	CL LO	NCM
1.4	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	15-30	10YR 5/4	YL BR	SA LO	NCM
1.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	26-38	10YR 5/4	YL BR	SA LO	NCM
1.6	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	19-30	10YR 5/4	YL BR	SA LO	NCM
1.7	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	18-30	10YR 5/4	YL BR	SA LO	NCM
1.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	23-33	10YR 5/4	YL BR	SA LO	NCM
1.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	27-37	10YR 5/4	YL BR	SA LO	NCM
1.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	25-36	10YR 5/4	YL BR	SA LO	NCM
1.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	23-36	10YR 5/4	YL BR	SA LO	NCM
1.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	26-38	10YR 5/4	YL BR	SA LO	NCM
1.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	22-34	10YR 5/4	YL BR	SA SI	NCM
1.14	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	18-29	10YR 5/4	YL BR	SA SI	NCM
1.15	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	16-30	10YR 5/4	YL BR	SA SI	NCM
1.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	21-33	10YR 5/4	YL BR	SA SI	NCM
1.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	28-39	10YR 5/4	YL BR	SA SI	NCM
1.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	26-38	10YR 5/4	YL BR	SA SI	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	29-40	10YR 6/2	LT BR GR	SI LO	NCM
2.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	28-42	10YR 6/2	LT BR GR	SI LO	NCM
2.3	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	18-30	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	23-35	10YR 5/4	YL BR	SI LO	NCM
2.5	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	20-31	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	24-36	10YR 5/6	YL BR	SI LO	NCM
2.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	28-39	10YR 5/6	YL BR	SI LO	NCM
2.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.8	2	23-35	10YR 5/6	YL BR	SI LO	NCM
2.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	28-39	10YR 5/6	YL BR	SI LO	NCM
2.10	1	0-28	10YR 4/2	DK GR BR	SA SI	NCM
2.10	2	28-39	10YR 5/4	YL BR	SA SI	NCM
2.11	1	0-24	10YR 4/2	DK GR BR	SA LO	NCM
2.11	2	24-34	10YR 5/4	YL BR	SA LO	NCM
2.12	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
2.12	2	28-39	10YR 5/4	YL BR	SA LO	NCM
2.13	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
2.13	2	25-37	10YR 5/4	YL BR	SA LO	NCM
2.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	29-43	10YR 5/4	YL BR	SI LO	NCM
2.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	28-39	10YR 5/4	YL BR	SI LO	NCM
2.16	1	0-24	10YR 4/2 10YR 3/3	DK GR BR DK BR	SI LO	NCM
2.16	2	24-36	10YR 5/4	YL BR	SI LO	NCM
2.17	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	33-45	10YR 5/4	YL BR	SI LO	NCM
2.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	30-42	10YR 5/4	YL BR	SI LO	NCM
3.1	1	0-21	10YR 4/4	DK YL BR	SI LO	NCM
3.1	2	21-33	10YR 5/3	BR	SI LO	NCM
3.2	1	0-22	10YR 4/4	DK YL BR	SI LO	NCM
3.2	2	22-32	10YR 5/3	BR	SI LO	NCM
3.3	1	0-22	10YR 4/4	DK YL BR	SI LO	NCM
3.3	2	22-32	10YR 5/4	YL BR	SI LO	NCM
3.4	1	0-20	10YR 4/4	DK YL BR	SI LO	NCM
3.4	2	20-32	10YR 5/4	YL BR	SI LO	NCM
3.5	1	0-18	10YR 4/4	DK YL BR	SI LO	NCM
3.5	2	18-28	10YR 5/6	YL BR	SI LO	NCM
3.6	1	0-22	10YR 4/4	DK YL BR	SI LO	NCM
3.6	2	22-32	10YR 5/6	YL BR	SI LO	NCM
3.7	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
3.7	2	26-37	10YR 5/4	YL BR	SI LO	NCM
3.8	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
3.8	2	26-36	10YR 5/4	YL BR	SI LO	NCM
3.9	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
3.9	2	27-38	10YR 5/6	YL BR	SI LO	NCM
3.10	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM; rock impasse
3.11	1	0-21	10YR 4/4	DK YL BR	SI LO	NCM
3.11	2	21-33	10YR 5/4	YL BR	SI LO	NCM
3.12	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
3.12	2	25-36	10YR 5/4	YL BR	SI LO	NCM
3.13	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
3.13	2	25-35	10YR 5/4	YL BR	SI LO	NCM
3.14	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
3.14	2	26-36	10YR 5/4	YL BR	SI LO	NCM
3.15	1	0-24	10YR 4/4	DK YL BR	SI LO	NCM
3.15	2	24-34	10YR 5/4	YL BR	SI LO	NCM
3.16	1	0-23	10YR 4/4	DK YL BR	SI LO	NCM
3.16	2	23-35	10YR 5/4	YL BR	SI LO	NCM
3.17	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM
3.17	2	31-42	10YR 5/4	YL BR	SI LO	NCM
3.18	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
3.18	2	26-37	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.1	1	0-26	10YR 4/3	BR	SI LO	NCM; gravel
4.1	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM; gravel
4.2	1	0-29	10YR 4/3	BR	SI LO	NCM; gravel
4.2	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM; gravel
4.3	1	0-21	10YR 4/3	BR	SI LO	NCM; gravel
4.3	2	21-31	10YR 5/6	YL BR	SI CL	NCM; gravel
4.4	1	0-23	10YR 4/3	BR	SI LO	NCM
4.4	2	23-33	10YR 5/4	YL BR	SI CL	NCM
4.5	1	0-31	10YR 4/3	BR	SI LO	NCM
4.5	2	31-41	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
4.6	1	0-30	10YR 4/3	BR	SI LO	NCM
4.6	2	30-40	10YR 5/4	YL BR	SI CL	NCM
4.7	1	0-32	10YR 4/3	BR	SI LO	NCM
4.7	2	32-42	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
4.8	1	0-33	10YR 4/3	BR	SI LO	NCM
4.8	2	33-43	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
4.9	1	0-36	10YR 4/3	BR	SI LO	NCM
4.9	2	36-46	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
4.10	1	0-29	10YR 4/3	BR	SI LO	NCM; gravel
4.10	2	29-39	10YR 5/4	YL BR	SI CL	NCM; gravel
4.11	1	0-26	10YR 4/3	BR	SI LO	NCM; gravel
4.11	2	26-36	10YR 5/4	YL BR	SI CL	NCM; gravel
4.12	1	0-30	10YR 4/3	BR	SI LO	NCM; gravel
4.12	2	30-40	10YR 5/4	YL BR	SI CL	NCM; gravel
4.13	1	0-24	10YR 4/3	BR	SI LO	NCM
4.13	2	24-34	10YR 5/4	YL BR	SI CL	NCM
4.14	1	0-26	10YR 4/3	BR	SI LO	NCM
4.14	2	26-36	10YR 5/4	YL BR	SI CL	NCM
4.15	1	0-34	10YR 4/3	BR	SI LO	NCM
4.15	2	34-44	10YR 5/4	YL BR	SI CL	NCM
4.16	1	0-29	10YR 4/3	BR	SI LO	NCM
4.16	2	29-39	10YR 5/4	YL BR	SI CL	NCM
4.17	1	0-30	10YR 4/3	BR	SI LO	NCM
4.17	2	30-40	10YR 5/4	YL BR	SI CL	NCM
4.18	1	0-31	10YR 4/3	BR	SI LO	NCM
4.18	2	31-41	10YR 5/4	YL BR	SI CL	NCM
5.1	1	0-23	10YR 4/3	BR	SI LO	NCM
5.1	2	23-33	10YR 5/4	YL BR	CL SI LO	NCM
5.2	1	0-26	10YR 4/3	BR	SI LO	NCM
5.2	2	26-36	10YR 5/4	YL BR	CL SI LO	NCM
5.3	1	0-12	10YR 4/3	BR	SI LO	NCM
5.3	2	12-22	10YR 5/4	YL BR	CL SI LO	NCM
5.4	1	0-30	10YR 4/3	BR	SI LO	NCM
5.4	2	30-40	10YR 5/4	YL BR	CL SI LO	NCM
5.5	1	0-27	10YR 4/3	BR	SI LO	NCM
5.5	2	27-37	10YR 5/4	YL BR	CL SI LO	NCM
5.6	1	0-29	10YR 4/3	BR	SI LO	surface find-glass marble
5.6	2	29-41	10YR 5/4	YL BR	CL SI LO	NCM
5.7	1	0-23	10YR 4/3	BR	SI LO	NCM
5.7	2	23-33	10YR 5/4	YL BR	CL SI LO	NCM
5.8	1	0-26	10YR 4/3	BR	SI LO	NCM
5.8	2	26-37	10YR 5/4	YL BR	CL SI LO	NCM
5.9	1	0-30	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.9	2	30-40	10YR 5/4	YL BR	CL SI LO	NCM
5.10	1	0-28	10YR 4/3	BR	SI LO	NCM
5.10	2	28-38	10YR 5/4	YL BR	CL SI LO	NCM
5.11	1	0-29	10YR 4/3	BR	SI LO	NCM
5.11	2	29-41	10YR 5/4	YL BR	CL SI LO	NCM
5.12	1	0-32	10YR 4/3	BR	SI LO	NCM
5.12	2	32-42	10YR 5/4	YL BR	CL SI LO	NCM
5.13	1	0-23	10YR 4/3	BR	SI LO	NCM
5.13	2	23-37	10YR 5/4	YL BR	CL SI LO	NCM
5.14	1	0-27	10YR 4/3	BR	SI LO	NCM
5.14	2	27-37	10YR 5/4	YL BR	CL SI LO	NCM
5.15	1	0-31	10YR 4/3	BR	SI LO	NCM
5.15	2	31-41	10YR 5/4	YL BR	CL SI LO	NCM
5.16	1	0-32	10YR 4/3	BR	SI LO	NCM
5.16	2	32-43	10YR 5/4	YL BR	CL SI LO	NCM
5.17	1	0-31	10YR 4/3	BR	SI LO	NCM
5.17	2	31-41	10YR 5/4	YL BR	CL SI LO	NCM
5.18	1	0-34	10YR 4/3	BR	SI LO	NCM
5.18	2	34-48	10YR 5/4	YL BR	CL SI LO	NCM
6.1	1	0-20	10YR 4/3	BR	LO	NCM
6.1	2	20-30	10YR 5/4	YL BR	CL LO	NCM
6.2	1	0-23	10YR 4/3	BR	LO	NCM
6.2	2	23-33	10YR 5/4	YL BR	CL LO	NCM
6.3	1	0-29	10YR 4/3	BR	LO	NCM
6.3	2	29-40	10YR 5/4	YL BR	CL LO	NCM
6.4	1	0-30	10YR 4/3	BR	LO	NCM
6.4	2	30-41	10YR 4/4	DK YL BR	CL LO	NCM
6.5	1	0-28	10YR 4/3	BR	LO	NCM
6.5	2	28-39	10YR 4/4	DK YL BR	CL LO	NCM
6.6	1	0-24	10YR 4/3	BR	LO	NCM
6.6	2	24-35	10YR 4/4	DK YL BR	CL LO	NCM
6.7	1	0-28	10YR 4/3	BR	LO	NCM
6.7	2	28-40	10YR 5/4	YL BR	SA LO	NCM
6.8	1	0-27	10YR 4/3	BR	LO	NCM
6.8	2	27-39	10YR 5/4	YL BR	SA LO	NCM
6.9	1	0-26	10YR 4/3	BR	LO	NCM
6.9	2	26-37	10YR 5/4	YL BR	SA LO	NCM
6.10	1	0-29	10YR 4/3	BR	LO	NCM
6.10	2	29-40	10YR 5/4	YL BR	CL LO	NCM
6.11	1	0-30	10YR 4/3	BR	LO	NCM
6.11	2	30-41	10YR 5/4	YL BR	CL LO	NCM
6.12	1	0-30	10YR 4/3	BR	LO	NCM
6.12	2	30-42	10YR 5/4	YL BR	CL LO	NCM
6.13	1	0-31	10YR 4/3	BR	LO	NCM
6.13	2	31-42	10YR 5/4	YL BR	SA LO	NCM
6.14	1	0-31	10YR 4/3	BR	LO	NCM
6.14	2	31-41	10YR 5/4	YL BR	SA LO	NCM
6.15	1	0-29	10YR 4/3	BR	LO	NCM
6.15	2	29-40	10YR 5/4	YL BR	SA LO	NCM
6.16	1	0-36	10YR 4/3	BR	LO	NCM
6.16	2	36-47	10YR 5/6	YL BR	SA LO	NCM
6.17	1	0-33	10YR 4/3	BR	LO	NCM
6.17	2	33-45	10YR 5/6	YL BR	SA LO	NCM
6.18	1	0-34	10YR 4/3	BR	LO	NCM
6.18	2	34-44	10YR 5/6	YL BR	SA LO	NCM
7.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	24-34	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	28-38	10YR 5/6	YL BR	CL LO	NCM
7.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	29-39	10YR 5/6	YL BR	CL LO	NCM
7.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	24-35	10YR 4/4	DK YL BR	SI LO	NCM
7.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	28-40	10YR 4/6	DK YL BR	SI LO	NCM
7.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	25-38	10YR 5/4	YL BR	SI LO	NCM
7.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	26-36	10YR 5/6	YL BR	SI LO	NCM
7.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	27-40	10YR 4/4	DK YL BR	SI LO	NCM
7.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	29-39	10YR 4/4	DK YL BR	SI LO	NCM
7.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	32-42	10YR 5/4	YL BR	SI LO	NCM
7.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	31-41	10YR 5/6	YL BR	SI LO	NCM
7.12	1	30-29	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	29-39	10YR 5/4	YL BR	SI LO	NCM
7.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	31-43	10YR 5/4	YL BR	SI LO	NCM
7.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	30-40	10YR 5/6	YL BR	SI LO	NCM
7.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	29-39	10YR 5/6	YL BR	SI LO	NCM
7.16	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	43-55	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.17	1	0-44	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	44-54	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	28-40	10YR 5/6	YL BR	CL LO	NCM
8.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	30-41	10YR 5/6	YL BR	CL LO	NCM
8.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	27-39	10YR 5/6	YL BR	CL LO	NCM
8.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	29-41	10YR 5/6	YL BR	CL LO	NCM
8.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	24-36	10YR 5/6	YL BR	CL LO	NCM
8.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	26-37	10YR 5/6	YL BR	CL LO	NCM
8.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	27-39	10YR 5/6	YL BR	CL LO	NCM
8.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	26-40	10YR 5/6	YL BR	CL LO	NCM
8.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	28-41	10YR 5/6	YL BR	CL LO	NCM
8.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	27-38	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	31-43	10YR 5/6	YL BR	CL LO	NCM
8.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	30-41	10YR 5/6	YL BR	CL LO	NCM
8.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	28-38	10YR 5/6	YL BR	CL LO	NCM
8.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.14	2	29-43	10YR 5/6	YL BR	CL LO	NCM
8.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.15	2	32-44	10YR 5/6	YL BR	CL LO	NCM
8.16	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
8.16	2	39-50	10YR 5/6	YL BR	CL LO	NCM
8.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
8.17	2	34-45	10YR 5/6	YL BR	CL LO	NCM
8.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
8.18	2	31-44	10YR 5/6	YL BR	CL LO	NCM
9.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	27-37	10YR 4/6	DK YL BR	SI LO	NCM
9.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	24-35	10YR 4/6	DK YL BR	SI LO	NCM
9.3	1	0-23	10YR 4/3	BR	SI LO	NCM
9.3	2	23-35	10YR 5/4	YL BR	SI LO	NCM
9.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	23-34	10YR 4/6	DK YL BR	SI LO	NCM
9.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	22-34	10YR 4/6	DK YL BR	SI LO	NCM
9.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	25-37	7.5YR 4/4	BR	SI LO	NCM
9.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	24-35	7.5YR 4/4	BR	SI LO	NCM
9.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
9.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	28-40	10YR 5/4	YL BR	SA LO	NCM
9.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	29-41	10YR 5/4	YL BR	SA SI	NCM
9.11	1	0-26	10YR 4/2	DK GR BR	SA LO	NCM
9.11	2	26-36	10YR 4/6	DK YL BR	SA SI	NCM
9.12	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
9.12	2	27-38	10YR 4/6	DK YL BR	SA SI	NCM
9.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	28-41	10YR 4/6	DK YL BR	SI LO	NCM
9.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	26-39	10YR 4/6	DK YL BR	SI LO	NCM
9.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	27-40	10YR 4/6	DK YL BR	SI LO	NCM
9.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	32-43	10YR 4/3	BR	SI LO	NCM
9.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	29-42	10YR 4/3	BR	SI LO	NCM
9.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	26-38	10YR 4/3	BR	SI LO	NCM
10.1	1	0-34	10YR 4/3	BR	SI LO	NCM
10.1	2	34-44	7.5YR 5/6	STRONG BR	SA LO	NCM
10.2	1	0-23	10YR 4/3	BR	SI LO	NCM
10.2	2	23-33	10YR 5/4	YL BR	SA LO	NCM
10.3	1	0-30	10YR 4/3	BR	SI LO	NCM
10.3	2	30-40	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.4	1	0-29	10YR 4/3	BR	SI LO	NCM
10.4	2	29-39	10YR 5/4	YL BR	SA LO	NCM
10.5	1	0-22	10YR 4/3	BR	SI LO	NCM
10.5	2	22-32	10YR 5/6	YL BR	SA LO	NCM
10.6	1	0-28	10YR 4/3	BR	SI LO	NCM
10.6	2	28-38	10YR 5/6 7.5YR 5/6	YL BR STRONG BR	SA LO	NCM
10.7	1	0-0-29	10YR 4/3	BR	SI LO	NCM
10.7	2	29-39	10YR 5/6	YL BR	SA LO	NCM
10.8	1	0-30	10YR 4/3	BR	SI LO	NCM
10.8	2	30-40	10YR 5/6	YL BR	SA LO	NCM
10.9	1	0-29	10YR 4/3	BR	SI LO	NCM
10.9	2	29-39	10YR 6/3	PALE BR	SA LO	NCM
10.10	1	0-34	10YR 4/3	BR	SI LO	NCM
10.10	2	34-44	10YR 5/6	YL BR	SA LO	NCM
10.11	1	0-28	10YR 4/3	BR	SI LO	NCM
10.11	2	28-38	10YR 5/6	YL BR	SA LO	NCM
10.12	1	0-34	10YR 4/3	BR	SI LO	NCM
10.12	2	34-44	10YR 5/6	YL BR	SA LO	NCM
10.13	1	0-29	10YR 4/3	BR	SI LO	NCM
10.13	2	29-39	10YR 5/4	YL BR	SA LO	NCM
10.14	1	0-35	10YR 4/3	BR	SI LO	NCM
10.14	2	35-45	10YR 5/4	YL BR	SA CL LO	NCM
10.15	1	0-29	10YR 4/3	BR	SI LO	NCM
10.15	2	29-39	10YR 5/4	YL BR	SA CL LO	NCM
10.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
10.16	2	33-43	10YR 5/4	YL BR	SI CL	NCM
10.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.17	2	28-38	10YR 5/4	YL BR	SA LO	NCM
10.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
10.18	2	31-41	10YR 5/4	YL BR	SA LO	NCM
11.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	23-33	10YR 5/4	YL BR	CL LO	NCM
11.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	25-35	10YR 5/4	YL BR	CL LO	NCM
11.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	24-34	10YR 5/4	YL BR	CL LO	NCM
11.4	1	0-25	10YR 4/3	BR	SI LO	NCM
11.4	2	25-35	10YR 5/6	YL BR	CL LO	NCM
11.5	1	0-23	10YR 4/3	BR	SI LO	NCM
11.5	2	23-33	10YR 5/6	YL BR	CL LO	NCM
11.6	1	0-25	10YR 4/3	BR	SI LO	NCM
11.6	2	25-35	10YR 5/6	YL BR	CL LO	NCM
11.7	1	0-26	10YR 4/3	BR	SI LO	NCM
11.7	2	26-36	10YR 5/6	YL BR	CL LO	NCM
11.8	1	0-25	10YR 4/3	BR	SI LO	NCM
11.8	2	25-35	10YR 5/6	YL BR	CL LO	NCM
11.9	1	0-27	10YR 4/3	BR	SI LO	NCM
11.9	2	27-40	10YR 5/6	YL BR	CL LO	NCM
11.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	26-36	10YR 5/6	YL BR	CL LO	NCM
11.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	24-34	10YR 5/6	YL BR	CL LO	NCM
11.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	26-36	10YR 5/6	YL BR	CL LO	NCM
11.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	27-37	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	26-36	10YR 5/6	YL BR	CL LO	NCM
11.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	30-40	10YR 5/6	YL BR	CL LO	NCM
11.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	27-37	10YR 5/6	YL BR	CL LO	NCM
11.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	25-35	10YR 5/6	YL BR	CL LO	NCM
11.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	30-40	10YR 5/6	YL BR	CL LO	NCM
12.1	1	0-24	10YR 4/3	BR	LO	NCM
12.1	2	24-35	10YR 5/6	YL BR	CL LO	NCM
12.2	1	0-31	10YR 4/3	BR	LO	NCM
12.2	2	31-41	10YR 5/6	YL BR	CL LO	NCM
12.3	1	0-24	10YR 4/3	BR	LO	NCM
12.3	2	24-36	10YR 5/6	YL BR	CL LO	NCM
12.4	1	0-30	10YR 4/3	BR	LO	NCM
12.4	2	30-42	10YR 5/6	YL BR	CL LO	NCM
12.5	1	0-26	10YR 4/3	BR	LO	NCM
12.5	2	26-37	10YR 5/6	YL BR	CL LO	NCM
12.6	1	0-24	10YR 4/3	BR	LO	NCM
12.6	2	24-35	10YR 5/6	YL BR	CL LO	NCM
12.7	1	0-29	10YR 4/3	BR	LO	NCM
12.7	2	29-40	10YR 5/4	YL BR	SA LO	NCM
12.8	1	0-26	10YR 4/3	BR	LO	NCM
12.8	2	26-38	10YR 5/4	YL BR	SA LO	NCM
12.9	1	0-28	10YR 4/3	BR	LO	NCM
12.9	2	28-40	10YR 5/4	YL BR	SA LO	NCM
12.10	1	0-29	10YR 4/3	BR	LO	NCM
12.10	2	29-40	10YR 5/8	YL BR	LO SA	NCM
12.11	1	0-25	10YR 4/3	BR	LO	NCM
12.11	2	25-36	10YR 5/8	YL BR	LO SA	NCM
12.12	1	0-27	10YR 4/3	BR	LO	NCM
12.12	2	27-38	10YR 5/8	YL BR	LO SA	NCM
12.13	1	0-27	10YR 4/3	BR	LO	NCM
12.13	2	27-39	10YR 5/6	YL BR	SA LO	NCM
12.14	1	0-31	10YR 4/3	BR	LO	NCM
12.14	2	31-42	10YR 5/6	YL BR	SA LO	NCM
12.15	1	0-30	10YR 4/3	BR	LO	NCM
12.15	2	30-40	10YR 5/6	YL BR	SA LO	NCM
12.16	1	0-31	10YR 4/3	BR	LO	NCM
12.16	2	31-42	10YR 3/4 10YR 5/6	DK YL BR YL BR	SA LO	NCM
12.17	1	0-29	10YR 4/3	BR	LO	NCM
12.17	2	29-40	10YR 3/4 10YR 5/6	DK YL BR YL BR	SA LO	NCM
12.18	1	0-27	10YR 4/3	BR	LO	NCM
12.18	2	27-37	10YR 3/4 10YR 5/6	DK YL BR YL BR	SA LO	NCM
13.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	30-41	10YR 5/6	YL BR	CL LO	NCM
13.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	35-47	10YR 5/6	YL BR	CL LO	NCM
13.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	29-42	10YR 5/6	YL BR	CL LO	NCM
13.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	28-40	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	29-40	10YR 5/6	YL BR	CL LO	NCM
13.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	28-38	10YR 5/6	YL BR	CL LO	NCM
13.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	26-39	10YR 5/6	YL BR	CL LO	NCM
13.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	27-38	10YR 5/6	YL BR	CL LO	NCM
13.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	30-42	10YR 5/6	YL BR	CL LO	NCM
13.10	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	34-45	10YR 5/6	YL BR	CL LO	NCM
13.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	28-41	10YR 5/6	YL BR	CL LO	NCM
13.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	27-39	10YR 5/6	YL BR	CL LO	NCM
13.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	24-35	10YR 5/6	YL BR	CL LO	NCM
13.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	26-39	10YR 5/6	YL BR	CL LO	NCM
13.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	27-39	10YR 5/6	YL BR	CL LO	NCM
13.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	31-43	10YR 5/6	YL BR	CL LO	NCM
13.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	26-39	10YR 5/6	YL BR	CL LO	NCM
13.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	28-40	10YR 5/6	YL BR	CL LO	NCM
14.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	23-35	10YR 5/4	YL BR	SI LO	NCM
14.2	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	37-49	10YR 5/4	YL BR	SI LO	NCM
14.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	27-37	10YR 5/4	YL BR	SI LO	NCM
14.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	32-43	10YR 5/4	YL BR	SI LO	NCM
14.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	22-35	10YR 5/4	YL BR	SI LO	NCM
14.6	1	0-22	10YR 4/3	BR	SI LO	NCM
14.6	2	22-34	10YR 5/6	YL BR	SI LO	NCM
14.7	1	0-37	10YR 4/3	BR	SI LO	NCM
14.7	2	37-49	10YR 5/6	YL BR	SI LO	NCM
14.8	1	0-37	10YR 4/3	BR	SI LO	NCM
14.8	2	37-40	10YR 5/6	YL BR	SI LO	NCM
14.9	1	0-29	10YR 4/3	BR	SI LO	NCM
14.9	2	29-39	10YR 6/2	LT BR GR	SI LO	NCM
14.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	31-42	10YR 6/3	PALE BR	SI LO	NCM
14.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	29-39	10YR 5/4	YL BR	SI LO	NCM
14.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	34-46	10YR 5/4	YL BR	SI LO	NCM
14.13	1	0-17	10YR 4/3	BR	SI LO	NCM
14.13	2	17-29	10YR 5/2	GR BR	SI LO	NCM
14.14	1	0-28	10YR 4/3	BR	SI LO	NCM
14.14	2	28-31	10YR 5/2	GR BR	SI LO	NCM
14.15	1	0-27	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.15	2	27-38	10YR 5/4	YL BR	SI LO	NCM
14.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	25-37	10YR 5/6	YL BR	SI LO	NCM
14.17	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	36-46	10YR 5/4	YL BR	SI LO	NCM
14.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	34-44	10YR 5/4	YL BR	SI LO	NCM
15.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	25-35	10YR 5/6	YL BR	CL LO	NCM
15.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	27-37	10YR 5/6	YL BR	CL LO	NCM
15.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	24-34	10YR 5/6	YL BR	CL LO	NCM
15.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	23-35	10YR 5/6	YL BR	CL LO	NCM
15.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	25-35	10YR 5/6	YL BR	CL LO	NCM
15.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	27-37	10YR 5/6	YL BR	CL LO	NCM
15.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	25-35	10YR 5/6	YL BR	CL LO	NCM
15.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	28-40	10YR 5/6	YL BR	CL LO	NCM
15.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	31-41	10YR 5/6	YL BR	CL LO	NCM
15.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	28-40	10YR 5/6	YL BR	CL LO	NCM
15.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	29-40	10YR 5/6	YL BR	CL LO	NCM
15.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	30-40	10YR 5/6	YL BR	CL LO	NCM
15.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	21-31	10YR 5/6	YL BR	CL LO	NCM
15.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	26-36	10YR 5/6	YL BR	CL LO	NCM
15.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	30-40	10YR 5/6	YL BR	CL LO	NCM
15.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	28-40	10YR 5/6	YL BR	CL LO	NCM
15.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	31-41	10YR 5/6	YL BR	CL LO	NCM
15.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	29-40	10YR 5/6	YL BR	CL LO	NCM
16.1	1	0-30	10YR 4/3	BR	SI LO	NCM
16.1	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI LO	NCM
16.2	1	0-34	10YR 4/3	BR	SI LO	NCM
16.2	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.3	1	0-28	10YR 4/3	BR	SI LO	NCM
16.3	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.4	1	0-30	10YR 4/3	BR	SI LO	NCM
16.4	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.5	1	0-28	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.5	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.6	1	0-30	10YR 4/3	BR	SI LO	NCM
16.6	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.7	1	0-31	10YR 4/3	BR	SI LO	NCM
16.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.8	1	0-33	10YR 4/3	BR	SI LO	NCM
16.8	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.9	1	0-27	10YR 4/3	BR	SI LO	NCM
16.9	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.10	1	0-34	10YR 4/3	BR	SI LO	NCM
16.10	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.11	1	0-34	10YR 4/3	BR	SI LO	NCM
16.11	2	34-45	10YR 5/4	YL BR	CL LO	NCM
16.12	1	0-29	10YR 4/3	BR	SI LO	NCM
16.12	2	29-40	10YR 4/6	DK YL BR	CL LO	NCM
16.13	1	0-30	10YR 4/3	BR	SI LO	NCM
16.13	2	30-42	10YR 5/4	YL BR	CL LO	NCM
16.14	1	0-33	10YR 4/3	BR	SI LO	NCM
16.14	2	33-43	10YR 5/4	YL BR	CL LO	NCM
16.15	1	0-32	10YR 4/3	BR	SI LO	NCM
16.15	2	32-42	10YR 5/4	YL BR	CL LO	NCM
16.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.18	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.1	1	0-27	10YR 4/3	BR	SI LO	NCM; gravel
17.1	2	27-37	10YR 5/4	YL BR	SI CL LO	NCM; gravel
17.2	1	0-28	10YR 4/3	BR	SI LO	NCM
17.2	2	28-38	10YR 5/4	YL BR	SI CL LO	NCM
17.3	1	0-26	10YR 4/3	BR	SI LO	NCM
17.3	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
17.4	1	0-29	10YR 4/3	BR	SI LO	NCM
17.4	2	29-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI LO	NCM
17.5	1	0-25	10YR 4/3	BR	SI LO	NCM
17.5	2	25-35	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI LO	NCM
17.6	1	0-32	10YR 4/3	BR	SI LO	NCM
17.6	2	32-42	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI LO	NCM
17.7	1	0-30	10YR 4/3	BR	SI LO	NCM; cobbles
17.7	2	30-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI LO	NCM; cobbles
17.8	1	0-27	10YR 4/3	BR	SI LO	NCM
17.8	2	27-37	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.9	1	0-24	10YR 4/3	BR	SI LO	NCM
17.9	2	24-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
17.10	1	0-31	10YR 4/3	BR	SI LO	NCM
17.10	2	31-44	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
17.11	1	0-25	10YR 4/3	BR	SI LO	NCM
17.11	2	25-37	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
17.12	1	0-29	10YR 4/3	BR	SI LO	NCM
17.12	2	29-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
17.13	1	0-24	10YR 4/3	BR	SI LO	NCM
17.13	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.14	1	0-31	10YR 4/3	BR	SI LO	NCM
17.14	2	31-44	10YR 4/6	DK YL BR	SA CL LO	NCM
17.15	1	0-29	10YR 4/3	BR	SI LO	NCM
17.15	2	29-40	10YR 4/6	DK YL BR	SA CL LO	NCM
17.16	1	0-30	10YR 4/3	BR	SI LO	NCM
17.16	2	30-40	10YR 4/6	DK YL BR	SA CL LO	NCM
17.17	1	0-34	10YR 4/3	BR	SI LO	NCM
17.17	2	34-44	10YR 4/6	DK YL BR	SA CL LO	NCM
17.18	1	0-32	10YR 4/3	BR	SI LO	NCM
17.18	2	32-44	10YR 4/6	DK YL BR	SA CL LO	NCM
18.1	1	0-28	10YR 4/3	BR	SI LO	NCM
18.1	2	28-38	10YR 5/4	YL BR	SA CL LO	NCM
18.2	1	0-29	10YR 4/3	BR	SI LO	NCM
18.2	2	29-39	10YR 5/4	YL BR	SA SI	NCM
18.3	1	0-31	10YR 4/3	BR	SI LO	NCM
18.3	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
18.4	1	0-26	10YR 4/3	BR	SI LO	NCM
18.4	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.5	1	0-24	10YR 4/3	BR	SI LO	NCM
18.5	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.6	1	0-30	10YR 4/3	BR	SI LO	NCM
18.6	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	31-41	10YR 5/4	YL BR	SA CL LO	NCM
18.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL LO	NCM
18.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	33-43	10YR 5/6	YL BR	SA CL LO	NCM
18.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	28-38	10YR 5/6	YL BR	SA LO	NCM
18.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	32-42	10YR 5/6	YL BR	SA LO	NCM
18.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.13	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
18.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.16	1	0-36	10YR 4/3	BR	SI LO	NCM
18.16	2	36-46	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
18.17	1	0-34	10YR 4/3	BR	SI LO	NCM
18.17	2	34-44	10YR 6/3 10YR 6/8	PALE BR BR YL	SI CL	NCM
18.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	33-43	10YR 6/3	PALE BR	SI CL LO	NCM
Turbine 32						
1.1	1	0-38	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	38-48	10YR 4/1	DK GR	SI CL	NCM
1.2	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	32-44	10YR 4/1	DK GR	SI CL	NCM
1.3	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
1.3	2	26-36	10YR 4/1	DK GR	SI CL	NCM
1.4	1	0-31	10YR 4/3	BR	SI LO	NCM
1.4	2	31-41	10YR 3/3	DK BR	SI CL	NCM
1.5	1	0-26	10YR 4/3	BR	SI LO	NCM
1.5	2	26-36	10YR 3/3	DK BR	SI CL	NCM
1.6	1	0-41	10YR 4/3	BR	SI LO	NCM
1.6	2	41-51	10YR 3/3	DK BR	SI CL	NCM
1.7	1	0-24	10YR 4/3	BR	SI LO	NCM
1.7	2	24-35	10YR 3/3	DK BR	SI CL	NCM
1.8	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
1.8	2	25-35	10YR 4/1	DK GR	SI CL	NCM
1.9	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM
1.9	2	23-33	10YR 4/1	DK GR	SI CL	NCM
1.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	28-38	10YR 3/3	DK BR	SI CL	NCM
1.11	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse
1.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	27-40	10YR 3/3	DK BR	SI CL	NCM
1.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	31-41	10YR 3/3	DK BR	SI CL	NCM
1.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	28-38	10YR 3/3	DK BR	SI CL	NCM
1.15	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	34-45	10YR 3/3	DK BR	SI CL	NCM
1.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	25-35	10YR 3/3	DK BR	SI CL	NCM
1.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	25-35	10YR 3/3	DK BR	SI CL	NCM
1.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	26-35	10YR 3/3	DK BR	SI CL	NCM
2.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; roots
2.1	2	32-44	10YR 5/4	YL BR	SI CL	NCM; roots
2.2	1	0-47	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	47-60	10YR 5/4	YL BR	SI CL	NCM
2.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.3	2	32-42	10YR 5/4	YL BR	SI CL	NCM
2.4	1	0-37	10YR 4/3 10YR 3/2	DK GR BR V DK GR BR	SI LO	NCM
2.4	2	37-50	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
2.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
2.5	2	32-42	10YR 5/6	YL BR	SI	NCM; cobbles
2.6	1	0-24	10YR 4/6	DK YL BR	SI LO	NCM; cobbles
2.6	2	24-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM; cobbles
2.7	1	0-24	10YR 4/4	DK YL BR	SI LO	NCM; cobbles
2.7	2	24-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM; cobbles
2.8	1	0-25	10YR 4/6	DK YL BR	SI LO	NCM; cobbles
2.8	2	25-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM; cobbles
2.9	1	0-32	10YR 4/6	DK YL BR	SI LO	NCM; cobbles
2.9	2	32-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI CL	NCM; cobbles
2.10	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
2.10	2	27-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.11	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.11	2	26-36	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.12	1	0-35	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.12	2	35-45	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.13	1	0-31	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.13	2	31-41	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.14	1	0-32	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.14	2	32-44	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.15	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.15	2	27-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.16	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.16	2	28-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.17	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.17	2	28-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
2.18	1	0-33	10YR 4/4	DK YL BR	SI LO	NCM; roots; cobbles
2.18	2	33-45	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; roots; cobbles
3.1	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
3.1	2	30-40	10YR 6/4	LT YL BR	SI CL LO	NCM
3.2	1	0-38	10YR 3/2	V DK GR BR	SI LO	NCM
3.2	2	38-48	10YR 4/6	DK YL BR	SI LO	NCM
3.3	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
3.3	2	26-36	10YR 4/6	DK YL BR	SI CL LO	NCM
3.4	1	0-13	10YR 3/2	V DK GR BR	SI LO	NCM
3.4	2	13-23	10YR 4/4	DK YL BR	SI CL	NCM
3.5	1	0-12	10YR 2/2	V DK BR	SI LO	NCM
3.5	2	12-24	10YR 4/4	DK YL BR	SI LO	NCM
3.6	1	0-8	10YR 2/2	V DK BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.6	2	8-20	10YR 4/4	DK YL BR	SI LO	NCM
3.7	1	0-22	10YR 4/3	BR	SI LO	NCM
3.7	2	22-32	10YR 4/6	DK YL BR	SI LO	NCM
3.8	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
3.8	2	28-38	10YR 4/6 10YR 5/4	DK YL BR YL BR	SI CL LO	NCM
3.9	1	0-16	10YR 3/2	V DK GR BR	SI LO	NCM
3.9	2	16-26	10YR 4/6 10YR 5/4	DK YL BR YL BR	SI CL LO	NCM
3.10	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
3.10	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
3.11	1	0-18	10YR 3/2	V DK GR BR	SI LO	NCM
3.11	2	18-30	10YR 4/4	DK YL BR	SI LO	NCM
3.12	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
3.12	2	30-40	10YR 4/4	DK YL BR	SI LO	NCM
3.13	1	0-22	10YR 3/3	DK BR	SI LO	NCM
3.13	2	22-32	10YR 4/4	DK YL BR	SI LO	NCM
3.14	1	0-25	10YR 3/3	DK BR	SI LO	NCM
3.14	2	25-35	10YR 4/4	DK YL BR	SI LO	NCM
3.15	1	0-21	10YR 3/3	DK BR	SI LO	NCM
3.15	2	21-32	10YR 4/4	DK YL BR	SI LO	NCM
3.16	1	0-14	10YR 4/4	DK YL BR	SI LO	NCM
3.16	2	14-29	10YR 5/4	YL BR	SI LO	NCM
3.17	1	0-14	10YR 4/4	DK YL BR	SI LO	NCM
3.17	2	14-29	10YR 5/4	YL BR	SI LO	NCM
3.18	1	0-10	10YR 3/2	V DK GR BR	SI LO	NCM
3.18	2	10-28	10YR 5/4	YL BR	SI LO	NCM
4.1	1	0-31	10YR 4/1	DK GR	SI LO	NCM
4.1	2	31-43	10YR 4/6	DK YL BR	SI LO	NCM
4.2	1	0-20	10YR 4/1	DK GR	SI LO	NCM
4.2	2	20-50	10YR 4/6	DK YL BR	SI LO	NCM
4.3	1	0-26	10YR 4/1	DK GR	SI LO	NCM
4.3	2	26-40	10YR 4/6	DK YL BR	SI LO	NCM
4.4	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM
4.4	2	21-34	10YR 4/6	DK YL BR	SI LO	NCM
4.5	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM
4.5	2	21-33	10YR 4/6	DK YL BR	SI LO	NCM
4.6	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
4.6	2	24-38	10YR 4/6	DK YL BR	SI LO	NCM
4.7	1	0-12	10YR 3/2	V DK GR BR	SI LO	NCM
4.7	2	12-28	10YR 4/6	DK YL BR	SI LO	NCM
4.8	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
4.8	2	28-45	10YR 4/6	DK YL BR	SI LO	NCM
4.9	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
4.9	2	20-32	10YR 4/6	DK YL BR	SI LO	NCM
4.10	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	15-28	10YR 4/6	DK YL BR	SI LO	NCM
4.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	25-40	10YR 4/6	DK YL BR	SI LO	NCM
4.12	1	0-6	10YR 4/3	BR	SI	NCM
4.12	2	6-20	10YR 4/6	DK YL BR	SI LO	NCM
4.13	1	0-26	10YR 4/3	BR	SI	NCM
4.13	2	26-37	10YR 4/6	DK YL BR	SI LO	NCM
4.14	1	0-20	10YR 4/3	BR	SI	NCM; roots
4.14	2	20-32	10YR 4/6	DK YL BR	SI LO	NCM; roots
4.15	1	0-7	10YR 4/3	BR	SI	NCM
4.15	2	7-27	10YR 4/6	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.16	1	0-37	10YR 4/3	BR	SI	NCM
4.16	2	37-50	10YR 4/6	DK YL BR	SI LO	NCM
4.17	1	0-6	10YR 4/3	BR	SI	NCM
4.17	2	6-26	10YR 4/6	DK YL BR	SI LO	NCM
4.18	1	0-28	10YR 4/3	BR	SI	NCM
4.18	2	28-40	10YR 4/6	DK YL BR	SI LO	NCM
5.1	1	0-47	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	47-59	10YR 5/6	YL BR	CL LO	NCM
5.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	24-35	10YR 5/6	YL BR	CL LO	NCM
5.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	22-35	10YR 5/6	YL BR	CL LO	NCM
5.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	25-37	10YR 5/6	YL BR	CL LO	NCM
5.5	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	21-34	10YR 5/6	YL BR	CL LO	NCM
5.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	24-36	10YR 5/6	YL BR	CL LO	NCM
5.7	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	42-55	10YR 5/6	YL BR	CL LO	NCM
5.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	30-44	10YR 5/6	YL BR	CL LO	NCM
5.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	26-37	10YR 5/6	YL BR	CL LO	NCM
5.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	30-41	10YR 5/6	YL BR	CL LO	NCM
5.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	27-39	10YR 5/6	YL BR	CL LO	NCM
5.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	28-40	10YR 5/6	YL BR	CL LO	NCM
5.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	25-37	10YR 5/6	YL BR	CL LO	NCM
5.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	22-35	10YR 5/6	YL BR	CL LO	NCM
5.15	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	14-30	10YR 5/6	YL BR	CL LO	NCM
5.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	29-40	10YR 5/6	YL BR	CL LO	NCM
5.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.17	2	27-38	10YR 5/6	YL BR	CL LO	NCM
5.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	25-38	10YR 5/6	YL BR	CL LO	NCM
6.1	1	0-24	10YR 4/3	BR	LO	NCM
6.1	2	24-35	10YR 5/4	YL BR	SI LO	NCM
6.2	1	0-25	10YR 4/3	BR	LO	NCM
6.2	2	25-36	10YR 5/4	YL BR	SI LO	NCM
6.3	1	0-30	10YR 4/3	BR	LO	NCM
6.3	2	30-41	10YR 5/4	YL BR	SI LO	NCM
6.4	1	0-24	10YR 4/3	BR	SI LO	NCM
6.4	2	24-35	10YR 5/4	YL BR	SI	NCM
6.5	1	0-29	10YR 4/3	BR	SI LO	NCM
6.5	2	29-40	10YR 5/4	YL BR	SI	NCM
6.6	1	0-28	10YR 4/3	BR	SI LO	NCM
6.6	2	28-40	10YR 5/4	YL BR	SI	NCM
6.7	1	0-32	10YR 4/3	BR	SI LO	NCM
6.7	2	32-42	10YR 5/4	YL BR	SA SI	NCM
6.8	1	0-28	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.8	2	28-39	10YR 5/4	YL BR	SA SI	NCM
6.9	1	0-28	10YR 4/3	BR	SI LO	NCM
6.9	2	28-40	10YR 5/4	YL BR	SA SI	NCM
6.10	1	0-24	10YR 4/3	BR	SI LO	NCM
6.10	2	24-35	10YR 4/4	DK YL BR	SA SI	NCM
6.11	1	0-33	10YR 4/3	BR	SI LO	NCM
6.11	2	33-44	10YR 4/4	DK YL BR	SA SI	NCM
6.12	1	0-28	10YR 4/3	BR	SI LO	1 ironstone sherd
6.12	2	28-40	10YR 4/4	DK YL BR	SA SI	NCM
6.13	1	0-44	10YR 4/3	BR	SI LO	NCM
6.13	2	44-54	10YR 4/4	DK YL BR	SA SI	NCM
6.14	1	0-34	10YR 4/3	BR	SI LO	NCM
6.14	2	34-45	10YR 4/4	DK YL BR	SA SI	NCM
6.15	1	0-30	10YR 4/3	BR	SI LO	NCM
6.15	2	30-41	10YR 4/4	DK YL BR	SA SI	NCM
6.16	1	0-24	10YR 4/3	BR	SI LO	NCM
6.16	2	24-35	10YR 4/4	DK YL BR	SA SI	NCM
6.17	1	0-21	10YR 4/3	BR	SI LO	NCM
6.17	2	21-33	10YR 4/4	DK YL BR	SA SI	NCM
6.18	1	0-18	10YR 4/3	BR	SI LO	NCM
6.18	2	18-32	10YR 4/4	DK YL BR	SA SI	NCM
7.1	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	21-31	10YR 5/4	YL BR	SI LO	NCM
7.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	28-38	10YR 5/4	YL BR	SI LO	NCM
7.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	27-39	10YR 5/4	YL BR	SI LO	NCM
7.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	26-38	10YR 5/4	YL BR	SI LO	NCM
7.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	22-32	10YR 5/4	YL BR	SI LO	NCM
7.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	31-45	10YR 5/4	YL BR	SI LO	NCM
7.7	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	23-35	10YR 5/4	YL BR	SI LO	NCM
7.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	29-40	10YR 5/4	YL BR	SI LO	NCM
7.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	27-39	10YR 5/4	YL BR	SI LO	NCM
7.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	28-38	10YR 5/4	YL BR	SI LO	NCM
7.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	24-36	10YR 5/4	YL BR	SI LO	NCM
7.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	28-44	10YR 5/4	YL BR	SI LO	NCM
7.13	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	17-32	10YR 5/4	YL BR	SI LO	NCM
7.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	24-36	10YR 5/4	YL BR	SI LO	NCM
7.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	17-30	10YR 5/4	YL BR	SI LO	NCM
7.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	25-35	10YR 5/4	YL BR	SI LO	NCM
7.17	1	0-23	10YR 4/3	BR	SI LO	NCM
7.17	2	23-33	10YR 4/4	DK YL BR	SI LO	NCM
7.18	1	0-20	10YR 4/3	BR	SI LO	NCM
7.18	2	20-35	10YR 4/4	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.1	1	0-28	10YR 4/3	BR	SI LO	NCM
8.1	2	28-38	10YR 5/4	YL BR	SA LO	NCM
8.2	1	0-27	10YR 4/3	BR	SI LO	NCM
8.2	2	27-37	10YR 5/4	YL BR	SA LO	NCM
8.3	1	0-28	10YR 4/3	BR	SI LO	NCM
8.3	2	28-38	10YR 5/4	YL BR	SA LO	NCM
8.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	29-39	10YR 5/4	YL BR	SA LO	NCM
8.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	32-42	10YR 5/4	YL BR	SA LO	NCM
8.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	27-37	10YR 5/4	YL BR	SA LO	NCM
8.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	28-38	10YR 5/4	YL BR	SA LO	NCM
8.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	29-40	10YR 5/4	YL BR	SA LO	NCM
8.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	32-42	10YR 5/4	YL BR	SA LO	NCM
8.10	1	0-33	10YR 4/3	BR	SI LO	NCM
8.10	2	33-43	10YR 5/4	YL BR	SI CL LO	NCM
8.11	1	0-26	10YR 4/3	BR	SI LO	NCM
8.11	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
8.12	1	0-25	10YR 4/3	BR	SI LO	NCM
8.12	2	25-35	10YR 5/4	YL BR	SI CL	NCM
8.13	1	0-26	10YR 4/3	BR	SI LO	NCM
8.13	2	26-36	10YR 5/4	YL BR	SI CL	NCM
8.14	1	0-25	10YR 4/3	BR	SI LO	NCM
8.14	2	25-35	10YR 5/4	YL BR	SI CL	NCM
8.15	1	0-27	10YR 4/3	BR	SI LO	NCM
8.15	2	27-37	10YR 5/4	YL BR	SI CL LO	NCM
8.16	1	0-29	10YR 4/3	BR	SI LO	NCM
8.16	2	29-40	10YR 5/4	YL BR	SA LO	NCM
8.17	1	0-29	10YR 4/3	BR	SI LO	NCM
8.17	2	29-39	10YR 5/4	YL BR	SA LO	NCM
8.18	1	0-30	10YR 4/3	BR	SI LO	NCM
8.18	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
9.1	1	0-24	10YR 3/2	V DK GR BR	SI	NCM
9.1	2	24-34	10YR 4/6	DK YL BR	SI LO	NCM
9.2	1	0-23	10YR 3/2	V DK GR BR	SI	NCM
9.2	2	23-33	10YR 4/6	DK YL BR	SI LO	NCM
9.3	1	0-30	10YR 3/2	V DK GR BR	SI	NCM
9.3	2	30-45	10YR 4/6	DK YL BR	SI LO	NCM
9.4	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
9.4	2	28-42	10YR 4/6	DK YL BR	SI LO	NCM
9.5	1	0-26	10YR 3/2	V DK GR BR	SI	NCM
9.5	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM
9.6	1	0-30	10YR 3/2	V DK GR BR	SI	NCM
9.6	2	30-40	10YR 4/6	DK YL BR	SI LO	NCM
9.7	1	0-32	10YR 3/2	V DK GR BR	SI	NCM
9.7	2	32-43	10YR 4/6	DK YL BR	SI LO	NCM
9.8	1	0-21	10YR 3/2	V DK GR BR	SI	NCM
9.8	2	21-31	10YR 4/6	DK YL BR	SI LO	NCM
9.9	1	0-33	10YR 3/2	V DK GR BR	SI	NCM
9.9	2	33-45	7.5YR 4/4	BR	SI LO	NCM
9.10	1	0-29	10YR 3/2	V DK GR BR	SI	NCM
9.10	2	29-41	10YR 4/6	DK YL BR	SI LO	NCM
9.11	1	0-26	10YR 3/2	V DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.11	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
9.12	1	0-26	10YR 3/2	V DK GR BR	SI	NCM
9.12	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM
9.13	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
9.13	2	28-40	10YR 4/6	DK YL BR	SI LO	NCM
9.14	1	0-27	10YR 3/2	V DK GR BR	SI	NCM
9.14	2	27-38	10YR 4/6	DK YL BR	SI LO	NCM
9.15	1	0-30	10YR 3/2	V DK GR BR	SI	NCM
9.15	2	30-43	10YR 4/6	DK YL BR	SI LO	NCM
9.16	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
9.16	2	28-43	10YR 4/6	DK YL BR	SI LO	NCM
9.17	1	0-29	10YR 4/2	DK GR BR	SI	NCM
9.17	2	29-40	10YR 5/4	YL BR	SI LO	NCM
9.18	1	0-30	10YR 4/2	DK GR BR	SI	NCM
9.18	2	30-56	10YR 5/4	YL BR	SI LO	NCM
10.1	1	0-25	10YR 4/2	DK GR BR	SI	NCM
10.1	2	25-35	10YR 5/6	YL BR	SI LO	NCM
10.2	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.2	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.3	1	0-33	10YR 4/2	DK GR BR	SI	NCM
10.3	2	33-43	10YR 5/6	YL BR	SI LO	NCM
10.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.4	2	28-40	10YR 5/6	YL BR	SI LO	NCM
10.5	1	0-33	10YR 4/2	DK GR BR	SI	NCM
10.5	2	33-45	10YR 5/6	YL BR	SI LO	NCM
10.6	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.6	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.7	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.7	2	28-40	10YR 5/6	YL BR	SI LO	NCM
10.8	1	0-32	10YR 4/2	DK GR BR	SI	NCM
10.8	2	32-42	10YR 5/6	YL BR	SI LO	NCM
10.9	1	0-29	10YR 4/2	DK GR BR	SI	NCM
10.9	2	29-40	10YR 5/6	YL BR	SI LO	NCM
10.10	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.10	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.11	1	0-31	10YR 4/2	DK GR BR	SI	NCM
10.11	2	31-41	10YR 5/6	YL BR	SI LO	NCM
10.12	1	0-23	10YR 4/2	DK GR BR	SI	NCM
10.12	2	23-33	10YR 5/6	YL BR	SI LO	NCM
10.13	1	0-29	10YR 4/2	DK GR BR	SI	NCM
10.13	2	29-40	10YR 5/6	YL BR	SI LO	NCM
10.14	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.14	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.15	1	0-33	10YR 4/2	DK GR BR	SI	NCM
10.15	2	33-43	10YR 5/6	YL BR	SI LO	NCM
10.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.16	2	28-40	10YR 5/6	YL BR	SI LO	NCM
10.17	1	0-29	10YR 4/2	DK GR BR	SI	NCM
10.17	2	29-40	10YR 5/6	YL BR	SI LO	NCM
10.18	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.18	2	30-40	10YR 5/6	YL BR	SI LO	NCM
11.1	1	0-27	10YR 4/2	DK GR BR	SI	NCM
11.1	2	27-37	10YR 5/4	YL BR	SI LO	NCM
11.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	26-37	10YR 5/4	YL BR	SI CL	NCM
11.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	31-41	10YR 5/4	YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	32-43	10YR 5/4	YL BR	SI LO	NCM
11.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	33-43	10YR 5/4	YL BR	CL	NCM
11.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	29-40	10YR 5/4	YL BR	CL	NCM
11.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	28-39	10YR 5/4	YL BR	CL SA	NCM
11.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	32-43	10YR 5/4	YL BR	CL SA	NCM
11.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	29-40	10YR 5/4	YL BR	CL SA	NCM
11.10	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	23-33	10YR 5/6	YL BR	SI LO	NCM
11.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	27-39	10YR 6/3	PALE BR	SI LO	NCM
11.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	30-40	10YR 5/2	GR BR	SI LO	NCM
11.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	31-43	10YR 5/4	YL BR	SI LO	NCM
11.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	26-39	10YR 5/4	YL BR	SI LO	NCM
11.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	30-41	10YR 5/4	YL BR	SI LO	NCM
11.16	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	42-52	10YR 5/4	YL BR	SI LO	NCM
11.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	29-42	10YR 5/4	YL BR	SI LO	NCM
11.18	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	43-53	10YR 5/4	YL BR	SI LO	NCM
12.1	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	21-35	10YR 5/2	GR BR	CL SA	NCM
12.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	22-33	10YR 5/2	GR BR	CL SA	NCM
12.3	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.3	2	28-39	10YR 5/4	YL BR	SA CL	NCM
12.4	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
12.4	2	26-36	10YR 5/4	YL BR	SA CL	NCM
12.5	1	0-32	10YR 4/4	DK YL BR	SI LO	NCM
12.5	2	32-42	10YR 5/4	YL BR	SA CL	NCM
12.6	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
12.6	2	26-36	10YR 5/4	YL BR	SA CL	NCM
12.7	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
12.7	2	28-38	10YR 5/4	YL BR	SA CL	NCM
12.8	1	0-20	10YR 4/4	DK YL BR	SI LO	NCM
12.8	2	20-32	10YR 5/4	YL BR	SA CL	NCM
12.9	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
12.9	2	25-35	10YR 5/4	YL BR	SA CL	NCM
12.10	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	20-31	10YR 5/2	GR BR	SA CL	NCM
12.11	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
12.11	2	29-35	10YR 6/3	PALE BR	SA CL	NCM
12.12	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
12.12	2	25-39	10YR 5/6	YL BR	SA CL	NCM
12.13	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
12.13	2	30-40	10YR 5/2	GR BR	SA CL	NCM
12.14	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.14	2	26-36	10YR 5/6	YL BR	SA CL	NCM
12.15	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
12.15	2	30-40	10YR 5/6	YL BR	SA CL	NCM
12.16	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
12.16	2	26-36	10YR 5/4	YL BR	SA CL	NCM
12.17	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
12.17	2	27-37	10YR 5/4	YL BR	SA CL	NCM
12.18	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
12.18	2	26-36	10YR 5/4	YL BR	SA CL	NCM
13.1	1	0-27	10YR 4/3	BR	LO	NCM
13.1	2	27-39	10YR 4/4	DK YL BR	SI LO	NCM
13.2	1	0-30	10YR 4/3	BR	LO	NCM
13.2	2	30-40	10YR 4/4	DK YL BR	SI LO	NCM
13.3	1	0-31	10YR 4/3	BR	LO	NCM
13.3	2	31-42	10YR 4/4	DK YL BR	SI LO	NCM
13.4	1	0-29	10YR 4/3	BR	LO	NCM
13.4	2	29-40	10YR 4/4	DK YL BR	SI LO	NCM
13.5	1	0-28	10YR 4/3	BR	LO	NCM
13.5	2	28-40	10YR 4/4	DK YL BR	SI LO	NCM
13.6	1	0-27	10YR 4/3	BR	LO	NCM
13.6	2	27-40	10YR 4/4	DK YL BR	SI LO	NCM
13.7	1	0-27	10YR 4/3	BR	LO	NCM
13.7	2	27-38	10YR 4/4	DK YL BR	SI LO	NCM
13.8	1	0-28	10YR 4/3	BR	LO	NCM
13.8	2	28-39	10YR 4/4	DK YL BR	SI LO	NCM
13.9	1	0-25	10YR 4/3	BR	LO	NCM
13.9	2	25-36	10YR 4/4	DK YL BR	SI LO	NCM
13.10	1	0-31	10YR 4/3	BR	LO	NCM
13.10	2	31-42	10YR 4/4	DK YL BR	SA SI	NCM
13.11	1	0-26	10YR 4/3	BR	LO	NCM
13.11	2	26-39	10YR 4/4	DK YL BR	SA SI	NCM
13.12	1	0-26	10YR 4/3	BR	LO	NCM
13.12	2	26-39	10YR 4/4	DK YL BR	SA SI	NCM
13.13	1	0-25	10YR 4/3	BR	LO	NCM
13.13	2	25-36	10YR 4/4	DK YL BR	SA SI	NCM
13.14	1	0-26	10YR 4/3	BR	LO	NCM
13.14	2	26-37	10YR 4/4	DK YL BR	SA SI	NCM
13.15	1	0-26	10YR 4/3	BR	LO	NCM
13.15	2	26-37	10YR 4/4	DK YL BR	SA SI	NCM
13.16	1	0-28	10YR 4/3	BR	LO	NCM
13.16	2	28-39	10YR 4/4	DK YL BR	SA SI	NCM
13.17	1	0-31	10YR 4/3	BR	LO	NCM
13.17	2	31-42	10YR 4/4	DK YL BR	SA SI	NCM
13.18	1	0-27	10YR 4/3	BR	LO	NCM
13.18	2	27-40	10YR 4/4	DK YL BR	SA SI	NCM
14.1	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.1	2	30-40	10YR 5/6	YL BR	SI LO	NCM
14.2	1	0-31	10YR 4/2	DK GR BR	SI	NCM
14.2	2	31-41	10YR 5/6	YL BR	SI LO	NCM
14.3	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.3	2	30-40	10YR 5/6	YL BR	SI LO	NCM
14.4	1	0-29	10YR 4/2	DK GR BR	SI	NCM
14.4	2	29-40	10YR 5/6	YL BR	SI LO	NCM
14.5	1	0-32	10YR 4/2	DK GR BR	SI	NCM
14.5	2	32-42	10YR 5/6	YL BR	SI LO	NCM
14.6	1	0-27	10YR 4/2	DK GR BR	SI	NCM
14.6	2	27-37	10YR 5/6	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.7	1	0-25	10YR 4/2	DK GR BR	SI	NCM
14.7	2	25-35	10YR 5/6	YL BR	SI LO	NCM
14.8	1	0-26	10YR 4/2	DK GR BR	SI	NCM
14.8	2	26-36	10YR 5/6	YL BR	SI LO	NCM
14.9	1	0-24	10YR 4/2	DK GR BR	SI	NCM
14.9	2	24-34	10YR 5/6	YL BR	SI LO	NCM
14.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
14.10	2	26-36	10YR 5/4	YL BR	SI LO	NCM
14.11	1	0-27	10YR 4/2	DK GR BR	SI	NCM
14.11	2	27-37	10YR 5/4	YL BR	SI LO	NCM
14.12	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.12	2	30-40	10YR 5/6	YL BR	SI LO	NCM
14.13	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.13	2	30-40	10YR 5/6	YL BR	SI LO	NCM
14.14	1	0-28	10YR 4/2	DK GR BR	SI	NCM
14.14	2	28-38	10YR 5/6	YL BR	SI LO	NCM
14.15	1	0-29	10YR 4/2	DK GR BR	SI	NCM
14.15	2	29-40	10YR 5/6	YL BR	SI LO	NCM
14.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
14.16	2	28-38	10YR 5/6	YL BR	SI LO	NCM
14.17	1	0-25	10YR 4/2	DK GR BR	SI	NCM
14.17	2	25-35	10YR 5/6	YL BR	SI LO	NCM
14.18	1	0-23	10YR 4/2	DK GR BR	SI	NCM
14.18	2	23-33	10YR 5/6	YL BR	SI LO	NCM
15.1	1	0-25	10YR 4/3	BR	SA LO	NCM
15.1	2	25-38	10YR 5/4	YL BR	SI LO	NCM
15.2	1	0-32	10YR 4/3	BR	SA LO	NCM
15.2	2	32-43	10YR 5/4	YL BR	SI LO	NCM
15.3	1	0-22	10YR 4/3	BR	SA LO	NCM
15.3	2	22-33	10YR 5/4	YL BR	SI LO	NCM
15.4	1	0-25	10YR 4/3	BR	SA LO	NCM
15.4	2	25-35	10YR 5/4	YL BR	SI LO	NCM
15.5	1	0-26	10YR 4/3	BR	SA LO	NCM
15.5	2	26-37	10YR 5/4	YL BR	SI LO	NCM
15.6	1	0-29	10YR 4/3	BR	SA LO	NCM
15.6	2	29-41	10YR 5/4	YL BR	SI LO	NCM
15.7	1	0-25	10YR 4/3	BR	SA LO	NCM
15.7	2	25-37	10YR 5/4	YL BR	SI LO	NCM
15.8	1	0-28	10YR 4/3	BR	SA LO	NCM
15.8	2	28-38	10YR 5/4	YL BR	SI LO	NCM
15.9	1	0-18	10YR 4/3	BR	SA LO	NCM
15.9	2	18-29	10YR 5/4	YL BR	SI LO	NCM
15.10	1	0-17	10YR 4/3	BR	SA LO	NCM
15.10	2	17-30	10YR 5/4	YL BR	SI LO	NCM
15.11	1	0-27	10YR 4/3	BR	SA LO	NCM
15.11	2	27-39	10YR 5/4	YL BR	SI LO	NCM
15.12	1	0-32	10YR 4/3	BR	SA LO	NCM
15.12	2	32-44	10YR 5/4	YL BR	SI LO	NCM
15.13	1	0-28	10YR 4/3	BR	SA LO	NCM
15.13	2	28-38	10YR 5/4	YL BR	SI LO	NCM
15.14	1	0-26	10YR 4/3	BR	SA LO	NCM
15.14	2	26-36	10YR 5/4	YL BR	SI LO	NCM
15.15	1	0-24	10YR 4/3	BR	SA LO	NCM
15.15	2	24-36	10YR 5/4	YL BR	SI LO	NCM
15.16	1	0-27	10YR 4/3	BR	SA LO	NCM
15.16	2	27-37	10YR 5/4	YL BR	SI LO	NCM
15.17	1	0-32	10YR 4/3	BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.17	2	32-44	10YR 5/4	YL BR	SI LO	NCM
15.18	1	0-28	10YR 4/3	BR	SA LO	NCM
15.18	2	28-40	10YR 5/4	YL BR	SI LO	NCM
16.1	1	0-25	10YR 4/3	BR	SA LO	NCM
16.1	2	25-35	10YR 5/4	YL BR	SI LO	NCM
16.2	1	0-29	10YR 4/3	BR	SA LO	NCM
16.2	2	29-40	10YR 5/4	YL BR	SI LO	NCM
16.3	1	0-27	10YR 4/3	BR	SA LO	NCM
16.3	2	27-39	10YR 5/4	YL BR	SI LO	NCM
16.4	1	0-30	10YR 4/3	BR	SA LO	NCM
16.4	2	30-40	10YR 5/4	YL BR	SI LO	NCM
16.5	1	0-26	10YR 4/3	BR	SA LO	NCM
16.5	2	26-36	10YR 5/4	YL BR	SI LO	NCM
16.6	1	0-22	10YR 4/3	BR	SA LO	NCM
16.6	2	22-35	10YR 5/4	YL BR	SI LO	NCM; gravel
16.7	1	0-16	10YR 4/3	BR	SA LO	NCM
16.7	2	16-26	10YR 5/4 10YR 5/6	YL BR YL BR	SI LO	NCM
16.8	1	0-28	10YR 4/3	BR	SA LO	NCM
16.8	2	28-40	10YR 5/4 10YR 5/6	YL BR YL BR	SI LO	NCM
16.9	1	0-26	10YR 4/3	BR	SA LO	NCM
16.9	2	26-36	10YR 5/4 10YR 5/6	YL BR YL BR	SI LO	NCM
16.10	1	0-29	10YR 4/3	BR	SA LO	NCM
16.10	2	29-41	10YR 5/4	YL BR	SI LO	NCM
16.11	1	0-26	10YR 4/3	BR	SA LO	NCM
16.11	2	26-36	10YR 5/4	YL BR	SI LO	NCM
16.12	1	0-27	10YR 4/3	BR	SA LO	NCM
16.12	2	27-40	10YR 5/4	YL BR	SI LO	NCM
16.13	1	0-25	10YR 4/3	BR	SA LO	NCM; gravel
16.13	2	25-35	10YR 5/4	YL BR	SI LO	NCM; gravel
16.14	1	0-26	10YR 4/3	BR	SA LO	NCM; gravel
16.14	2	26-36	10YR 5/4	YL BR	SI LO	NCM; gravel
16.15	1	0-22	10YR 4/3	BR	SA LO	NCM; gravel
16.15	2	22-35	10YR 5/4	YL BR	SI LO	NCM; gravel
16.16	1	0-30	10YR 4/3	BR	SA LO	NCM
16.16	2	30-40	10YR 5/4	YL BR	SI LO	NCM
16.17	1	0-23	10YR 4/3	BR	SA LO	NCM; cobbles
16.17	2	23-34	10YR 5/4	YL BR	SI LO	NCM; cobbles
16.18	1	0-26	10YR 4/3	BR	SA LO	NCM
16.18	2	26-42	10YR 5/4	YL BR	SI LO	NCM
17.1	1	0-26	10YR 4/3	BR	SI	NCM
17.1	2	26-40	10YR 4/6	DK YL BR	SI LO	NCM
17.2	1	0-28	10YR 4/3	BR	SI	NCM
17.2	2	28-40	10YR 4/6	DK YL BR	SI LO	NCM
17.3	1	0-28	10YR 4/3	BR	SI	NCM
17.3	2	28-39	10YR 4/6	DK YL BR	SI LO	NCM
17.4	1	0-26	10YR 4/3	BR	SI	NCM
17.4	2	26-39	10YR 4/6	DK YL BR	SI LO	NCM
17.5	1	0-29	10YR 4/3	BR	SI	NCM
17.5	2	29-39	10YR 4/6	DK YL BR	SI LO	NCM
17.6	1	0-28	10YR 4/3	BR	SI	NCM
17.6	2	28-38	10YR 4/6	DK YL BR	SI LO	NCM
17.7	1	0-27	10YR 4/3	BR	SI	NCM
17.7	2	27-38	10YR 4/6	DK YL BR	SI LO	NCM
17.8	1	0-26	10YR 4/3	BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.8	2	26-40	10YR 4/6	DK YL BR	SI LO	NCM
17.9	1	0-33	10YR 4/3	BR	SI	NCM
17.9	2	33-45	10YR 4/6	DK YL BR	SI LO	NCM
17.10	1	0-27	10YR 4/3	BR	SI	NCM
17.10	2	27-38	10YR 4/6	DK YL BR	SI LO	NCM
17.11	1	0-26	10YR 4/3	BR	SI	NCM
17.11	2	26-36	10YR 5/4	YL BR	SI LO	NCM
17.12	1	0-29	10YR 4/3	BR	SI	NCM
17.12	2	29-39	10YR 4/6	DK YL BR	SI LO	NCM
17.13	1	0-25	10YR 4/3	BR	SI	NCM
17.13	2	25-35	10YR 4/6	DK YL BR	SI LO	NCM
17.14	1	0-28	10YR 4/3	BR	SI	NCM
17.14	2	28-38	10YR 4/6	DK YL BR	SI LO	NCM
17.15	1	0-24	10YR 4/3	BR	SI	NCM
17.15	2	24-36	10YR 4/6	DK YL BR	SI LO	NCM
17.16	1	0-26	10YR 4/3	BR	SI	NCM
17.16	2	26-40	10YR 4/6	DK YL BR	SI LO	NCM
17.17	1	0-28	10YR 4/3	BR	SI	NCM
17.17	2	28-39	10YR 4/6	DK YL BR	SI LO	NCM
17.18	1	0-24	10YR 4/3	BR	SI	NCM
17.18	2	24-35	10YR 4/6	DK YL BR	SI LO	NCM
18.1	1	0-24	10YR 4/3	BR	SI LO	NCM
18.1	2	24-36	10YR 5/4	YL BR	SI LO	NCM
18.2	1	0-28	10YR 4/3	BR	SI LO	NCM
18.2	2	28-39	10YR 4/6	DK YL BR	SI LO	NCM
18.3	1	0-29	10YR 4/3	BR	SI LO	NCM
18.3	2	29-39	10YR 4/6	DK YL BR	SI LO	NCM
18.4	1	0-28	10YR 4/3	BR	SI LO	NCM
18.4	2	28-40	10YR 5/4	YL BR	SI LO	NCM
18.5	1	0-26	10YR 4/3	BR	SI LO	NCM
18.5	2	26-36	10YR 5/4	YL BR	SI LO	NCM
18.6	1	0-26	10YR 4/3	BR	SI LO	NCM
18.6	2	26-39	10YR 5/4	YL BR	SI LO	NCM
18.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	25-37	10YR 5/4	YL BR	SI LO	NCM
18.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	29-39	10YR 5/4	YL BR	SI LO	NCM
18.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	30-40	10YR 5/4	YL BR	SI LO	NCM
18.10	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	22-35	10YR 5/4	YL BR	SI LO	NCM
18.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	28-38	10YR 5/4	YL BR	SI LO	NCM
18.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	26-36	10YR 5/4	YL BR	SI LO	NCM
18.13	1	0-27	10YR 4/3	BR	SI LO	NCM
18.13	2	27-37	10YR 5/4	YL BR	SI LO	NCM
18.14	1	0-29	10YR 4/3	BR	SI LO	NCM
18.14	2	29-39	10YR 5/4	YL BR	SI LO	NCM
18.15	1	0-27	10YR 4/3	BR	SI LO	NCM
18.15	2	27-37	10YR 5/4	YL BR	SI LO	NCM
18.16	1	0-29	10YR 4/3	BR	SI LO	NCM
18.16	2	29-39	10YR 5/4	YL BR	SI LO	NCM
18.17	1	0-27	10YR 4/3	BR	SI LO	NCM
18.17	2	27-39	10YR 5/4	YL BR	SI LO	NCM
18.18	1	0-20	10YR 4/3	BR	SI LO	NCM
18.18	2	20-32	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
Turbine 41						
1.1	1	0-26	10YR 4/3	BR	SA LO	NCM
1.1	2	26-36	10YR 5/4	YL BR	SI LO	NCM
1.2	1	0-25	10YR 4/3	BR	SA LO	NCM
1.2	2	25-36	10YR 5/4	YL BR	SI LO	NCM
1.3	1	0-27	10YR 4/3	BR	SA LO	NCM
1.3	2	27-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
1.4	1	0-27	10YR 4/3	BR	SA LO	NCM
1.4	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
1.5	1	0-30	10YR 4/3	BR	SA LO	NCM
1.5	2	30-41	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
1.6	1	0-32	10YR 4/3	BR	SA LO	NCM
1.6	2	32-45	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
1.7	1	0-31	10YR 4/3	BR	SA LO	NCM
1.7	2	31-42	10YR 6/3 10YR 5/8	PALE BR YL BR	SI LO	NCM
1.8	1	0-28	10YR 4/3	BR	SA LO	NCM
1.8	2	28-40	10YR 6/3 10YR 5/8	PALE BR YL BR	SI LO	NCM
1.9	1	0-25	10YR 4/3	BR	SA LO	NCM
1.9	2	25-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SI LO	NCM
1.10	1	0-32	10YR 4/3	BR	SA LO	NCM
1.10	2	32-44	10YR 5/4	YL BR	SA LO	NCM
1.11	1	0-26	10YR 4/3	BR	SA LO	NCM
1.11	2	26-38	10YR 5/4	YL BR	SA LO	NCM
1.12	1	0-25	10YR 4/3	BR	SA LO	NCM
1.12	2	25-36	10YR 5/4	YL BR	SA LO	NCM
1.13	1	0-26	10YR 4/3	BR	SA LO	NCM
1.13	2	26-37	10YR 5/4	YL BR	SI LO	NCM
1.14	1	0-25	10YR 4/3	BR	SA LO	NCM
1.14	2	25-36	10YR 5/4	YL BR	SI LO	NCM
1.15	1	0-27	10YR 4/3	BR	SA LO	NCM
1.15	2	27-37	10YR 5/4	YL BR	SI LO	NCM
1.16	1	0-23	10YR 4/3	BR	SA LO	NCM
1.16	2	23-35	10YR 5/4	YL BR	SI LO	NCM
1.17	1	0-18	10YR 4/3	BR	SI LO	NCM
1.17	2	18-30	10YR 6/4	LT YL BR	SI LO	NCM
2.1	1	0-23	10YR 4/4	DK YL BR	SI LO	NCM
2.1	2	23-37	10YR 5/4	YL BR	SA LO	NCM
2.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	31-41	10YR 5/6	YL BR	CL LO	NCM
2.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	22-32	10YR 5/6	YL BR	CL LO	NCM
2.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	29-40	10YR 6/4	LT YL BR	SA LO	NCM
2.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	27-37	10YR 6/4	LT YL BR	LO	NCM
2.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	29-39	10YR 6/4	LT YL BR	LO	NCM
2.7	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	33-43	10YR 5/6	YL BR	SA CL	NCM
2.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.8	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	27-30	10YR 5/4	YL BR	CL LO	NCM; rock impasse at 30cm
2.10	1	0-24	10YR 4/4	DK YL BR	SI LO	NCM
2.10	2	24-34	10YR 6/2	LT BR GR	SA CL	NCM
2.11	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
2.11	2	27-37	10YR 5/2 10YR 6/2	GR BR LT BR GR	SA CL	NCM
2.12	1	0-20	10YR 4/4	DK YL BR	SI LO	NCM
2.12	2	20-30	10YR 5/4	YL BR	SI LO	NCM
2.13	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
2.13	2	26-36	10YR 5/4	YL BR	SI LO	NCM
2.14	1	0-27	10YR 4/3	BR	SI LO	NCM
2.14	2	27-38	10YR 4/6	DK YL BR	SI LO	NCM
2.15	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
2.15	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.16	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
2.16	2	30-40	10YR 6/4	LT YL BR	SA LO	NCM
2.17	1	0-16	10YR 4/4	DK YL BR	SI LO	NCM
2.17	2	16-30	10YR 6/2 10YR 6/4	LT BR GR LT YL BR	SA LO	NCM
3.1	1	0-28	10YR 5/4	YL BR	SI LO	NCM
3.1	2	28-40	10YR 6/3	PALE BR	SA SI	NCM
3.2	1	0-27	10YR 4/3	BR	LO	NCM
3.2	2	27-39	10YR 5/6	YL BR	SI LO	NCM
3.3	1	0-26	10YR 4/3	BR	LO	NCM
3.3	2	26-38	10YR 5/6	YL BR	SI LO	NCM
3.4	1	0-33	10YR 4/3	BR	LO	NCM
3.4	2	33-44	10YR 5/6	YL BR	CL LO	NCM
3.5	1	0-27	10YR 4/3	BR	LO	NCM
3.5	2	27-39	10YR 5/6	YL BR	CL LO	NCM
3.6	1	0-29	10YR 4/3	BR	LO	NCM
3.6	2	29-40	10YR 5/6	YL BR	CL LO	NCM
3.7	1	0-28	10YR 4/3	BR	LO	NCM
3.7	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.8	1	0-23	10YR 4/3	BR	LO	NCM
3.8	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.9	1	0-24	10YR 4/3	BR	LO	NCM
3.9	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.10	1	0-22	10YR 4/2	DK GR BR	LO	NCM
3.10	2	22-34	10YR 5/8	YL BR	CL LO	NCM
3.11	1	0-26	10YR 4/2	DK GR BR	LO	NCM
3.11	2	26-38	10YR 5/8	YL BR	CL LO	NCM
3.12	1	0-27	10YR 5/4	YL BR	LO	NCM
3.12	2	27-39	10YR 4/4	DK YL BR	CL LO	NCM
3.13	1	0-31	10YR 4/3	BR	LO	NCM
3.13	2	31-42	10YR 4/4	DK YL BR	CL LO	NCM
3.14	1	0-29	10YR 4/3	BR	LO	1 flake
3.14	2	29-40	10YR 4/4	DK YL BR	CL LO	NCM
3.14 3N	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.14 3N	2	28-38	10YR 5/4	YL BR	SI LO	NCM
3.14 1N	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.14 1N	2	26-36	10YR 5/4	YL BR	SI LO	NCM
3.14 3W	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
3.14 3W	2	30-42	10YR 5/4	YL BR	SI LO	NCM
3.14 1W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.14 1W	2	27-37	10YR 5/6	YL BR	SI LO	NCM
3.14 1E	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.14 1E	2	23-33	10YR 5/6	YL BR	SI LO	NCM
3.14 3E	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.14 3E	2	22-32	10YR 5/4	YL BR	SA LO	NCM
3.14 1S	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.14 1S	2	23-33	10YR 5/4	YL BR	SA LO	NCM
3.14 3S	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.14 3S	2	33-43	10YR 5/4	YL BR	SA LO	NCM
3.15	1	0-30	10YR 4/3	BR	LO	NCM
3.15	2	30-41	10YR 4/4	DK YL BR	CL LO	NCM
3.16	1	0-24	10YR 4/3	BR	LO	NCM
3.16	2	24-35	10YR 4/4	DK YL BR	CL LO	NCM
3.17	1	0-20	10YR 4/3	BR	LO	NCM
3.17	2	20-32	10YR 4/4	DK YL BR	CL LO	NCM
4.1	1	0-28	10YR 4/3	BR	SA SI	NCM; gravel
4.1	2	28-38	10YR 5/4	YL BR	SA SI	NCM; gravel
4.2	1	0-32	10YR 4/3	BR	SA SI	NCM; gravel
4.2	2	32-43	10YR 6/4	LT YL BR	SA SI	NCM; gravel
4.3	1	0-26	10YR 4/3	BR	SA SI	NCM; gravel
4.3	2	26-40	10YR 6/4	LT YL BR	SA SI	NCM; gravel
4.4	1	0-31	10YR 4/3	BR	SA SI	NCM; cobbles
4.4	2	31-43	10YR 5/4	YL BR	SA SI	NCM; cobbles
4.5	1	0-28	10YR 4/3	BR	SA SI	NCM; cobbles
4.5	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; cobbles
4.6	1	0-25	10YR 4/3	BR	SA SI	NCM; cobbles
4.6	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; cobbles
4.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	25-42	10YR 3/1 10YR 5/4 10YR 6/1	V DK GR YL BR GR	CL LO	NCM
4.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	25-35	10YR 6/2 10YR 5/8	LT BR GR YL BR	SA CL	NCM
4.10	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	22-34	10YR 6/2 10YR 5/8	LT BR GR YL BR	SA CL	NCM
4.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	30-40	10YR 5/8	YL BR	SA CL	NCM; standing water at 35cm
4.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	28-38	10YR 5/4	YL BR	SA CL	NCM
4.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	29-42	10YR 5/8 10YR 6/2	YL BR KT BR GR	SA CL	NCM
4.14	1	0-21	10YR 4/3	BR	SA SI	NCM
4.14	2	21-31	10YR 5/4	YL BR	SA SI	NCM
4.15	1	0-27	10YR 4/2	DK GR BR	SA SI	NCM
4.15	2	27-39	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.16	1	0-32	10YR 4/3	BR	SA SI	NCM
4.16	2	32-42	10YR 5/4	YL BR	SA SI	NCM
4.17	1	0-32	10YR 4/3	BR	SA SI	NCM
4.17	2	32-42	10YR 5/8	YL BR	SA SI	NCM
5.1	1	0-25	10YR 4/3	BR	SI LO	NCM
5.1	2	25-40	10YR 5/4	YL BR	SI LO	NCM
5.2	1	0-23	10YR 4/3	BR	SI LO	NCM
5.2	2	23-35	10YR 4/6	DK YL BR	SA SI	NCM
5.3	1	0-24	10YR 4/3	BR	SI LO	NCM
5.3	2	24-35	10YR 4/6 10YR 3/2	DK YL BR V DK GR BR	SA SI	NCM
5.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	28-41	10YR 5/4 10YR 3/2	YL BR V DK GR BR	SI	NCM
5.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	33-42	10YR 5/1	GR	CL	NCM
5.6	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	36-46	10YR 5/1	GR	CL	NCM
5.7	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	20-30	10YR 5/4	YL BR	SI CL	NCM
5.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
5.9	1	0-19	10YR 6/2	LT BR GR	SI CL	NCM
5.9	2	19-29	10YR 6/2 10YR 5/8	LT BR GR YL BR	SI CL	NCM
5.10	1	0-20	10YR 6/2	LT BR GR	SI CL	NCM
5.10	2	20-30	10YR 6/2	LT BR GR	CL	NCM
5.11	1	0-19	10YR 4/2	DK GR BR	SI CL	NCM
5.11	2	19-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL	NCM
5.12	1	0-23	10YR 4/2	DK GR BR	SI	NCM
5.12	2	23-35	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
5.13	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	37-47	10YR 5/4	YL BR	SI CL	NCM
5.14	1	0-22	10YR 4/3	BR	SI LO	NCM
5.14	2	22-34	10YR 5/4	YL BR	SI CL	NCM
5.15	1	0-28	10YR 4/3	BR	SI LO	NCM
5.15	2	28-40	10YR 5/4	YL BR	SI CL	NCM
5.16	1	0-27	10YR 4/3	BR	SI LO	NCM
5.16	2	27-40	10YR 5/4	YL BR	SI LO	NCM
5.17	1	0-24	10YR 4/3	BR	SI LO	NCM
5.17	2	24-40	10YR 5/4	YL BR	SI LO	NCM
6.1	1	0-29	10YR 4/3	BR	SI LO	NCM
6.1	2	29-40	10YR 5/1 10YR 6/2	GR LT BR GR	SI LO	NCM; disturbed
6.2	1	0-26	10YR 4/3	BR	SI LO	NCM
6.2	2	26-38	10YR 5/4	YL BR	SI LO	NCM
6.3	1	0-30	10YR 4/3	BR	SI LO	NCM
6.3	2	30-40	10YR 5/4	YL BR	SI LO	NCM
6.4	1	0-31	10YR 4/3	BR	SI LO	NCM
6.4	2	31-41	10YR 5/4	YL BR	SI LO	NCM
6.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	24-36	10YR 6/3	PALE BR	SA SI	NCM
6.6	1	0-25	10YR 3/3	DK BR	SI LO	NCM
6.6	2	25-37	10YR 6/2	LT BR GR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.7	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL	NCM
6.8	1	0-21	10YR 3/3	DK BR	SI LO	NCM
6.8	2	21-32	10YR 7/2	LT GR	CL	NCM
6.9	1	0-23	10YR 3/3	DK BR	SI LO	NCM
6.9	2	23-33	10YR 7/2	LT GR	SI CL	NCM
6.10	1	0-18	10YR 4/3	BR	SI LO	NCM
6.10	2	18-35	10YR 5/2	GR BR	SI CL	NCM
6.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	32-45	10YR 6/2	LT BR GR	SI CL	NCM
6.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	26-36	10YR 6/2	LT BR GR	SI LO	NCM
6.13	1	0-28	10YR 3/3	DK BR	SI LO	NCM
6.13	2	28-39	10YR 5/4	YL BR	SI LO	NCM
6.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	25-35	10YR 5/4	YL BR	SI LO	NCM
6.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	31-42	10YR 5/4	YL BR	SI LO	NCM
6.16	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
6.16	2	22-33	10YR 5/4	YL BR	SI LO	NCM
6.17	1	0-24	10YR 3/3	DK BR	SI LO	NCM
6.17	2	24-37	10YR 5/4	YL BR	SI LO	NCM
7.1	1	0-28	10YR 4/3	BR	SI LO	NCM
7.1	2	28-38	10YR 5/6	YL BR	SI LO	NCM
7.2	1	0-27	10YR 4/3	BR	SI LO	NCM
7.2	2	27-37	10YR 5/6	YL BR	SI LO	NCM
7.3	1	0-25	10YR 4/3	BR	SI LO	NCM
7.3	2	25-36	10YR 5/6	YL BR	SI LO	NCM
7.4	1	0-32	10YR 4/3	BR	SI LO	NCM
7.4	2	32-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
7.5	1	0-17	10YR 4/3	BR	SI LO	NCM
7.5	2	17-29	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
7.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	22-32	10YR 6/2	LT BR GR	SA LO	NCM
7.7	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.9	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	21-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.11	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	22-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.12	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	22-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
7.13	1	0-28	10YR 4/3	BR	SI LO	NCM
7.13	2	28-38	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.14	1	0-29	10YR 4/3	BR	SI LO	NCM
7.14	2	29-39	10YR 5/4	YL BR	SI LO	NCM
7.15	1	0-32	10YR 4/3	BR	SI LO	NCM
7.15	2	32-45	10YR 5/4	YL BR	SI LO	NCM
7.16	1	0-28	10YR 4/3	BR	SI LO	NCM
7.16	2	28-38	10YR 5/4	YL BR	SI LO	NCM
7.17	1	0-30	10YR 4/3	BR	SI LO	NCM
7.17	2	30-42	10YR 5/4	YL BR	SI LO	NCM
8.1	1	0-24	10YR 4/3	BR	SI LO	NCM; gravel
8.1	2	24-35	10YR 5/4	YL BR	SI CL	NCM; gravel
8.2	1	0-28	10YR 4/3	BR	SI LO	NCM; gravel
8.2	2	28-40	10YR 5/4	YL BR	SI CL	NCM; gravel
8.3	1	0-25	10YR 4/3	BR	SI LO	NCM; gravel
8.3	2	25-35	10YR 5/4	YL BR	SI CL	NCM; gravel
8.4	1	0-33	10YR 4/3	BR	SI LO	NCM; gravel
8.4	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM; gravel
8.5	1	0-14	10YR 4/4	DK YL BR	SI L	NCM; gravel
8.5	2	14-25	10YR 5/1 10YR 6/4	GR LT YL BR	SI CL	NCM; gravel
8.6	1	0-29	10YR 4/1	DK GR	CL LO	NCM; gravel
8.6	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI CL	NCM; gravel; cobbles
8.7	1	0-28	10YR 4/1	DK GR	SI LO	NCM; gravel
8.7	2	28-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM; gravel
8.8	1	0-24	10YR 4/1 10YR 5/2	DK GR GR BR	SI LO	NCM; gravel
8.8	2	24-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM; gravel
8.9	1	0-26	10YR 4/1 10YR 5/2	DK GR GR BR	SI LO	NCM; gravel
8.9	2	26-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM; gravel
8.10	1	0-23	10YR 4/3	BR	SI LO	NCM; cobbles; rock impasse
8.11	1	0-21	10YR 4/3	BR	SI LO	NCM; gravel
8.11	2	21-33	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI	NCM; gravel
8.12	1	0-31	10YR 4/3	BR	SI LO	NCM; gravel
8.12	2	31-42	10YR 5/4 10YR 5/6	YL BR YL BR	SA SI	NCM; gravel
8.13	1	0-36	10YR 4/3	BR	SI LO	NCM; gravel
8.13	2	36-46	10YR 5/4	YL BR	SA SI	NCM; gravel
8.14	1	0-29	10YR 4/3	BR	SI LO	NCM; gravel
8.14	2	29-40	10YR 5/4	YL BR	SA SI	NCM; gravel
8.15	1	0-25	10YR 4/3	BR	SI LO	NCM
8.15	2	25-35	10YR 5/4	YL BR	SA SI	NCM
8.16	1	0-31	10YR 4/3	BR	SI LO	NCM
8.16	2	31-44	10YR 5/4	YL BR	SA SI	NCM
8.17	1	0-34	10YR 4/3	BR	SI LO	NCM
8.17	2	34-45	10YR 5/4	YL BR	SA SI	NCM
9.1	1	0-31	10YR 4/3	BR	SI LO	NCM
9.1	2	31-41	10YR 5/6	YL BR	SA SI	NCM
9.2	1	0-28	10YR 4/3	BR	SI LO	NCM
9.2	2	28-38	10YR 5/4	YL BR	SA SI	NCM
9.3	1	0-29	10YR 4/3	BR	SI LO	NCM
9.3	2	29-40	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.4	1	0-32	10YR 4/3	BR	SI LO	NCM
9.4	2	32-42	10YR 5/4	YL BR	SA SI	NCM
9.5	1	0-37	10YR 4/3	BR	SI LO	NCM
9.5	2	37-47	10YR 5/4 10YR 6/2	YL BR PALE BR	SA SI	NCM
9.6	1	0-27	10YR 4/3	BR	SI LO	NCM
9.6	2	27-37	10YR 5/4 10YR 6/2	YL BR PALE BR	SA SI	NCM
9.7	1	0-31	10YR 4/3	BR	SI LO	NCM
9.7	2	31-42	10YR 6/2	PALE BR	SA LO	NCM
9.8	1	0-28	10YR 4/3	BR	SI LO	NCM
9.8	2	28-38	10YR 6/2	PALE BR	SA LO	NCM
9.9	1	0-22	10YR 4/3	BR	SI LO	NCM
9.9	2	22-32	10YR 6/2 7.5YR 5/4	PALE BR BR	SA LO	NCM
9.10	1	0-30	10YR 4/3	BR	SI LO	NCM
9.10	2	30-40	10YR 5/4 10YR 6/8	YL BR BR YL	SA LO	NCM
9.11	1	0-29	10YR 4/3	BR	SI LO	NCM
9.11	2	29-40	10YR 4/6	DK YL BR	SA LO	NCM
9.12	1	0-27	10YR 4/3	BR	SI LO	NCM
9.12	2	27-38	10YR 5/6	YL BR	SA LO	NCM
9.13	1	0-47	10YR 4/3	BR	SI LO	NCM
9.13	2	47-57	10YR 6/8	BR YL	SA LO	NCM
Turbine 42						
1.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
1.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM
1.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.7	1	0-35	10YR 4/1	DK GR	SI LO	NCM
1.7	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.8	1	0-26	10YR 4/1	DK GR	SI LO	NCM
1.8	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.9	1	0-28	10YR 4/1	DK GR	SI LO	NCM
1.9	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.10	1	0-29	10YR 4/1	DK GR	SI LO	NCM
1.10	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.11	1	0-30	10YR 4/1	DK GR	SI LO	NCM
1.11	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.12	1	0-33	10YR 4/1	DK GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.12	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.13	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	35-45	10YR 5/4	YL BR	SI CL LO	NCM
1.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	31-41	10YR 5/4	YL BR	SI CL LO	NCM
1.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
1.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.17	1	0-27	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.17	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.18	1	0-24	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.18	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
2.1	1	0-28	10YR 4/3	BR	SI LO	NCM
2.1	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.2	1	0-24	10YR 4/3	BR	SI LO	NCM
2.2	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.3	1	0-29	10YR 4/3	BR	SI LO	NCM
2.3	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.4	1	0-31	10YR 4/3	BR	SI LO	NCM
2.4	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.5	1	0-30	10YR 4/3	BR	SI LO	NCM
2.5	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.6	1	0-33	10YR 4/3	BR	SI LO	NCM
2.6	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.7	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	25-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.12	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	36-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM; gravel

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.13	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
2.14	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.14	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
2.15	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.15	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
2.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	30-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.1	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.1	2	23-35	10YR 6/3 10YR 5/4	PALE BR YL BR	SA SI	NCM
3.2	1	0-31	10YR 4/2	DK GR BR	SI	NCM
3.2	2	31-42	10YR 6/3 10YR 5/4	PALE BR YL BR	SA SI	NCM
3.3	1	0-28	10YR 4/6	DK YL BR	SI	NCM
3.3	2	28-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SA SI	NCM
3.4	1	0-38	10YR 4/2	DK GR BR	SI	NCM
3.4	2	38-50	10YR 4/6	DK YL BR	SA SI	NCM
3.5	1	0-29	10YR 4/2	DK GR BR	SI	NCM
3.5	2	29-40	10YR 4/6	DK YL BR	SA SI	NCM
3.6	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.6	2	26-40	10YR 4/6	DK YL BR	SA SI	NCM
3.7	1	0-35	10YR 4/2	DK GR BR	SI	NCM
3.7	2	35-46	10YR 4/6	DK YL BR	SA SI	NCM
3.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.8	2	29-40	10YR 3/1 10YR 5/4	V DK GR YL BR	SA SI	NCM
3.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	23-33	10YR 3/1 10YR 5/4	V DK GR YL BR	SA SI	NCM
3.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.10	2	26-36	10YR 3/1 10YR 5/4	V DK GR YL BR	SA SI	NCM
3.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.11	2	25-35	10YR 3/1 10YR 5/4	V DK GR YL BR	SA SI	NCM
3.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
3.12	2	30-40	10YR 3/1 10YR 5/4	V DK GR YL BR	SA SI	NCM
3.13	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
3.13	2	34-45	10YR 6/3 10YR 5/2	PALE BR GR BR	SA SI	NCM
3.14	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
3.14	2	24-37	10YR 5/2 10YR 6/8	GR BR BR YL	SA SI	NCM
3.15	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.15	2	23-35	10YR 5/2 10YR 6/8	GR BR BR YL	SA SI	NCM
3.16	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
3.16	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SA SI	NCM
3.17	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
3.17	2	29-42	10YR 6/1 10YR 5/4	GR YL BR	SA SI	NCM
3.18	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM
3.18	2	21-25	10YR 2/2	V DK BR	LO	NCM
3.18	3	25-40	10YR 6/3 10YR 5/2	PALE BR GR BR	SA SI	NCM
4.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.1	2	29-41	10YR 5/6	YL BR	CL LO	NCM
4.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.2	2	30-43	10YR 5/6	YL BR	CL LO	NCM
4.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	32-44	10YR 5/6	YL BR	CL LO	NCM
4.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	35-47	10YR 5/6	YL BR	CL LO	NCM
4.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	33-44	10YR 5/6	YL BR	CL LO	NCM
4.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	35-48	10YR 5/6	YL BR	CL LO	NCM
4.7	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	36-47	10YR 5/6	YL BR	CL LO	NCM
4.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	32-44	10YR 5/6	YL BR	CL LO	NCM
4.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	29-40	10YR 5/6	YL BR	CL LO	NCM
4.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	29-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	34-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
4.14	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	30-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	28-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.1	1	0-30	10YR 4/3	BR	SI LO	NCM
5.1	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.2	1	0-31	10YR 4/3	BR	SI LO	NCM
5.2	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.3	1	0-28	10YR 4/3	BR	SI LO	NCM
5.3	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.4	1	0-30	10YR 4/3	BR	SI LO	NCM
5.4	2	30-40	10YR 5/2	GR BR	SA CL	NCM
5.5	1	0-40	10YR 4/3	BR	SI LO	NCM
5.5	2	40-50	10YR 5/2	GR BR	SA CL	NCM
5.6	1	0-34	10YR 4/3	BR	SI LO	NCM
5.6	2	34-44	10YR 5/2	GR BR	SA CL	NCM
5.7	1	0-34	10YR 4/3	BR	SI LO	NCM
5.7	2	34-44	10YR 5/2	GR BR	SA CL	NCM
5.8	1	0-31	10YR 4/3	BR	SI LO	NCM
5.8	2	31-40	10YR 5/2	GR BR	SA CL	NCM
5.9	1	0-28	10YR 4/3	BR	SI LO	NCM
5.9	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	36-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.12	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	15-28	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL SI	NCM
5.13	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	36-46	10YR 3/1	V DK GR	SA CL	NCM
5.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	29-39	10YR 5/1	GR	SA CL	NCM
5.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	30-40	10YR 5/1	GR	SA CL	NCM
5.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.17	2	30-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA CL	NCM
5.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA CL	NCM
6.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	28-39	10YR 5/4	YL BR	SI LO	NCM
6.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	26-36	10YR 5/4	YL BR	SI LO	NCM
6.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	26-39	10YR 5/4	YL BR	SI LO	NCM
6.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	29-40	10YR 5/4	YL BR	SI LO	NCM
6.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	27-37	10YR 5/4	YL BR	SI LO	NCM
6.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.6	2	31-41	10YR 5/4	YL BR	SI LO	NCM
6.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	26-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	21-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	30-40	10YR 6/2	LT BR GR	CL LO	NCM
6.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.16	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.17	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	1 possible flake
6.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.18	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
6.18 3N	1	0-38	10YR 4/2	DK GR BR	SI	NCM
6.18 3N	2	38-50	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 1N	1	0-29	10YR 4/2	DK GR BR	SI	NCM
6.18 1N	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 3W	1	0-27	10YR 4/2	DK GR BR	SI	NCM
6.18 3W	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 1W	1	0-28	10YR 4/2	DK GR BR	SI	NCM
6.18 1W	2	28-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 1E	1	0-30	10YR 4/2	DK GR BR	SI	NCM
6.18 1E	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 3E	1	0-26	10YR 4/2	DK GR BR	SI	NCM
6.18 3E	2	26-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
6.18 1S	1	0-29	10YR 4/2	DK GR BR	SI	NCM
6.18 1S	2	29-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.18 3S	1	0-32	10YR 4/2	DK GR BR	SI	NCM
6.18 3S	2	32-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
7.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	32-42	10YR 5/4	YL BR	SI CL LO	NCM
7.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
7.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	27-37	10YR 5/4	YL BR	SI CL LO	NCM
7.4	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	34-44	10YR 5/4	YL BR	SI CL LO	NCM
7.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
7.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
7.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.17	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
7.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	27-37	10YR 6/3	PALE BR	SA LO	NCM
8.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.3	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.14	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.15	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
8.16	2	23-35	10YR 5/6	YL BR	SI LO	NCM
8.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.17	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
8.18	2	25-35	10YR 5/6	YL BR	SI LO	NCM
9.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	29-41	10YR 5/6	YL BR	CL LO	NCM
9.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	27-40	10YR 5/6	YL BR	CL LO	NCM
9.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	28-39	10YR 5/6	YL BR	CL LO	NCM
9.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	32-44	10YR 5/6	YL BR	CL LO	NCM
9.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	30-41	10YR 5/6	YL BR	CL LO	NCM
9.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	28-40	10YR 5/6	YL BR	CL LO	NCM
9.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	27-37	10YR 5/6	YL BR	CL LO	NCM
9.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	25-38	10YR 5/6	YL BR	CL LO	NCM
9.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	27-39	10YR 5/6	YL BR	CL LO	NCM
9.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	28-40	10YR 5/6	YL BR	CL LO	NCM
9.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	24-38	10YR 5/6	YL BR	CL LO	NCM
9.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	29-40	10YR 5/6	YL BR	CL LO	NCM
9.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	22-35	10YR 5/6	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	25-37	10YR 5/6	YL BR	CL LO	NCM
9.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	28-40	10YR 5/6	YL BR	CL LO	NCM
9.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	26-39	10YR 5/6	YL BR	CL LO	NCM
9.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	27-38	10YR 5/6	YL BR	CL LO	NCM
9.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	29-40	10YR 5/6	YL BR	CL LO	NCM
10.1	1	0-30	10YR 4/2	DK GR BR	CL LO	NCM
10.1	2	30-41	10YR 5/6	YL BR	SA CL	NCM
10.2	1	0-26	10YR 4/2	DK GR BR	CL LO	NCM
10.2	2	26-37	10YR 5/6	YL BR	SA CL	NCM
10.3	1	0-34	10YR 4/2	DK GR BR	CL LO	NCM
10.3	2	34-45	10YR 5/6	YL BR	SA CL	NCM
10.4	1	0-31	10YR 4/3	BR	LO LO	NCM
10.4	2	31-43	10YR 5/4	YL BR	SA CL	NCM
10.5	1	0-35	10YR 4/3	BR	LO LO	NCM
10.5	2	35-46	10YR 5/4	YL BR	SA CL	NCM
10.6	1	0-31	10YR 4/3	BR	LO LO	NCM
10.6	2	31-42	10YR 5/4	YL BR	SA CL	NCM
10.7	1	0-32	10YR 4/2	DK GR BR	CL LO	NCM
10.7	2	32-45	10YR 5/4	YL BR	SA CL	NCM
10.8	1	0-30	10YR 4/2	DK GR BR	CL LO	NCM
10.8	2	30-41	10YR 5/4	YL BR	SA CL	NCM
10.9	1	0-31	10YR 4/2	DK GR BR	CL LO	NCM
10.9	2	31-42	10YR 5/4	YL BR	SA CL	NCM
10.10	1	0-29	10YR 4/2	DK GR BR	CL LO	NCM
10.10	2	29-40	10YR 5/4	YL BR	SA CL	NCM
10.11	1	0-30	10YR 4/2	DK GR BR	CL LO	NCM
10.11	2	30-42	10YR 5/4	YL BR	SA CL	NCM
10.12	1	0-31	10YR 4/2	DK GR BR	CL LO	NCM
10.12	2	31-42	10YR 5/4	YL BR	SA CL	NCM
10.13	1	0-31	10YR 4/2	DK GR BR	LO	NCM
10.13	2	31-42	10YR 5/8	YL BR	CL LO	NCM
10.14	1	0-28	10YR 4/2	DK GR BR	LO	NCM
10.14	2	28-40	10YR 5/8	YL BR	CL LO	NCM
10.15	1	0-30	10YR 4/2	DK GR BR	LO	NCM
10.15	2	30-41	10YR 5/8	YL BR	CL LO	NCM
10.16	1	0-29	10YR 4/2	DK GR BR	LO	NCM
10.16	2	29-40	10YR 5/8	YL BR	CL LO	NCM
10.17	1	0-31	10YR 4/2	DK GR BR	LO	NCM
10.17	2	31-42	10YR 5/8	YL BR	CL LO	NCM
10.18	1	0-30	10YR 4/2	DK GR BR	LO	NCM
10.18	2	30-43	10YR 5/8	YL BR	CL LO	NCM
11.1	1	0-27	10YR 4/2	DK GR BR	SA SI	NCM
11.1	2	27-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL	NCM
11.2	1	0-20	10YR 4/2	DK GR BR	SA SI	NCM
11.2	2	20-35	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL	NCM
11.3	1	0-25	10YR 4/2	DK GR BR	SA SI	NCM
11.3	2	25-36	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL	NCM
11.4	1	0-30	10YR 4/2	DK GR BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.4	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
11.5	1	0-32	10YR 4/2	DK GR BR	SA SI	NCM
11.5	2	32-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
11.6	1	0-35	10YR 4/2	DK GR BR	SA SI	NCM
11.6	2	35-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
11.7	1	0-32	10YR 4/2	DK GR BR	SA LO	NCM
11.7	2	32-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.8	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
11.8	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.9	1	0-24	10YR 4/2	DK GR BR	SA LO	NCM
11.9	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.10	1	0-23	10YR 4/2	DK GR BR	SA SI	NCM
11.10	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.11	1	0-25	10YR 4/2	DK GR BR	SA SI	NCM
11.11	2	25-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.12	1	0-23	10YR 4/2	DK GR BR	SA SI	NCM
11.12	2	23-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
11.13	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	19-30	10YR 5/4 10YR 6/3	YL BR PALE BR	SA CL	NCM
11.14	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	18-30	10YR 5/4 10YR 6/3	YL BR PALE BR	SA CL	NCM
11.15	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	24-34	10YR 5/4 10YR 6/3	YL BR PALE BR	SA CL	NCM
11.16	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
11.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL	NCM
11.18	1	0-29	10YR 4/1	DK GR	SI LO	NCM
11.18	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
12.1	1	0-33	10YR 4/2	DK GR BR	SI	NCM
12.1	2	33-45	10YR 4/6	DK YL BR	SA SI	NCM
12.2	1	0-28	10YR 4/2	DK GR BR	SI	NCM
12.2	2	28-40	10YR 4/6	DK YL BR	SA SI	NCM
12.3	1	0-31	10YR 4/2	DK GR BR	SI	NCM
12.3	2	31-42	10YR 4/6	DK YL BR	SA SI	NCM
12.4	1	0-32	10YR 4/2	DK GR BR	SI	NCM
12.4	2	32-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.5	1	0-35	10YR 4/2	DK GR BR	SI	NCM
12.5	2	35-47	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.6	1	0-34	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.6	2	34-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.7	1	0-34	10YR 4/1	DK GR	SI	NCM
12.7	2	34-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.8	1	0-32	10YR 4/1	DK GR	SI	NCM
12.8	2	32-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.9	1	0-30	10YR 4/1	DK GR	SI	NCM
12.9	2	30-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
12.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
12.10	2	26-37	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.11	1	0-25	10YR 4/2	DK GR BR	SI	NCM
12.11	2	25-38	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.12	1	0-24	10YR 4/2	DK GR BR	SI	NCM
12.12	2	24-35	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.13	1	0-21	10YR 4/2	DK GR BR	SI	NCM
12.13	2	21-32	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.14	1	0-23	10YR 4/2	DK GR BR	SI	NCM
12.14	2	23-34	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.15	1	0-24	10YR 4/2	DK GR BR	SI	NCM
12.15	2	24-35	10YR 5/4 10YR 6/3	YL BR PALE BR	SA SI	NCM
12.16	1	0-25	10YR 4/2	DK GR BR	SI	NCM
12.16	2	25-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SA SI	NCM
12.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM
12.17	2	28-38	10YR 6/3 10YR 5/4	PALE BR YL BR	SA SI	NCM
12.18	1	0-27	10YR 4/2	DK GR BR	SI	NCM
12.18	2	27-38	10YR 4/1 10YR 6/3	DK GR PALE BR	SI LO	NCM
13.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	27-37	10YR 5/4	YL BR	SA SI	NCM
13.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
13.3	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
13.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
13.5	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	35-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
13.6	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	37-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
13.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	30-40	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	27-40	10YR 5/4	YL BR	SA SI	NCM
13.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	30-40	10YR 5/4	YL BR	SA SI	NCM
13.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	25-37	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
13.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	24-35	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
13.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	34-45	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
13.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; gravel
13.13	2	24-35	10YR 5/2 10YR 6/4	GR BR LT YL BR	SI CL	NCM
13.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; gravel
13.14	2	26-36	10YR 5/2 10YR 6/4	GR BR LT YL BR	SI CL	NCM
13.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
13.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
13.17	1	0-32	10YR 4/1	DK GR	SI LO	NCM
13.17	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
13.18	1	0-29	10YR 4/1	DK GR	SI LO	NCM
13.18	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
14.1	1	0-32	10YR 4/3	BR	SI LO	NCM
14.1	2	32-42	10YR 5/4	YL BR	SA SI	NCM
14.2	1	0-21	10YR 4/3	BR	SI LO	NCM
14.2	2	21-32	10YR 5/4	YL BR	SA SI	NCM
14.3	1	0-26	10YR 4/3	BR	SI LO	NCM
14.3	2	26-36	10YR 5/4	YL BR	SA SI	NCM
14.4	1	0-27	10YR 4/3	BR	SI LO	NCM
14.4	2	27-38	10YR 5/4	YL BR	SA SI	NCM
14.5	1	0-30	10YR 4/3	BR	SI LO	NCM
14.5	2	30-40	10YR 5/4	YL BR	SA SI	NCM
14.6	1	0-36	10YR 4/3	BR	SI LO	NCM
14.6	2	36-47	10YR 5/4	YL BR	SA SI	NCM
14.7	1	0-26	10YR 4/3	BR	SI LO	NCM
14.7	2	26-37	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.8	1	0-27	10YR 4/3	BR	SI LO	NCM
14.8	2	27-37	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.9	1	0-24	10YR 4/3	BR	SI LO	NCM
14.9	2	24-32	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.10	1	0-25	10YR 4/3	BR	SI LO	NCM
14.10	2	25-35	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.11	1	0-38	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.11	2	38-48	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.12	1	0-33	10YR 4/3	BR	SI LO	NCM
14.12	2	33-42	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.13	1	0-26	10YR 4/3	BR	SA SI	NCM
14.13	2	26-46	10YR 5/4 10YR 6/1	YL BR GR	SA CL	NCM
14.14	1	0-30	10YR 4/3	BR	SA SI	NCM
14.14	2	30-40	10YR 5/4 10YR 6/1	YL BR GR	SA CL	NCM
14.15	1	0-23	10YR 4/3	BR	SA SI	NCM
14.15	2	23-33	10YR 5/4 10YR 6/1	YL BR GR	SA CL	NCM
14.16	1	0-32	10YR 4/3	BR	SI LO	NCM
14.16	2	32-42	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.17	1	0-22	10YR 4/3	BR	SI LO	NCM
14.17	2	22-36	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
14.18	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	22-35	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
15.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	34-44	10YR 5/6	YL BR	SI LO	NCM
15.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	30-40	10YR 5/6	YL BR	SI LO	NCM
15.3	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	36-46	10YR 5/6	YL BR	SI LO	NCM
15.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	33-45	10YR 6/4	LT YL BR	SI LO	NCM
15.5	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	37-47	10YR 6/4	LT YL BR	SI LO	NCM
15.6	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	34-44	10YR 6/4	LT YL BR	SI LO	NCM
15.7	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	36-46	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	31-41	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.9	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	32-42	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.10	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	36-46	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	27-37	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	26-40	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
15.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	27-38	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
15.14	1	0-32	10YR 3/3	DK BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.14	2	32-43	10YR 5/4	YL BR	SI LO	NCM
15.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	28-40	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
15.16	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	39-49	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
15.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	28-38	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
15.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	31-41	10YR 5/6 10YR 6/8	YL BR BR YL	SI LO	NCM
16.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.4	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	36-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.5	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	38-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.7	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
16.8	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.9	2	24-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.10	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.11	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.13	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.15	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	26-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.17	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	23-37	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
16.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	26-36	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
17.1	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	38-48	10YR 6/2	LT BR GR	SA LO	NCM
17.2	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	36-46	10YR 5/4	YL BR	CL SI	NCM
17.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	34-45	10YR 5/4	YL BR	CL LO	NCM
17.4	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	38-50	10YR 5/4	YL BR	SI LO	NCM
17.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	33-43	10YR 5/4	YL BR	SI LO	NCM
17.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	32-42	10YR 5/4	YL BR	SI LO	NCM
17.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	31-43	10YR 5/4	YL BR	CL SI	NCM
17.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	22-39	10YR 5/4	YL BR	CL SI	NCM
17.9	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	21-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.10	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	20-31	10YR 5/4	YL BR	SI LO	NCM
17.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	23-35	10YR 5/4	YL BR	SI LO	NCM
17.12	1	0-34	10YR 3/3	DK BR	SI LO	NCM
17.12	2	34-46	10YR 5/4	YL BR	SI LO	NCM
17.13	1	0-20	10YR 3/3	DK BR	SI LO	NCM
17.13	2	20-25	10YR 5/4	YL BR	SI LO	NCM; water at 25cm
17.14	1	0-4	10YR 3/3	DK BR	SI LO	NCM; standing water at 4cm
17.15	1	0-6	10YR 3/3	DK BR	SI LO	NCM; water at 6cm
17.16	1	0-18	10YR 3/3	DK BR	SI LO	NCM
17.16	2	18-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
17.17	1	0-22	10YR 3/1	V DK GR	SI LO	NCM; seepage at 22cm
17.18	1	0-22	10YR 3/3	DK BR	SI LO	NCM
17.18	2	22-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	32-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.4	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.6	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	34-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
18.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM; seepage
18.12	1	0-2	10YR 4/2	DK GR BR	SI LO	NCM; standing water
18.13	1	0-15	10YR 3/1	V DK GR	SI LO	NCM; filled with water
18.14	1	0-10	10YR 3/1	V DK GR	SI LO	NCM; filled with water
18.15	1	0-10	10YR 3/1	V DK GR	SI LO	NCM; filled with water
18.16	1	0-18	10YR 3/1	V DK GR	SI LO	NCM
18.16	2	18-30	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM; seepage
18.17	1	0-35	10YR 3/1	V DK GR	SI LO	NCM
18.17	2	35-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM; seepage
18.18	1	0-31	10YR 4/1	DK GR	SI LO	NCM
18.18	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
Turbine 43						
1.1	1	0-33	10YR 4/1	DK GR	SI LO	NCM
1.1	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.2	1	0-28	10YR 4/1	DK GR	SI LO	NCM
1.2	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.3	1	0-37	10YR 4/1	DK GR	SI LO	NCM
1.3	2	37-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.4	1	0-39	10YR 4/1	DK GR	SI LO	NCM
1.4	2	39-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.5	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.7	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.8	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.13	1	0-29	10YR 4/3	BR	SI LO	NCM
1.13	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.14	1	0-31	10YR 4/3	BR	SI LO	NCM
1.14	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.15	1	0-27	10YR 4/3	BR	SI LO	NCM
1.15	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.16	1	0-30	10YR 4/3	BR	SI LO	NCM
1.16	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.17	1	0-34	10YR 4/3	BR	SI LO	NCM
1.17	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.18	1	0-26	10YR 4/3	BR	SI LO	NCM
1.18	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
2.1	1	0-36	10YR 3/3	DK BR	SI LO	NCM
2.1	2	36-40	10YR 5/4	YL BR	CL SI	NCM
2.2	1	0-41	10YR 3/3	DK BR	SI LO	NCM
2.2	2	41-51	10YR 5/4	YL BR	CL SI	NCM
2.3	1	0-37	10YR 3/3	DK BR	SI LO	NCM
2.3	2	37-49	10YR 5/4	YL BR	CL SI	NCM
2.4	1	0-31	10YR 3/3	DK BR	SI LO	NCM
2.4	2	31-42	10YR 5/4	YL BR	CL SI	NCM
2.5	1	0-33	10YR 3/3	DK BR	SI LO	NCM
2.5	2	33-45	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	30-41	10YR 5/4	YL BR	SI LO	NCM
2.7	1	0-40	10YR 3/3	DK BR	SI LO	NCM
2.7	2	40-51	10YR 5/4	YL BR	SI LO	NCM
2.8	1	0-37	10YR 3/3	DK BR	SI LO	NCM
2.8	2	37-49	10YR 5/4	YL BR	SI LO	NCM
2.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	29-39	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	32-43	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.12	1	0-28	10YR 3/3	DK BR	SI LO	NCM
2.12	2	28-39	10YR 5/4	YL BR	SI LO	NCM
2.13	1	0-35	10YR 3/3	DK BR	SI LO	NCM
2.13	2	35-47	10YR 5/4	YL BR	SI LO	NCM
2.14	1	0-34	10YR 3/3	DK BR	SI LO	NCM
2.14	2	34-46	10YR 5/4	YL BR	SI LO	NCM
2.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	32-45	10YR 5/4	YL BR	SI CL	NCM
2.16	1	0-31	10YR 3/3	DK BR	SI LO	NCM
2.16	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.17	1	0-29	10YR 3/3	DK BR	SI LO	NCM
2.17	2	29-41	10YR 5/4	YL BR	SI LO	NCM
2.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	24-36	10YR 5/4	YL BR	SI LO	NCM
3.1	1	0-26	10YR 4/1	DK GR	SI LO	NCM
3.1	2	26-36	10YR 5/4	YL BR	CL SI	NCM
3.2	1	0-25	10YR 4/1	DK GR	SI LO	NCM
3.2	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
3.3	1	0-28	10YR 4/1	DK GR	SI LO	NCM
3.3	2	28-38	10YR 5/4	YL BR	CL SI	NCM
3.4	1	0-28	10YR 4/1	DK GR	SI LO	NCM
3.4	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
3.5	1	0-30	10YR 4/2	DK GR BR	CL LO	NCM
3.5	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
3.6	1	0-26	10YR 4/2	DK GR BR	CL LO	NCM
3.6	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
3.7	1	0-27	10YR 4/2	DK GR BR	CL LO	NCM
3.7	2	27-38	10YR 5/4	YL BR	SI CL	NCM
3.8	1	0-37	10YR 4/2	DK GR BR	CL LO	NCM
3.8	2	37-48	10YR 5/4	YL BR	SI CL	NCM
3.9	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	37-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.10	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
3.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.11	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
3.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
3.12	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
3.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
3.13	2	34-45	10YR 5/4	YL BR	SI CL	NCM
3.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.14	2	29-39	10YR 5/4	YL BR	SI CL	NCM
3.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.15	2	29-39	10YR 5/4	YL BR	SI CL	NCM
3.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.16	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
3.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.17	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
3.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.18	2	33-43	10YR 5/4	YL BR	SI CL	NCM
4.1	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
4.1	2	34-44	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.2	1	0-40	10YR 4/1	DK GR	SI LO	NCM
4.2	2	40-50	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.3	1	0-31	10YR 4/1	DK GR	SI LO	NCM
4.3	2	31-41	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.4	1	0-33	10YR 4/1	DK GR	SI LO	NCM
4.4	2	33-43	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.5	1	0-37	10YR 4/1	DK GR	SI LO	NCM
4.5	2	37-47	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.6	1	0-29	10YR 4/1	DK GR	SI LO	NCM
4.6	2	29-39	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.7	1	0-24	10YR 4/1	DK GR	SI LO	NCM
4.7	2	24-34	10YR 5/4 10YR 6/8	YL BR BR YL	SI LO	NCM
4.8	1	0-14	10YR 4/1	DK GR	SI LO	NCM; rock impasse
4.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	24-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	31-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.14	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	28-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.18	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	35-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
5.1	1	0-31	10YR 4/1	DK GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.1	2	31-41	10YR 5/6	YL BR	SI LO	NCM
5.2	1	0-35	10YR 4/1	DK GR	SI LO	NCM
5.2	2	35-45	10YR 5/6	YL BR	SI LO	NCM
5.3	1	0-30	10YR 4/1	DK GR	SI LO	NCM
5.3	2	30-40	10YR 5/6	YL BR	SI LO	NCM
5.4	1	0-30	10YR 4/1	DK GR	SI LO	NCM
5.4	2	30-40	10YR 5/6	YL BR	SI LO	NCM
5.5	1	0-27	10YR 4/1	DK GR	SI LO	NCM
5.5	2	27-40	10YR 5/6	YL BR	SI LO	NCM
5.6	1	0-29	10YR 4/1	DK GR	SI LO	NCM
5.6	2	29-40	10YR 5/6	YL BR	SI LO	NCM
5.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	30-40	10YR 5/6	YL BR	SI LO	NCM
5.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	28-40	10YR 5/6	YL BR	SI LO	NCM
5.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	27-40	10YR 5/6	YL BR	SI LO	NCM
5.10	1	0-27	10YR 4/1	DK GR	SI LO	NCM
5.10	2	27-30	10YR 5/6	YL BR	SI LO	NCM
5.11	1	0-28	10YR 4/1	DK GR	SI LO	NCM
5.11	2	28-40	10YR 5/6	YL BR	SI LO	NCM
5.12	1	0-30	10YR 4/1	DK GR	SI LO	NCM
5.12	2	30-40	10YR 5/6	YL BR	SI LO	NCM
5.13	1	0-25	10YR 4/1	DK GR	SI LO	NCM
5.13	2	25-35	10YR 5/6	YL BR	SI LO	NCM
5.14	1	0-27	10YR 4/1	DK GR	SI LO	NCM
5.14	2	27-40	10YR 5/6	YL BR	SI LO	NCM
5.15	1	0-28	10YR 4/1	DK GR	SI LO	NCM
5.15	2	28-40	10YR 5/6	YL BR	SI LO	NCM
5.16	1	0-31	10YR 4/1	DK GR	SI LO	NCM
5.16	2	31-41	10YR 5/6	YL BR	SI LO	NCM
5.17	1	0-26	10YR 4/1	DK GR	SI LO	NCM
5.17	2	26-36	10YR 5/6	YL BR	SI LO	NCM
5.18	1	0-26	10YR 4/1	DK GR	SI LO	NCM
5.18	2	26-37	10YR 5/6	YL BR	SI LO	NCM
6.1	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.2	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	36-50	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
6.3	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	37-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	29-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.5	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM; gravel
6.5	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM; gravel
6.6	1	0-17	10YR 4/4	DK YL BR	SI LO	NCM; gravel
6.6	2	17-30	10YR 5/4	YL BR	SA SI	NCM; gravel
6.7	1	0-33	10YR 4/3	BR	SI LO	NCM
6.7	2	33-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.8	1	0-24	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.8	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.9	1	0-27	10YR 4/3	BR	SI LO	NCM
6.9	2	27-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
6.10	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	22-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	25-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.13	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	32-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	27-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.15	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	19-30	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.16	1	0-26	10YR 4/3	BR	SI LO	NCM
6.16	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.17	1	0-33	10YR 4/3	BR	SI LO	NCM
6.17	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
6.18	1	0-22	10YR 4/3	BR	SI LO	NCM
6.18	2	22-33	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
7.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	26-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
7.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; gravel
7.4	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM; gravel
7.5	1	0-23	10YR 4/3	BR	SI LO	NCM; cobbles
7.5	2	23-33	10YR 5/6	YL BR	SA SI	NCM; cobbles
7.6	1	0-26	10YR 4/3	BR	SI LO	NCM; gravel
7.6	2	26-36	10YR 5/6	YL BR	SA SI	NCM; gravel
7.7	1	0-29	10YR 4/3	BR	SI LO	NCM; gravel
7.7	2	29-40	10YR 5/6	YL BR	SA SI	NCM; gravel
7.8	1	0-24	10YR 4/3	BR	SI LO	NCM; gravel
7.8	2	24-34	10YR 5/6	YL BR	SA SI	NCM; gravel
7.9	1	0-24	10YR 4/3	BR	SI LO	NCM; gravel
7.9	2	24-34	10YR 5/6	YL BR	SA SI	NCM; gravel
7.10	1	0-20	10YR 4/6	DK YL BR	SI LO	NCM
7.10	2	20-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.11	1	0-25	10YR 4/6	DK YL BR	SI LO	NCM
7.11	2	25-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
7.12	1	0-33	10YR 4/6	DK YL BR	SI LO	NCM
7.12	2	33-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
7.13	1	0-40	10YR 4/3	BR	SI LO	NCM
7.13	2	40-52	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.14	1	0-33	10YR 4/3	BR	SI LO	NCM
7.14	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.15	1	0-37	10YR 4/3	BR	SI LO	NCM
7.15	2	37-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.16	1	0-24	10YR 4/3	BR	SI LO	NCM
7.16	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.17	1	0-30	10YR 4/3	BR	SI LO	NCM
7.17	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
7.18	1	0-34	10YR 4/3	BR	SI LO	NCM
7.18	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	28-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	26-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	29-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	24-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	29-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	26-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.13	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	32-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
8.14	2	33-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
8.15	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.16	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
8.17	2	34-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.18	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
8.18	2	35-47	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	24-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	31-43	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM
9.5	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	33-43	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM
9.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	24-38	10YR 5/6 10YR 6/1	YL BR GR	CL LO	NCM
9.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	32-42	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
9.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	30-40	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
9.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	29-39	10YR 5/4 10YR 5/6	YL BR YL BR	SA LO	NCM
9.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
9.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	31-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	28-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.15	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
9.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	30-40	10YR 5/6 10YR 5/4	YL BR YL BR	SI LO	NCM
9.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	29-39	10YR 5/6 10YR 5/4	YL BR YL BR	SI LO	NCM
9.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	32-42	10YR 5/6 10YR 5/4	YL BR YL BR	SI LO	NCM
10.1	1	0-27	10YR 4/2	DK GR BR	CL LO	NCM
10.1	2	27-39	10YR 5/6	YL BR	SA CL	NCM
10.2	1	0-26	10YR 4/2	DK GR BR	CL LO	NCM
10.2	2	26-37	10YR 5/6	YL BR	SA CL	NCM
10.3	1	0-28	10YR 4/2	DK GR BR	CL LO	NCM
10.3	2	28-40	10YR 5/6	YL BR	SA CL	NCM
10.4	1	0-28	10YR 4/2	DK GR BR	CL LO	NCM
10.4	2	28-40	10YR 5/6	YL BR	SA CL	NCM
10.5	1	0-26	10YR 4/2	DK GR BR	CL LO	NCM
10.5	2	26-38	10YR 5/6	YL BR	SA CL	NCM
10.6	1	0-23	10YR 4/2	DK GR BR	CL LO	NCM
10.6	2	23-34	10YR 5/6	YL BR	SA CL	NCM
10.7	1	0-25	10YR 5/3	BR	SI LO	NCM
10.7	2	25-36	10YR 5/8	YL BR	SA LO	NCM
10.8	1	0-24	10YR 5/3	BR	SI LO	NCM
10.8	2	24-36	10YR 5/8	YL BR	SA LO	NCM
10.9	1	0-23	10YR 5/3	BR	SI LO	NCM
10.9	2	23-35	10YR 5/8	YL BR	SA LO	NCM
10.10	1	0-28	10YR 4/3	BR	SA LO	NCM
10.10	2	28-39	10YR 6/3	PALE BR	SI SA	NCM
10.11	1	0-24	10YR 4/3	BR	SA LO	NCM
10.11	2	24-36	10YR 6/3	PALE BR	SI SA	NCM
10.12	1	0-26	10YR 4/3	BR	SA LO	NCM
10.12	2	26-37	10YR 6/3	PALE BR	SI SA	NCM
10.13	1	0-26	10YR 4/3	BR	LO	NCM
10.13	2	26-37	10YR 5/6	YL BR	SA LO	NCM
10.14	1	0-28	10YR 4/3	BR	LO	NCM
10.14	2	28-40	10YR 5/6	YL BR	SA LO	NCM
10.15	1	0-33	10YR 4/3	BR	LO	NCM
10.15	2	33-43	10YR 5/6	YL BR	SA LO	NCM
10.16	1	0-28	10YR 4/3	BR	SA LO	NCM
10.16	2	28-39	10YR 6/3	PALE BR	SA LO	NCM
10.17	1	0-27	10YR 4/3	BR	SA LO	NCM
10.17	2	27-39	10YR 6/3	PALE BR	SA LO	NCM
10.18	1	0-27	10YR 4/3	BR	SA LO	NCM; rock impasse
11.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	25-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.2	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.2	2	23-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.3	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	21-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.4	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	25-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.6	1	0-24	10YR 4/3	BR	SI LO	NCM
11.6	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.7	1	0-21	10YR 4/3	BR	SI LO	NCM
11.7	2	21-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.8	1	0-20	10YR 4/3	BR	SI LO	NCM
11.8	2	20-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.9	1	0-22	10YR 4/3	BR	SI LO	NCM
11.9	2	22-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
11.10	1	0-25	10YR 4/3	BR	SI LO	NCM; gravel
11.10	2	25-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
11.11	1	0-19	10YR 4/3	BR	SI LO	NCM
11.11	2	19-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; cobbles
11.12	1	0-30	10YR 4/3	BR	SI LO	NCM
11.12	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.13	1	0-32	10YR 4/3	BR	SI LO	NCM
11.13	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.14	1	0-30	10YR 4/3	BR	SI LO	NCM
11.14	2	30-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; rock impasse
11.15	1	0-27	10YR 4/3	BR	SI LO	NCM
11.15	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.16	1	0-30	10YR 4/3	BR	SI LO	NCM
11.16	2	30-40	10YR 4/6	DK YL BR	SA SI	NCM
11.17	1	0-31	10YR 4/3	BR	SI LO	NCM
11.17	2	31-42	10YR 4/6	DK YL BR	SA SI	NCM
11.18	1	0-25	10YR 4/3	BR	SI LO	NCM
11.18	2	25-36	10YR 4/6	DK YL BR	SA SI	NCM
12.1	1	0-26	10YR 4/2	DK GR BR	LO	NCM
12.1	2	26-38	10YR 5/6	YL BR	CL LO	NCM
12.2	1	0-27	10YR 4/2	DK GR BR	LO	NCM
12.2	2	27-40	10YR 5/6	YL BR	CL LO	NCM
12.3	1	0-30	10YR 4/2	DK GR BR	LO	NCM
12.3	2	30-41	10YR 5/6	YL BR	CL LO	NCM
12.4	1	0-33	10YR 4/2	DK GR BR	LO	NCM
12.4	2	33-44	10YR 5/8	YL BR	CL LO	NCM
12.5	1	0-14	10YR 4/2	DK GR BR	LO	NCM
12.5	2	14-31	10YR 5/8	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.6	1	0-32	10YR 4/2	DK GR BR	LO	NCM
12.6	2	32-42	10YR 5/8	YL BR	CL LO	NCM
12.7	1	0-26	10YR 4/3	BR	CL LO	NCM
12.7	2	26-37	10YR 5/4	YL BR	SA CL	NCM
12.8	1	0-24	10YR 4/3	BR	CL LO	NCM
12.8	2	24-35	10YR 5/4	YL BR	SA CL	NCM
12.9	1	0-27	10YR 4/3	BR	CL LO	NCM
12.9	2	27-39	10YR 5/4	YL BR	SA CL	NCM
12.10	1	0-30	10YR 4/3	BR	SA LO	NCM
12.10	2	30-43	10YR 6/3	PALE BR	SI SA	NCM
12.11	1	0-20	10YR 4/3	BR	SA LO	NCM
12.11	2	20-34	10YR 6/3	PALE BR	SI SA	NCM
12.12	1	0-32	10YR 4/3	BR	SA LO	NCM
12.12	2	32-43	10YR 6/3	PALE BR	SI SA	NCM
12.13	1	0-30	10YR 4/3	BR	LO	NCM
12.13	2	0-41	10YR 5/6	YL BR	SA LO	NCM
12.14	1	0-32	10YR 4/3	BR	LO	NCM
12.14	2	32-44	10YR 5/6	YL BR	SA LO	NCM
12.15	1	0-31	10YR 4/3	BR	LO	NCM
12.15	2	31-42	10YR 5/6	YL BR	SA LO	NCM
12.16	1	0-32	10YR 4/3	BR	LO	NCM
12.16	2	32-45	10YR 5/6	YL BR	SA LO	NCM
12.17	1	0-33	10YR 4/3	BR	LO	NCM
12.17	2	33-43	10YR 5/6	YL BR	SA LO	NCM
12.18	1	0-29	10YR 4/3	BR	LO	NCM
12.18	2	29-40	10YR 5/6	YL BR	SA LO	NCM
13.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	34-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.2	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	34-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	25-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.5	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	13-26	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	22-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.7	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	21-31	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	25-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	25-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.11	2	20-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.13	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	35-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.17	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	33-46	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	32-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.2	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	21-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	25-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.12	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.13	1	0-32	10YR 4/3	BR	SI LO	NCM
14.13	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.14	1	0-33	10YR 4/3	BR	SI LO	NCM
14.14	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.15	1	0-31	10YR 4/3	BR	SI LO	NCM
14.15	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.16	1	0-30	10YR 4/3	BR	SI LO	NCM
14.16	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.17	1	0-34	10YR 4/3	BR	SI LO	NCM
14.17	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.18	1	0-32	10YR 4/3	BR	SI LO	NCM
14.18	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.1	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.1	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.2	1	0-37	10YR 4/2	DK GR BR	SI	NCM
15.2	2	37-47	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.3	1	0-24	10YR 4/2	DK GR BR	SI	NCM
15.3	2	24-34	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.4	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.5	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.6	1	0-37	10YR 4/2	DK GR BR	SI	NCM; rock impasse
15.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.7	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL SI	NCM
15.8	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.8	2	28-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL SI	NCM
15.9	1	0-24	10YR 4/2	DK GR BR	SI	NCM
15.9	2	24-34	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.10	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	37-49	10YR 5/4	YL BR	SI CL	NCM
15.11	1	0-22	10YR 4/2	DK GR BR	SI	NCM
15.11	2	22-31	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.12	1	0-41	10YR 4/2	DK GR BR	SI	NCM
15.12	2	41-54	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.13	1	0-35	10YR 4/2	DK GR BR	SI	NCM
15.13	2	35-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.14	1	0-32	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.14	2	32-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.15	1	0-26	10YR 4/2	DK GR BR	SI	NCM
15.15	2	26-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.16	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.16	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.17	1	0-44	10YR 4/2	DK GR BR	SI	NCM
15.17	2	44-54	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
15.18	1	0-50	10YR 4/2	DK GR BR	SI	NCM
15.18	2	50-60	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	26-38	10YR 5/6	YL BR	SA SI	NCM
16.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	28-38	10YR 5/6	YL BR	SA SI	NCM
16.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	27-34	10YR 5/6	YL BR	SA SI	NCM; rock impasse
16.7	1	0-23	10YR 4/3	BR	SI LO	NCM
16.7	2	23-36	10YR 5/6	YL BR	SA SI	NCM
16.8	1	0-25	10YR 4/3	BR	SI LO	NCM
16.8	2	25-36	10YR 5/6	YL BR	SA SI	NCM
16.9	1	0-24	10YR 4/3	BR	SI LO	NCM
16.9	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.10	1	0-25	10YR 4/3	BR	SI LO	NCM
16.10	2	25-35	10YR 4/6	DK YL BR	SA SI	NCM
16.11	1	0-22	10YR 4/3	BR	SI LO	NCM
16.11	2	22-34	10YR 5/4	YL BR	SA SI	NCM
16.12	1	0-26	10YR 4/3	BR	SI LO	NCM
16.12	2	26-37	10YR 4/6	DK YL BR	SA SI	NCM
16.13	1	0-27	10YR 4/3	BR	SI LO	NCM
16.13	2	27-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.14	1	0-22	10YR 4/3	BR	SI LO	NCM
16.14	2	22-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.15	1	0-26	10YR 4/3	BR	SI LO	NCM
16.15	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
16.16	1	0-27	10YR 4/2	DK GR BR	SI	NCM
16.16	2	27-38	10YR 4/6	DK YL BR	SI LO	NCM
16.17	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.17	2	30-41	10YR 4/6	DK YL BR	SI LO	NCM
16.18	1	0-28	10YR 4/3	BR	SI	NCM
16.18	2	28-38	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.1	1	0-29	10YR 4/3	BR	SI LO	NCM
17.1	2	29-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.2	1	0-23	10YR 4/3	BR	SI LO	NCM
17.2	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.3	1	0-22	10YR 4/3	BR	SI LO	NCM
17.3	2	22-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.4	1	0-26	10YR 4/3	BR	SI LO	NCM
17.4	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.5	1	0-27	10YR 4/3	BR	SI LO	NCM
17.5	2	27-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.6	1	0-30	10YR 4/3	BR	SI LO	NCM
17.6	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.7	1	0-29	10YR 4/3	BR	SI LO	NCM
17.7	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.8	1	0-28	10YR 4/3	BR	SI LO	NCM
17.8	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.9	1	0-27	10YR 4/3	BR	SI LO	NCM
17.9	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.10	1	0-24	10YR 4/3	BR	SI LO	NCM
17.10	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.11	1	0-37	10YR 4/3	BR	SI LO	NCM
17.11	2	37-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.12	1	0-36	10YR 4/3	BR	SI LO	NCM
17.12	2	36-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.15	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
17.15	2	20-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.16	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	35-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	29-40	10YR 5/4	YL BR	CL LO	NCM
18.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.2	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.4	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.6	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
18.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	29-39	10YR 5/4	YL BR	SI CL	NCM
18.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	31-41	10YR 5/4	YL BR	SI CL	NCM
18.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	29-39	10YR 5/4	YL BR	SI CL LO	NCM
18.16	1	0-31	10YR 4/3	BR	SI LO	NCM
18.16	2	31-41	10YR 5/4	YL BR	SI CL	NCM
18.17	1	0-33	10YR 4/3	BR	SI LO	NCM
18.17	2	33-43	10YR 5/4	YL BR	SI CL	NCM
18.18	1	0-32	10YR 4/3	BR	SI LO	NCM
18.18	2	32-42	10YR 5/4	YL BR	SI CL	NCM
Turbine 46						
1.1	1	0-36	10YR 4/2	DK GR BR	SI CL LO	NCM
1.1	2	36-46	10YR 5/4	YL BR	SI CL	NCM
1.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	33-43	10YR 5/4	YL BR	SI CL	NCM
1.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL LO	NCM
1.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
1.5	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	23-33	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	22-32	10YR 5/4	YL BR	SA LO	NCM
1.7	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	21-31	10YR 5/4	YL BR	SI CL	NCM
1.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	23-33	10YR 5/4	YL BR	SA CL LO	NCM
1.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	24-34	10YR 5/4	YL BR	SA CL LO	NCM
1.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	27-37	10YR 5/4	YL BR	SA LO	NCM
1.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	26-36	10YR 5/4	YL BR	SA LO	NCM
1.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	25-35	10YR 5/4	YL BR	SA LO	NCM
1.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	29-39	10YR 5/4	YL BR	SA LO	NCM
1.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	28-38	10YR 5/4	YL BR	SA LO	NCM
1.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	17-27	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
1.16	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	19-29	10YR 5/4	YL BR	SA CL	NCM
1.17	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	16-26	10YR 5/4	YL BR	SI CL	NCM
1.18	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	14-24	10YR 5/4	YL BR	SI CL	NCM
2.1	1	0-7	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI	NCM
2.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	26-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI	NCM
2.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	24-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI	NCM
2.7	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	18-30	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.9	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	21-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.10	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	19-31	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.11	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	20-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.12	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	17-28	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.13	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	16-29	10YR 5/4	YL BR	SA LO	NCM
2.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	27-39	10YR 5/4	YL BR	SA LO	NCM
2.15	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 15cm
2.16	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 10cm
2.17	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 13cm
2.18	1	0-8	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 8cm
3.1	1	0-30	10YR 4/2	DK GR BR	SI	NCM
3.1	2	30-40	10YR 5/6	YL BR	SI LO	NCM
3.2	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.2	2	26-36	10YR 5/6	YL BR	SI LO	NCM
3.3	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.3	2	27-37	10YR 5/6	YL BR	SI LO	NCM
3.4	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.4	2	25-35	10YR 5/6	YL BR	SI LO	NCM
3.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.5	2	27-40	10YR 5/6	YL BR	SI LO	NCM
3.6	1	0-15	10YR 4/2	DK GR BR	SI	NCM
3.6	2	15-25	10YR 5/6	YL BR	SI LO	NCM
3.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.7	2	27-40	10YR 5/6	YL BR	SI LO	NCM
3.8	1	0-20	10YR 4/2	DK GR BR	SI	NCM
3.8	2	20-30	10YR 5/6	YL BR	SI LO	NCM
3.9	1	0-15	10YR 4/2	DK GR BR	SI	NCM
3.9	2	15-25	10YR 5/6	YL BR	SI LO	NCM
3.10	1	0-13	10YR 4/2	DK GR BR	SI	NCM
3.10	2	13-25	10YR 5/6	YL BR	SI LO	NCM
3.11	1	0-15	10YR 4/2	DK GR BR	SI	NCM
3.11	2	15-25	10YR 5/6	YL BR	SI LO	NCM
3.12	1	0-15	10YR 4/2	DK GR BR	SI	NCM
3.12	2	15-25	10YR 5/6	YL BR	SI LO	NCM
3.13	1	0-20	10YR 4/2	DK GR BR	SI	NCM
3.13	2	20-30	10YR 5/6	YL BR	SI LO	NCM
3.14	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.14	2	25-35	10YR 5/6	YL BR	SI LO	NCM
3.15	1	0-17	10YR 4/2	DK GR BR	SI	NCM
3.15	2	17-30	10YR 5/6	YL BR	SI LO	NCM
3.16	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.16	2	25-35	10YR 5/6	YL BR	SI LO	NCM
3.17	1	0-10	10YR 4/2	DK GR BR	SI	NCM; filled with water at 10cm
3.18	1	0-10	10YR 4/2	DK GR BR	SI	NCM
4.1	1	0-25	10YR 4/2	DK GR BR	SI	NCM
4.1	2	25-35	10YR 5/6	YL BR	SI LO	NCM
4.2	1	0-26	10YR 4/2	DK GR BR	SI	NCM
4.2	2	26-36	10YR 5/6	YL BR	SI LO	NCM
4.3	1	0-24	10YR 4/2	DK GR BR	SI	NCM
4.3	2	24-34	10YR 5/6	YL BR	SI LO	NCM
4.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
4.4	2	28-38	10YR 5/6	YL BR	SI LO	NCM
4.5	1	0-30	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.5	2	30-40	10YR 5/6	YL BR	SI LO	NCM
4.6	1	0-15	10YR 4/2	DK GR BR	SI	NCM
4.6	2	15-27	10YR 5/6	YL BR	SI LO	NCM
4.7	1	0-12	10YR 4/2	DK GR BR	SI	NCM
4.7	2	12-24	10YR 5/6	YL BR	SI LO	NCM
4.8	1	0-15	10YR 4/2	DK GR BR	SI	NCM
4.8	2	15-26	10YR 5/6	YL BR	SI LO	NCM
4.9	1	0-17	10YR 4/2	DK GR BR	SI	NCM
4.9	2	17-27	10YR 5/6	YL BR	SI LO	NCM
4.10	1	0-14	10YR 4/2	DK GR BR	SI	NCM
4.10	2	14-25	10YR 5/6	YL BR	SI LO	NCM
4.11	1	0-16	10YR 4/2	DK GR BR	SI	NCM
4.11	2	16-26	10YR 5/6	YL BR	SI LO	NCM
4.12	1	0-17	10YR 4/2	DK GR BR	SI	NCM
4.12	2	17-27	10YR 5/6	YL BR	SI LO	NCM
4.13	1	0-24	10YR 4/2	DK GR BR	SI	NCM
4.13	2	24-35	10YR 5/6	YL BR	SI LO	NCM
4.14	1	0-10	10YR 4/2	DK GR BR	SI	NCM
4.14	2	10-23	10YR 5/6	YL BR	SI LO	NCM
4.15	1	0-6	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 6cm
4.16	1	0-13	10YR 4/2	DK GR BR	SI	NCM; very gravely
4.16	2	13-23	10YR 5/6	YL BR	SI LO	NCM; very gravely
4.17	1	0-17	10YR 4/2	DK GR BR	SI	NCM
4.17	2	14-29	10YR 5/6	YL BR	SI LO	NCM
4.18	1	0-21	10YR 4/2	DK GR BR	SI	NCM
4.18	2	21-31	10YR 5/6	YL BR	SI LO	NCM
5.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	31-43	10YR 5/4	YL BR	CL LO	NCM
5.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	28-41	10YR 5/4	YL BR	CL SI	NCM
5.3	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	36-49	10YR 5/4	YL BR	CL SI	NCM
5.4	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	36-46	10YR 5/4	YL BR	CL SI	NCM
5.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	27-38	10YR 5/4	YL BR	CL SI	NCM
5.6	1	0-44	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	44-55	10YR 5/4	YL BR	CL SI	NCM
5.7	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	35-47	10YR 5/4	YL BR	CL SI	NCM
5.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	33-47	10YR 5/4	YL BR	CL SI	NCM
5.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	31-45	10YR 5/4	YL BR	CL SI	NCM
5.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	33-41	10YR 5/4	YL BR	CL SI	NCM
5.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	28-39	10YR 5/4	YL BR	CL SI	NCM
5.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	27-39	10YR 5/4	YL BR	CL SI	NCM
5.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	26-37	10YR 5/4	YL BR	CL LO	NCM
5.14	1	0-4	10YR 4/2	DK GR BR	SI LO	NCM; gravel impasse at 4cm
5.15	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	24-34	10YR 5/4	YL BR	CL LO	NCM
5.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; concrete impasse at 25cm
5.17	1	0-2	10YR 4/2	DK GR BR	SI LO	NCM; standing water at 2cm

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; standing water at 23cm
6.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	26-37	10YR 5/4	YL BR	SI	NCM
6.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	27-39	10YR 5/4	YL BR	SI	NCM
6.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	28-40	10YR 5/4	YL BR	SI	NCM
6.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	31-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI	NCM
6.5	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	42-52	10YR 5/4	YL BR	SI	NCM
6.6	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
6.6	2	42-53	10YR 5/4	YL BR	SI	NCM
6.7	1	0-48	10YR 4/2	DK GR BR	CL LO	NCM
6.7	2	48-59	10YR 4/1 10YR 4/6	DK GR DK YL BR	CL	NCM
6.8	1	0-36	10YR 4/2	DK GR BR	CL LO	NCM
6.8	2	36-47	10YR 4/1 10YR 4/6	DK GR DK YL BR	CL	NCM
6.9	1	0-38	10YR 4/2	DK GR BR	CL LO	NCM
6.9	2	38-50	10YR 4/1 10YR 4/6	DK GR DK YL BR	CL	NCM
6.10	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	35-46	10YR 4/1	DK GR	CL LO	NCM
6.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	32-44	10YR 4/1	DK GR	CL LO	NCM
6.12	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	33-43	10YR 4/1	DK GR	CL LO	NCM
6.13	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	35-46	10YR 4/1	DK GR	CL LO	NCM
6.14	1	0-18	10YR 4/2	DK GR BR	SI LO	horseshoe piece (discarded)
6.14	2	18-31	10YR 5/6	YL BR	SI	NCM
6.15	1	0-3	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	3-21	10YR 5/6	YL BR	SI	NCM
6.16	1	0-18	10YR 4/3	BR	SI LO	NCM
6.16	2	18-35	10YR 4/4	DK YL BR	SA LO	NCM
6.17	1	0-25	10YR 4/3	BR	SI LO	NCM
6.17	2	25-36	10YR 4/4	DK YL BR	SA LO	NCM
6.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.18	2	30-40	10YR 4/1	DK GR	SA LO	NCM; water at 35cm
7.1	1	0-27	10YR 4/2	DK GR BR	SI	NCM
7.1	2	27-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.2	1	0-30	10YR 4/2	DK GR BR	SI	NCM
7.2	2	30-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.3	1	0-38	10YR 4/2	DK GR BR	SI	NCM
7.3	2	38-58	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.4	1	0-38	10YR 4/2	DK GR BR	SI	NCM
7.4	2	38-48	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.5	1	0-45	10YR 4/2	DK GR BR	SI	NCM
7.5	2	45-56	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.6	1	0-54	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.6	2	54-66	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.7	1	0-47	10YR 4/2	DK GR BR	SI	NCM
7.7	2	47-57	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.8	1	0-50	10YR 4/2	DK GR BR	SI	NCM
7.8	2	50-60	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.9	1	0-40	10YR 4/2	DK GR BR	SI	NCM
7.9	2	40-50	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.10	1	0-37	10YR 4/2	DK GR BR	SI	NCM
7.10	2	37-57	10YR 6/2	LT BR GR	CI SI	NCM
7.11	1	0-33	10YR 4/2	DK GR BR	SI	NCM
7.11	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.12	1	0-43	10YR 4/2	DK GR BR	SI	NCM
7.12	2	43-53	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.13	1	0-33	10YR 4/2	DK GR BR	SI	NCM
7.13	2	33-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.14	1	0-18	10YR 4/2	DK GR BR	SI	NCM
7.14	2	18-28	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.15	1	0-7	10YR 4/2	DK GR BR	SI	NCM
7.15	2	7-15	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM; gravel impasse at 15cm; on road
7.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
7.16	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM
7.17	1	0-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM; disturbed
7.18	1	0-36	10YR 4/2	DK GR BR	SI	NCM
7.18	2	36-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	CI SI	NCM; seepage at 44cm
8.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; gravel; cobbles
8.1	2	28-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM; gravel; cobbles
8.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; gravel; cobbles
8.2	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM; gravel; cobbles
8.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; gravel; cobbles
8.3	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM; gravel; cobbles
8.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; gravel
8.4	2	24-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; gravel
8.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; gravel
8.5	2	32-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; gravel
8.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; gravel; boulder impasse at 30cm
8.7	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM; gravel
8.7	2	41-51	10YR 5/4	YL BR	CL LO	NCM; gravel
8.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM; gravel

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.8	2	33-44	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; gravel
8.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM; gravel
8.9	2	34-45	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM; gravel
8.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
8.10	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM; cobbles
8.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	23-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.13	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
8.14	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM; road disturbance
8.14	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; road disturbance
8.15	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM; road disturbance
8.15	2	26-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; road disturbance
8.16	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM; on road disturbance
8.16	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; on road disturbance
8.17	1	0-10	10YR 4/4	DK YL BR	SI LO	NCM; standing water
8.18	1	0-10	10YR 4/4	DK YL BR	SI LO	NCM; standing water
9.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	32-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	30-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	29-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.10	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	27-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	29-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.15	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	35-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.16	1	0-44	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	44-54	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.17	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	37-48	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM; water filled pit at 31cm
10.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	27-37	10YR 5/4	YL BR	CL LO	NCM
10.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	26-36	10YR 5/4	YL BR	CL LO	NCM
10.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	28-38	10YR 5/4	YL BR	CL LO	NCM
10.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
10.4	2	25-35	10YR 5/4	YL BR	CL LO	NCM
10.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
10.5	2	26-36	10YR 5/4	YL BR	CL LO	NCM
10.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
10.6	2	27-37	10YR 5/4	YL BR	CL LO	NCM
10.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.7	2	30-40	10YR 5/4	YL BR	CL LO	NCM
10.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
10.8	2	29-39	10YR 5/4	YL BR	CL LO	NCM
10.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
10.9	2	25-35	10YR 5/4	YL BR	CL LO	NCM
10.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
10.10	2	24-34	10YR 5/4	YL BR	CL LO	NCM
10.11	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
10.11	2	24-34	10YR 5/4	YL BR	CL LO	NCM
10.12	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
10.12	2	22-32	10YR 5/4	YL BR	CL LO	NCM
10.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
10.13	2	23-33	10YR 5/4	YL BR	CL LO	NCM
10.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
10.14	2	25-35	10YR 5/4	YL BR	CL LO	NCM
10.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
10.15	2	23-33	10YR 5/4	YL BR	CL LO	NCM
10.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
10.16	2	21-31	10YR 5/4	YL BR	CL LO	NCM
10.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.17	2	24-34	10YR 5/4	YL BR	CL LO	NCM
10.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
10.18	2	24-34	10YR 5/4	YL BR	CL LO	NCM
11.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	26-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
11.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	24-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
11.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
11.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	23-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	22-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	26-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	24-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	23-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	27-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	23-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	25-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	25-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.14	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
11.15	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	22-36	10YR 4/6	DK YL BR	LO SA	NCM
11.16	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	22-33	10YR 4/6	DK YL BR	LO SA	NCM
11.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	26-38	10YR 4/6	DK YL BR	LO SA	NCM
11.18	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	21-34	10YR 4/6	DK YL BR	LO SA	NCM
12.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	27-37	10YR 5/4	YL BR	SI CL	NCM
12.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	28-30	10YR 5/4	YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	26-36	10YR 5/4	YL BR	SI CL	NCM
12.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	26-39	10YR 5/4	YL BR	SI CL	NCM
12.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	26-37	10YR 5/4	YL BR	SI CL	NCM
12.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	29-43	10YR 5/4	YL BR	SI CL	NCM
12.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.7	2	25-35	10YR 5/4	YL BR	SI CL	NCM
12.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	29-41	10YR 5/4	YL BR	SI CL	NCM
12.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	28-38	10YR 5/4	YL BR	SI CL	NCM
12.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	31-43	10YR 5/4	YL BR	SI CL	NCM
12.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	32-42	10YR 5/4	YL BR	SI CL	NCM
12.12	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	36-49	10YR 5/4	YL BR	SI CL	NCM
12.13	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	22-35	10YR 5/4	YL BR	SI CL	NCM
12.14	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM; rock/gravel impasse at 12cm
12.15	1	0-3	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 3cm
12.16	1	0-10	10YR 4/2	DK GR BR	SI LO	bone
12.16	2	10-43	10YR 5/4	YL BR	SI CL	NCM; water at 43cm
12.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	31-45	10YR 5/4	YL BR	SI CL	NCM
12.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 28cm
13.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; gravel
13.1	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; gravel
13.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	31-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.9	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	33-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
13.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.10	2	30-42	10YR 5/4	YL BR	CL LO	NCM
13.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	28-41	10YR 5/4	YL BR	CL LO	NCM
13.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	34-45	10YR 5/4	YL BR	CL LO	NCM
13.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	31-44	10YR 5/4	YL BR	CL LO	NCM
13.14	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	21-32	10YR 5/4	YL BR	CL LO	NCM
13.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
13.15	2	17-27	10YR 5/4	YL BR	CL LO	NCM; disturbed
13.16	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
13.16	2	21-33	10YR 5/4	YL BR	CL LO	NCM; cobbles
13.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	27-37	10YR 5/4	YL BR	CL LO	NCM
13.18	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM; gravel; farm road; excavation limit reached
14.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	32-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	31-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
14.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	29-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	29-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.13	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.13	2	33-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.14	2	30-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	33-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	27-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	25-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.1	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.1	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.2	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.2	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.3	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.3	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.4	1	0-31	10YR 4/2	DK GR BR	SI	NCM
15.4	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.5	1	0-32	10YR 4/2	DK GR BR	SI	NCM
15.5	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.6	1	0-31	10YR 4/2	DK GR BR	SI	NCM
15.6	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.7	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.7	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.8	1	0-31	10YR 4/2	DK GR BR	SI	NCM
15.8	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.9	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.9	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
15.10	1	0-29	10YR 4/2	DK GR BR	SI	NCM
15.10	2	29-40	10YR 6/2	LT BR GR	SI LO	NCM
15.11	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.11	2	28-39	10YR 6/2	LT BR GR	SI LO	NCM
15.12	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.12	2	27-39	10YR 6/2	LT BR GR	SI LO	NCM
15.13	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.13	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
15.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.14	2	27-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
15.15	1	0-35	10YR 4/2	DK GR BR	SI	NCM
15.15	2	35-47	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
15.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.16	2	28-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
15.17	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.17	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
15.18	1	0-35	10YR 4/2	DK GR BR	SI	NCM
15.18	2	35-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI LO	NCM
16.1	1	0-34	10YR 4/2	DK GR BR	SI	NCM
16.1	2	34-47	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.2	1	0-31	10YR 4/2	DK GR BR	SI	NCM
16.2	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.3	1	0-32	10YR 4/2	DK GR BR	SI	NCM
16.3	2	32-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.4	1	0-33	10YR 4/2	DK GR BR	SI	NCM
16.4	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.5	1	0-28	10YR 4/2	DK GR BR	SI	NCM
16.5	2	28-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.6	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.6	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.7	1	0-32	10YR 4/2	DK GR BR	SI	NCM
16.7	2	32-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.8	1	0-29	10YR 4/2	DK GR BR	SI	NCM
16.8	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.9	1	0-34	10YR 4/2	DK GR BR	SI	NCM
16.9	2	34-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.10	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.10	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.11	1	0-26	10YR 4/2	DK GR BR	SI	NCM
16.11	2	26-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.12	1	0-33	10YR 4/2	DK GR BR	SI	NCM
16.12	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.13	1	0-24	10YR 4/2	DK GR BR	SI	NCM
16.13	2	24-34	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.14	1	0-25	10YR 4/2	DK GR BR	SI	NCM
16.14	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.15	1	0-32	10YR 4/2	DK GR BR	SI	NCM
16.15	2	32-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.16	1	0-22	10YR 4/2	DK GR BR	SI	NCM
16.16	2	22-33	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.17	2	28-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
16.18	1	0-31	10YR 4/2	DK GR BR	SI	NCM
16.18	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
17.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	27-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	36-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	28-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.14	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	23-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.15	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
17.15	2	21-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	30-42	10YR 4/6	DK YL BR	SA SI	NCM
17.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	29-39	10YR 4/6	DK YL BR	SA SI	NCM
17.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	25-36	10YR 4/6	DK YL BR	SA SI	NCM
18.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.1	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.4	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
18.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.16	2	29-39	10YR 6/2	LT BR GR	SA LO	NCM
18.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.17	2	31-41	10YR 6/2	LT BR GR	SA LO	NCM
18.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.18	2	28-38	10YR 6/2	LT BR GR	SA LO	NCM
Turbine 50						NCM
1.1	1	0-27	10YR 4/3	BR	SI LO	NCM
1.1	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
1.2	1	0-30	10YR 4/3	BR	SI LO	NCM
1.2	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.3	1	0-25	10YR 4/3	BR	SI LO	NCM
1.3	2	25-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
1.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	24-37	10YR 4/6	DK YL BR	SA LO	NCM
1.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	26-38	10YR 4/6	DK YL BR	SA LO	NCM
1.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	24-39	10YR 4/6	DK YL BR	SA LO	NCM
1.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	30-41	10YR 4/6	DK YL BR	LO	NCM
1.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	31-42	10YR 4/6	DK YL BR	LO	NCM
1.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	28-41	10YR 4/6	DK YL BR	LO	NCM
1.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	27-41	10YR 5/2 10YR 5/6	GR BR YL BR	SA SI	NCM
1.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	25-37	10YR 5/2 10YR 5/6	GR BR YL BR	SA SI	NCM
1.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	24-34	10YR 5/2 10YR 5/6	GR BR YL BR	SA SI	NCM
1.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	30-42	10YR 4/6	DK YL BR	SA SI	NCM
1.14	1	0-33	10YR 4/1	DK GR	SA SI	NCM
1.14	2	33-45	10YR 4/6	DK YL BR	CL LO	NCM
1.15	1	0-27	10YR 4/1	DK GR	SA SI	NCM
1.15	2	27-37	10YR 4/6	DK YL BR	CL LO	NCM
1.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	32-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
1.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	24-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
1.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	23-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
2.1	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	35-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.6	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	23-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
2.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	28-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
3.1	1	0-29	10YR 4/2	DK GR BR	SI	NCM
3.1	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.2	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.2	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.3	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.3	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.4	1	0-31	10YR 4/2	DK GR BR	SI	NCM
3.4	2	31-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.5	1	0-21	10YR 4/2	DK GR BR	SI	NCM
3.5	2	21-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.6	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.6	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.7	1	0-28	10YR 4/2	DK GR BR	SI	NCM
3.7	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.8	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.8	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.9	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.9	2	24-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.10	1	0-31	10YR 4/2	DK GR BR	SI	NCM
3.10	2	31-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.11	1	0-28	10YR 4/2	DK GR BR	SI	NCM
3.11	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.12	1	0-28	10YR 4/2	DK GR BR	SI	NCM
3.12	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.13	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.13	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.14	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.14	2	25-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.15	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.15	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.16	1	0-26	10YR 4/2	DK GR BR	SI	NCM
3.16	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.17	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.17	2	23-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
3.18	1	0-21	10YR 4/2	DK GR BR	SI	NCM
3.18	2	21-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
4.1	1	0-31	10YR 4/2	DK GR BR	SI	NCM
4.1	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.2	1	0-28	10YR 4/2	DK GR BR	SI	NCM
4.2	2	28-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
4.3	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
4.4	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.5	1	0-28	10YR 4/2	DK GR BR	SI	NCM
4.5	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.6	1	0-30	10YR 4/2	DK GR BR	SI	NCM
4.6	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM
4.7	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.8	1	0-25	10YR 4/2	DK GR BR	SI	NCM
4.8	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.9	1	0-26	10YR 4/2	DK GR BR	SI	NCM
4.9	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
4.10	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.11	1	0-33	10YR 4/2	DK GR BR	SI	NCM
4.11	2	33-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.12	1	0-26	10YR 4/2	DK GR BR	SI	NCM
4.12	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.13	1	0-29	10YR 4/2	DK GR BR	SI	NCM
4.13	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.14	1	0-22	10YR 4/2	DK GR BR	SI	NCM
4.14	2	22-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.15	1	0-28	10YR 4/2	DK GR BR	SI	NCM
4.15	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.16	1	0-21	10YR 4/2	DK GR BR	SI	NCM
4.16	2	21-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.17	1	0-26	10YR 4/2	DK GR BR	SI	NCM
4.17	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
4.18	1	0-20	10YR 4/2	DK GR BR	SI	NCM
4.18	2	20-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
5.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
5.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	35-47	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	29-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	26-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	26-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
5.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
5.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI CL	NCM
5.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.17	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
5.18	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	34-51	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
6.1	1	0-25	10YR 4/2	DK GR BR	SI	NCM
6.1	2	25-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.2	1	0-26	10YR 4/2	DK GR BR	SI	NCM
6.2	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.3	1	0-24	10YR 4/2	DK GR BR	SI	NCM
6.3	2	24-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.4	1	0-22	10YR 4/2	DK GR BR	SI	NCM
6.4	2	22-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.5	1	0-24	10YR 4/2	DK GR BR	SI	NCM
6.5	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.6	1	0-23	10YR 4/2	DK GR BR	SI	NCM
6.6	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.7	1	0-20	10YR 4/2	DK GR BR	SI	NCM
6.7	2	20-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.8	1	0-23	10YR 4/2	DK GR BR	SI	NCM
6.8	2	23-31	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.9	1	0-28	10YR 4/2	DK GR BR	SI	NCM
6.9	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.10	1	0-28	10YR 4/2	DK GR BR	SI	NCM
6.10	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.11	1	0-29	10YR 4/2	DK GR BR	SI	NCM
6.11	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.12	1	0-26	10YR 4/2	DK GR BR	SI	NCM
6.12	2	26-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.13	1	0-27	10YR 4/2	DK GR BR	SI	NCM
6.13	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.14	1	0-26	10YR 4/2	DK GR BR	SI	NCM
6.14	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.15	1	0-27	10YR 4/2	DK GR BR	SI	NCM
6.15	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.16	1	0-15	10YR 4/2	DK GR BR	SI	NCM
6.16	2	15-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM
6.17	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
6.18	1	0-26	10YR 4/2	DK GR BR	SI	NCM
6.18	2	26-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
7.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.3	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	22-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	22-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
7.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	28-38	10YR 5/4	YL BR	CL LO	NCM
7.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	26-36	10YR 5/4	YL BR	CL LO	NCM
7.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	27-37	10YR 5/4	YL BR	CL LO	NCM
7.10	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	23-33	10YR 5/4	YL BR	CL LO	NCM
7.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	26-36	10YR 5/4	YL BR	CL LO	NCM
7.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	25-35	10YR 5/4	YL BR	CL LO	NCM
7.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	24-34	10YR 5/4	YL BR	CL LO	NCM
7.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.14	2	27-37	10YR 5/4	YL BR	CL LO	NCM
7.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.15	2	25-35	10YR 5/4	YL BR	CL LO	NCM
7.16	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.16	2	22-32	10YR 5/4	YL BR	CL LO	NCM
7.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.17	2	25-35	10YR 5/4	YL BR	CL LO	NCM
7.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
7.18	2	26-36	10YR 5/4	YL BR	CL LO	NCM
8.1	1	0-20	10YR 4/2	DK GR BR	SI	NCM
8.1	2	20-30	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.2	1	0-25	10YR 4/2	DK GR BR	SI	NCM
8.2	2	25-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
8.3	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.4	1	0-24	10YR 4/2	DK GR BR	SI	NCM
8.4	2	24-35	10YR 5/6	YL BR	SI LO	NCM
8.5	1	0-25	10YR 4/2	DK GR BR	SI	NCM
8.5	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.6	1	0-20	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 20cm
8.7	1	0-26	10YR 4/2	DK GR BR	SI	NCM
8.7	2	26-36	10YR 5/6	YL BR	SI LO	NCM
8.8	1	0-25	10YR 4/2	DK GR BR	SI	NCM
8.8	2	25-35	10YR 5/6	YL BR	SI LO	NCM
8.9	1	0-30	10YR 4/2	DK GR BR	SI	NCM
8.9	2	30-40	10YR 5/6	YL BR	SI LO	NCM
8.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
8.10	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.11	1	0-27	10YR 4/2	DK GR BR	SI	NCM
8.11	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.12	1	0-25	10YR 4/2	DK GR BR	SI	NCM
8.12	2	25-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.13	1	0-26	10YR 4/2	DK GR BR	SI	NCM
8.13	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM
8.14	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.15	1	0-30	10YR 4/2	DK GR BR	SI	NCM
8.15	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.16	1	0-26	10YR 4/2	DK GR BR	SI	NCM
8.16	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.17	1	0-25	10YR 4/2	DK GR BR	SI	NCM
8.17	2	25-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
8.18	1	0-30	10YR 4/2	DK GR BR	SI	NCM
8.18	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
9.1	1	0-23	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.1	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.2	1	0-26	10YR 4/2	DK GR BR	SI	NCM
9.2	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.3	1	0-27	10YR 4/2	DK GR BR	SI	NCM
9.3	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
9.4	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.5	1	0-30	10YR 4/2	DK GR BR	SI	NCM
9.5	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.6	1	0-26	10YR 4/2	DK GR BR	SI	NCM
9.6	2	26-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.7	1	0-23	10YR 4/2	DK GR BR	SI	NCM
9.7	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.8	1	0-30	10YR 4/2	DK GR BR	SI	NCM
9.8	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.9	1	0-25	10YR 4/2	DK GR BR	SI	NCM
9.9	2	25-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.10	1	0-36	10YR 4/2	DK GR BR	SI	NCM
9.10	2	36-46	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.11	1	0-24	10YR 4/2	DK GR BR	SI	NCM
9.11	2	24-35	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.12	1	0-27	10YR 4/2	DK GR BR	SI	NCM
9.12	2	27-37	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.13	1	0-30	10YR 4/2	DK GR BR	SI	NCM
9.13	2	30-41	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.14	1	0-36	10YR 4/2	DK GR BR	SI	NCM
9.14	2	36-46	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.15	1	0-27	10YR 4/2	DK GR BR	SI	NCM
9.15	2	27-37	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
9.16	1	0-29	10YR 4/2	DK GR BR	SI	NCM
9.16	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.17	1	0-26	10YR 4/2	DK GR BR	SI	NCM
9.17	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
9.18	1	0-30	10YR 4/2	DK GR BR	SI	NCM
9.18	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.1	1	0-31	10YR 4/2	DK GR BR	SI	NCM
10.1	2	31-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.2	1	0-23	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.2	2	23-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
10.3	2	23-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.4	1	0-32	10YR 4/2	DK GR BR	SI	NCM
10.4	2	32-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.5	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.5	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.6	1	0-23	10YR 4/2	DK GR BR	SI	NCM
10.6	2	23-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.7	1	0-25	10YR 4/2	DK GR BR	SI	NCM
10.7	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.8	1	0-24	10YR 4/2	DK GR BR	SI	NCM
10.8	2	24-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.9	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.9	2	28-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
10.10	2	26-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.11	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.11	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.12	1	0-26	10YR 4/2	DK GR BR	SI	NCM
10.12	2	26-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
10.13	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.13	2	28-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.14	1	0-28	10YR 4/2	DK GR BR	SI	NCM
10.14	2	28-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.15	1	0-29	10YR 4/2	DK GR BR	SI	NCM
10.15	2	29-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.16	1	0-23	10YR 4/2	DK GR BR	SI	NCM
10.16	2	23-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.17	1	0-23	10YR 4/2	DK GR BR	SI	NCM
10.17	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
10.18	1	0-20	10YR 4/2	DK GR BR	SI	NCM
10.18	2	20-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
11.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	24-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.3	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.6	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	20-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	28-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	23-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	23-36	10YR 5/6	YL BR	CL LO	NCM
11.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	27-38	10YR 5/6	YL BR	CL LO	NCM
11.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	25-39	10YR 5/6	YL BR	CL LO	NCM
11.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	26-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	28-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
11.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	34-45	10YR 5/6	YL BR	CL LO	NCM
12.2	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	23-33	10YR 5/6	YL BR	CL LO	NCM
12.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	27-37	10YR 5/4	YL BR	CL LO	NCM
12.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; gravel
12.4	2	24-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM; gravel
12.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	29-41	10YR 5/4	YL BR	CL LO	NCM
12.6	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.6	2	36-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
12.7	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
12.7	2	37-50	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
12.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
12.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	30-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
12.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
12.11	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	32-46	10YR 5/4	YL BR	SI CL	NCM
12.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	29-40	10YR 5/4	YL BR	SI CL	NCM
12.13	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	33-45	10YR 5/4	YL BR	CL LO	NCM
12.14	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
12.14	2	18-30	10YR 5/4	YL BR	CL LO	NCM
12.15	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
12.15	2	22-34	10YR 5/4	YL BR	CL LO	NCM
12.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	25-37	10YR 5/4	YL BR	CL LO	NCM
12.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	29-41	10YR 5/4	YL BR	CL LO	NCM
12.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	27-41	10YR 5/4	YL BR	CL LO	NCM
13.1	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.1	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.2	1	0-25	10YR 4/2	DK GR BR	SI	NCM
13.2	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.3	1	0-24	10YR 4/2	DK GR BR	SI	NCM
13.3	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.4	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.4	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.5	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.6	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.6	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.7	1	0-25	10YR 4/2	DK GR BR	SI	NCM
13.7	2	25-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.8	1	0-26	10YR 4/2	DK GR BR	SI	NCM
13.8	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.9	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.9	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.10	1	0-31	10YR 4/2	DK GR BR	SI	NCM
13.10	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.11	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.11	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.12	1	0-25	10YR 4/2	DK GR BR	SI	NCM
13.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.13	1	0-31	10YR 4/2	DK GR BR	SI	NCM
13.13	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.14	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.15	1	0-34	10YR 4/2	DK GR BR	SI	NCM
13.15	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.16	1	0-20	10YR 4/2	DK GR BR	SI	NCM
13.16	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.17	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.17	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
13.18	1	0-36	10YR 4/2	DK GR BR	SI	NCM
13.18	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
14.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.2	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	17-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	24-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	25-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	27-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.9	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	29-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.13	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
14.14	2	29-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	26-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.16	2	32-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
14.17	2	34-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	36-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
15.1	1	0-32	10YR 4/2	DK GR BR	SI	NCM
15.1	2	32-42	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.2	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.2	2	27-37	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
15.3	2	23-33	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.4	1	0-15	10YR 4/2	DK GR BR	SI	NCM
15.4	2	15-25	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.5	1	0-30	10YR 4/2	DK GR BR	SI	NCM
15.5	2	30-40	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.6	1	0-20	10YR 4/2	DK GR BR	SI	NCM
15.6	2	20-34	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.7	1	0-22	10YR 4/2	DK GR BR	SI	NCM
15.7	2	22-33	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.8	1	0-26	10YR 4/2	DK GR BR	SI	NCM
15.8	2	26-38	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.9	1	0-26	10YR 4/2	DK GR BR	SI	NCM
15.9	2	26-36	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.10	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.10	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
15.11	1	0-31	10YR 4/2	DK GR BR	SI	NCM
15.11	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.12	1	0-27	10YR 4/2	DK GR BR	SI	NCM
15.12	2	27-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
15.13	1	0-29	10YR 4/2	DK GR BR	SI	NCM
15.13	2	29-40	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.14	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.14	2	28-38	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.15	1	0-26	10YR 4/2	DK GR BR	SI	NCM
15.15	2	26-39	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
15.16	2	28-40	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.17	1	0-31	10YR 4/2	DK GR BR	SI	NCM
15.17	2	31-41	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
15.18	1	0-32	10YR 4/2	DK GR BR	SI	NCM
15.18	2	32-44	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
16.1	1	0-24	10YR 4/2	DK GR BR	SI	NCM
16.1	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.2	1	0-21	10YR 4/2	DK GR BR	SI	NCM
16.2	2	21-31	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.3	1	0-26	10YR 4/2	DK GR BR	SI	NCM
16.3	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.4	1	0-24	10YR 4/2	DK GR BR	SI	NCM
16.4	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.5	1	0-25	10YR 4/2	DK GR BR	SI	NCM
16.5	2	25-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.6	1	0-26	10YR 4/2	DK GR BR	SI	NCM
16.6	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM
16.7	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.8	1	0-26	10YR 4/2	DK GR BR	SI	NCM
16.8	2	26-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.9	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.9	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.10	1	0-24	10YR 4/2	DK GR BR	SI	NCM
16.10	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.11	1	0-22	10YR 4/2	DK GR BR	SI	NCM
16.11	2	22-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.12	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.12	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.13	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.13	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.14	1	0-24	10YR 4/2	DK GR BR	SI	NCM
16.14	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.15	1	0-27	10YR 4/2	DK GR BR	SI	NCM
16.15	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
16.16	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.17	1	0-30	10YR 4/2	DK GR BR	SI	NCM
16.17	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
16.18	1	0-27	10YR 4/2	DK GR BR	SI	NCM
16.18	2	27-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SI LO	NCM
17.1	1	0-45	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	45-55	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.2	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	35-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	28-40	10YR 4/6	DK YL BR	CL LO	NCM
17.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	28-39	10YR 4/6	DK YL BR	CL LO	NCM
17.5	3	39-50	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	26-36	10YR 4/6	DK YL BR	CL LO	NCM
17.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	26-40	10YR 4/6	DK YL BR	CL LO	NCM
17.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	31-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	27-37	10YR 4/6	DK YL BR	CL LO	NCM
17.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	28-38	10YR 4/6	DK YL BR	CL LO	NCM
17.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	23-35	10YR 4/6	DK YL BR	CL LO	NCM
17.11	3	35-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	30-40	10YR 4/6	DK YL BR	CL LO	NCM
17.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.13	2	30-40	10YR 4/6	DK YL BR	CL LO	NCM
17.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	27-42	10YR 4/6	DK YL BR	CL LO	NCM
17.15	1	0-23	10YR 4/2	DK YL BR	CL LO	NCM
17.15	2	23-34	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.16	1	0-24	10YR 4/2	DK YL BR	CL LO	NCM
17.16	2	24-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.17	1	0-15	10YR 4/2	DK YL BR	CL LO	NCM
17.17	2	15-30	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
17.18	1	0-33	10YR 4/2	DK YL BR	CL LO	NCM
17.18	2	33-46	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.1	1	0-34	10YR 4/2	DK YL BR	SI LO	NCM
18.1	2	34-47	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
18.2	1	0-32	10YR 4/2	DK YL BR	CL LO	NCM
18.2	2	32-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.3	1	0-29	10YR 4/2	DK YL BR	CL LO	NCM
18.3	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.4	1	0-31	10YR 4/2	DK YL BR	CL LO	NCM
18.4	2	31-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.5	1	0-33	10YR 4/2	DK YL BR	CL LO	NCM
18.5	2	33-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.6	1	0-28	10YR 4/2	DK YL BR	CL LO	NCM
18.6	2	28-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.7	1	0-30	10YR 4/2	DK YL BR	CL LO	NCM
18.7	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.8	1	0-34	10YR 4/2	DK YL BR	CL LO	NCM
18.8	2	34-46	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.9	1	0-28	10YR 4/2	DK YL BR	CL LO	NCM
18.9	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.10	1	0-27	10YR 4/2	DK YL BR	CL LO	NCM
18.10	2	27-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.11	1	0-29	10YR 4/2	DK YL BR	CL LO	NCM
18.11	2	29-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.12	1	0-31	10YR 4/2	DK YL BR	CL LO	NCM
18.12	2	31-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.13	1	0-28	10YR 4/2	DK YL BR	CL LO	NCM
18.13	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.14	1	0-30	10YR 4/2	DK YL BR	CL LO	NCM
18.14	2	30-44	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.15	1	0-27	10YR 4/2	DK YL BR	CL LO	NCM
18.15	2	27-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.16	1	0-29	10YR 4/2	DK YL BR	CL LO	NCM
18.16	2	29-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.17	1	0-31	10YR 4/2	DK YL BR	CL LO	NCM
18.17	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
18.18	1	0-28	10YR 4/2	DK YL BR	CL LO	NCM
18.18	2	28-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
Turbine 57						
1.1	1	0-13	10YR 4/2	DK GR BR	SA LO	NCM
1.1	2	13-28	5YR 5/4	RD BR	SI SA	NCM
1.2	1	0-31	10YR 4/2	DK GR BR	SA LO	NCM
1.2	2	31-43	5YR 5/4	RD BR	SI SA	NCM
1.3	1	0-30	10YR 4/2	DK GR BR	SA LO	NCM
1.3	2	30-40	5YR 5/4	RD BR	SI SA	NCM
1.4	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
1.4	2	27-39	5YR 5/4	RD BR	SI SA	NCM
1.5	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
1.5	2	25-36	5YR 5/4	RD BR	SI SA	NCM
1.6	1	0-26	10YR 4/2	DK GR BR	SA LO	NCM
1.6	2	26-38	5YR 5/4	RD BR	SI SA	NCM
1.7	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
1.7	2	28-40	5YR 5/4	RD BR	SI SA	NCM
1.8	1	0-29	10YR 4/2	DK GR BR	SA LO	NCM
1.8	2	29-41	5YR 5/4	RD BR	SI SA	NCM
1.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	27-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.12	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	21-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.13	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	18-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.14	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	15-28	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	29-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
1.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SA	NCM
2.1	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	16-26	5YR 5/4	RD BR	CL LO	NCM
2.2	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	18-28	5YR 5/4	RD BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	24-35	5YR 5/4	RD BR	CL LO	NCM
2.4	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	34-46	5YR 5/4	RD BR	CL LO	NCM
2.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	31-41	5YR 5/4	RD BR	CL LO	NCM
2.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	27-39	5YR 5/4	RD BR	CL LO	NCM
2.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	29-40	5YR 5/4	RD BR	CL LO	NCM
2.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	22-32	5YR 5/4	RD BR	CL LO	NCM
2.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	31-41	5YR 5/4	RD BR	CL LO	NCM
2.10	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	34-44	2.5Y 5/3	LT OLIVE BR	CL LO	NCM
2.11	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	23-36	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	28-38	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	21-33	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	33-43	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.15	1	0-7	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 7cm
2.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	32-42	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.17	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	36-46	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
2.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	31-43	10YR 6/2 10YR 5/8	LT BR GR YL BR	CL LO	NCM
3.1	1	0-22	10YR 4/2	DK GR BR	SI	NCM
3.1	2	22-35	5YR 5/4	RD BR	SI LO	NCM
3.2	1	0-20	10YR 4/2	DK GR BR	SI	NCM
3.2	2	20-30	5YR 5/4	RD BR	SI LO	NCM
3.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.3	2	23-35	5YR 5/4	RD BR	SI LO	NCM
3.4	1	0-30	10YR 4/2	DK GR BR	SI	NCM
3.4	2	30-40	5YR 5/4	RD BR	SI LO	NCM
3.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
3.5	2	27-37	5YR 5/4	RD BR	SI LO	NCM
3.6	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.6	2	25-35	5YR 5/4	RD BR	SI LO	NCM
3.7	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.7	2	25-35	5YR 5/4	RD BR	SI LO	NCM
3.8	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.8	2	24-35	5YR 5/4	RD BR	SI LO	NCM
3.9	1	0-28	10YR 4/2	DK GR BR	SI	NCM
3.9	2	28-40	5YR 5/4	RD BR	SI LO	NCM
3.10	1	0-24	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.10	2	24-35	5YR 5/4	RD BR	SI LO	NCM
3.11	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.11	2	25-35	10YR 5/4	YL BR	SI LO	NCM
3.12	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.12	2	24-35	10YR 5/4	YL BR	SI LO	NCM
3.13	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.13	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.14	1	0-23	10YR 4/2	DK GR BR	SI	NCM
3.14	2	23-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.15	1	0-24	10YR 4/2	DK GR BR	SI	NCM
3.15	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.16	1	0-25	10YR 4/2	DK GR BR	SI	NCM
3.16	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.17	1	0-20	10YR 4/2	DK GR BR	SI	NCM
3.17	2	20-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
3.18	1	0-22	10YR 4/2	DK GR BR	SI	NCM
3.18	2	22-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
4.1	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
4.1	2	22-37	5YR 5/4	RD BR	SA LO	NCM
4.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.2	2	26-40	5YR 5/4	RD BR	SA LO	NCM
4.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	33-45	10YR 5/6	YL BR	SA LO	NCM
4.4	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	36-46	10YR 5/6	YL BR	SA LO	NCM
4.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	28-44	10YR 5/6	YL BR	SA LO	NCM
4.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	32-46	5YR 5/4	RD BR	SA LO	NCM
4.7	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	17-40	5YR 5/4	RD BR	SA LO	NCM
4.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	27-39	5YR 5/4	RD BR	SA LO	NCM
4.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	27-42	10YR 5/4	YL BR	CL LO	NCM
4.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	31-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
4.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	26-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
4.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	32-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
4.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	25-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
4.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.14	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
4.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.15	2	30-40	10YR 5/4	YL BR	SA LO	NCM
4.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	33-44	5YR 5/4	RD BR	SA LO	NCM
4.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	32-46	5YR 5/4	RD BR	SA LO	NCM
4.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	23-38	5YR 5/4	RD BR	SA LO	NCM
5.1	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
5.1	2	15-25	5YR 5/4	RD BR	SA LO	NCM
5.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5.2	2	27-38	5YR 5/4	RD BR	SA LO	NCM
5.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5.3	2	31-42	5YR 5/4	RD BR	SA LO	NCM
5.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
5.4	2	35-47	5YR 5/4	RD BR	SA LO	NCM
5.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5.5	2	30-40	5YR 5/4	RD BR	SA LO	NCM
5.6	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
5.6	2	18-29	5YR 5/4	RD BR	SA LO	NCM
5.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.7	2	28-39	5YR 5/4	RD BR	SA LO	NCM
5.8	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM
5.8	2	10-27	5YR 5/4	RD BR	SA LO	NCM
5.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
5.9	2	25-35	5YR 5/4	RD BR	SA LO	NCM
5.10	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
5.10	2	36-49	2.5Y 5/3	LT OLIVE BR	SI LO	NCM
5.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
5.11	2	26-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
5.12	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
5.12	2	22-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
5.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
5.13	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
5.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
5.14	2	28-38	5YR 5/4	RD BR	SI LO	NCM
5.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
5.15	2	23-34	5YR 5/4	RD BR	SI LO	NCM
5.16	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
5.16	2	37-49	5YR 5/4	RD BR	SA LO	NCM
5.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5.17	2	29-40	5YR 5/4	RD BR	SA LO	NCM
5.18	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM
5.18	2	12-27	5YR 5/4	RD BR	SA LO	NCM
6.1	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	15-25	5YR 5/4	RD BR	SI SA	NCM
6.2	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	13-25	5YR 5/4	RD BR	SI SA	NCM
6.3	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	18-30	5YR 5/4	RD BR	SI SA	NCM
6.4	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	15-25	5YR 5/4	RD BR	SI SA	NCM
6.5	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	13-23	5YR 5/4	RD BR	SI SA	NCM
6.6	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
6.6	2	17-30	5YR 5/4	RD BR	SI SA	NCM
6.7	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	14-25	5YR 5/4	RD BR	SI SA	NCM
6.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	23-33	5YR 5/4	RD BR	SI SA	NCM
6.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	28-40	5YR 5/4	RD BR	SI SA	NCM
6.10	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	20-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
6.11	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	19-29	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
6.12	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	20-30	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA CL	NCM
6.13	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	15-25	5YR 5/4	RD BR	SI LO	NCM
6.14	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	13-23	5YR 5/4	RD BR	SI LO	NCM
6.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
6.15	2	17-30	5YR 5/4	RD BR	SI LO	NCM
6.16	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
6.16	2	15-35	5YR 5/4	RD BR	SA CL	NCM
6.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
6.17	2	25-35	5YR 5/4	RD BR	SA CL	NCM
6.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
6.18	2	26-34	5YR 5/4	RD BR	SA CL	NCM
7.1	1	0-16	10YR 4/2	DK GR BR	SI	NCM
7.1	2	16-31	5YR 5/4	RD BR	SI LO	NCM
7.2	1	0-17	10YR 4/2	DK GR BR	SI	NCM
7.2	2	17-33	5YR 5/4	RD BR	SI LO	NCM
7.3	1	0-23	10YR 4/2	DK GR BR	SI	NCM
7.3	2	23-34	5YR 5/4	RD BR	SI LO	NCM
7.4	1	0-24	10YR 4/2	DK GR BR	SI	NCM
7.4	2	24-34	5YR 5/4	RD BR	SI LO	NCM
7.5	1	0-31	10YR 4/2	DK GR BR	SI	NCM
7.5	2	31-42	5YR 5/4	RD BR	SI LO	NCM
7.6	1	0-28	10YR 4/2	DK GR BR	SI	NCM
7.6	2	28-40	5YR 5/4	RD BR	SI LO	NCM
7.7	1	0-31	10YR 4/2	DK GR BR	SI	NCM
7.7	2	31-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.8	1	0-23	10YR 4/2	DK GR BR	SI	NCM
7.8	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.9	1	0-26	10YR 4/2	DK GR BR	SI	NCM
7.9	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.10	1	0-26	10YR 4/2	DK GR BR	SI	NCM
7.10	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.11	1	0-27	10YR 4/2	DK GR BR	SI	NCM
7.11	2	27-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.12	1	0-26	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.12	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
7.13	1	0-25	10YR 4/2	DK GR BR	SI	NCM
7.13	2	25-37	2.5YR 5/4	RD BR	SI LO	NCM
7.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM
7.14	2	27-39	2.5YR 5/4	RD BR	SI LO	NCM
7.15	1	0-28	10YR 4/2	DK GR BR	SI	NCM
7.15	2	28-39	2.5YR 5/4	RD BR	SI LO	NCM
7.16	1	0-28	10YR 4/2	DK GR BR	SI	NCM
7.16	2	28-41	10YR 4/1 10YR 5/4	DK GR YL BR	SI LO	NCM
7.17	1	0-27	10YR 4/2	DK GR BR	SI	NCM
7.17	2	27-39	10YR 4/1 10YR 5/4	DK GR YL BR	SI LO	NCM
7.18	1	0-29	10YR 4/2	DK GR BR	SI	NCM
7.18	2	29-40	10YR 4/1 10YR 5/4	DK GR YL BR	SI LO	NCM
8.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	26-36	7.5YR 5/4	BR	CL LO	NCM
8.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	31-42	7.5YR 5/4	BR	CL LO	NCM
8.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	28-40	7.5YR 5/4	BR	CL LO	NCM
8.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	26-36	7.5YR 5/4	BR	CL LO	NCM
8.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	32-42	7.5YR 5/4	BR	CL LO	NCM
8.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	29-42	7.5YR 5/4	BR	CL LO	NCM
8.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	26-36	10YR 5/6	YL BR	CL LO	NCM
8.8	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	17-27	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
8.9	1	0-31	10YR 4/1	DK GR	SI LO	NCM
8.9	2	31-41	10YR 5/6	YL BR	CL LO	NCM
8.10	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	28-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
8.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
8.12	1	0-20	10YR 4/4	DK YL BR	SI LO	NCM
8.12	2	20-32	10YR 5/4	YL BR	CL LO	NCM
8.13	1	0-30	10YR 4/4	DK YL BR	SI LO	NCM
8.13	2	30-40	10YR 5/4	YL BR	CL LO	NCM
8.14	1	0-28	10YR 4/4	DK YL BR	SI LO	NCM
8.14	2	28-40	10YR 5/4	YL BR	CL LO	NCM
8.15	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
8.15	2	25-35	10YR 5/4	YL BR	CL LO	NCM
8.16	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
8.16	2	26-38	10YR 5/4	YL BR	CL LO	NCM
8.17	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
8.17	2	27-40	10YR 5/4	YL BR	CL LO	NCM
8.18	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
8.18	2	26-39	10YR 5/4	YL BR	CL LO	NCM
9.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
9.1	2	26-36	10YR 5/4	YL BR	CL LO	NCM
9.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	31-41	10YR 5/4	YL BR	CL LO	NCM
9.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	32-42	10YR 5/4	YL BR	CL LO	NCM
9.4	1	0-34	10YR 4/3	BR	SI LO	NCM
9.4	2	34-44	10YR 5/6	YL BR	CL LO	NCM
9.5	1	0-32	10YR 4/3	BR	SI LO	NCM
9.5	2	32-42	10YR 5/6	YL BR	CL LO	NCM
9.6	1	0-30	10YR 4/3	BR	SI LO	NCM
9.6	2	30-40	10YR 5/6	YL BR	CL LO	NCM
9.7	1	0-31	10YR 4/3	BR	SI LO	NCM
9.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.8	1	0-33	10YR 3/1	V DK GR	SI LO	NCM
9.8	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.9	1	0-31	10YR 3/1	V DK GR	SI LO	NCM
9.9	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
9.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	29-39	10YR 6/2	LT BR GR	SA CL LO	NCM
9.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	30-40	10YR 6/2	LT BR GR	SA CL LO	NCM
9.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	28-38	7.5YR 5/4	BR	SA CL LO	NCM
9.13	1	0-33	10YR 4/3	BR	SI LO	NCM
9.13	2	33-43	10YR 5/4	YL BR	CL LO	NCM
9.14	1	0-31	10YR 4/3	BR	SI LO	NCM
9.14	2	31-41	10YR 5/6	YL BR	CL LO	NCM
9.15	1	0-32	10YR 4/3	BR	SI LO	NCM
9.15	2	32-42	10YR 5/6	YL BR	CL LO	NCM
9.16	1	0-27	10YR 4/3	BR	SI LO	NCM
9.16	2	27-37	10YR 5/4	YL BR	SA CL LO	NCM
9.17	1	0-26	10YR 4/3	BR	SI LO	NCM
9.17	2	26-36	10YR 5/4	YL BR	SA CL LO	NCM
9.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	29-39	7.5YR 5/4	BR	SA LO	NCM
10.1	1	0-25	10YR 4/3	BR	SA SI	NCM
10.1	2	25-37	10YR 4/6	DK YL BR	SI LO	NCM
10.2	1	0-24	10YR 4/3	BR	SA SI	NCM
10.2	2	24-37	5YR 4/4	RD BR	SA SI	NCM
10.3	1	0-25	10YR 4/3	BR	SI LO	NCM
10.3	2	25-38	7.5YR 4/4	BR	SA SI	NCM
10.4	1	0-33	10YR 4/3	BR	SI LO	NCM
10.4	2	33-45	7.5YR 5/4	BR	SA SI	NCM
10.5	1	0-32	10YR 4/3	BR	S	NCM
10.5	2	32-44	7.5YR 4/4	BR	SI LO	NCM
10.6	1	0-31	10YR 4/3	BR	SI	NCM
10.6	2	31-42	7.5YR 4/4	BR	SI LO	NCM
10.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
10.7	2	28-41	10YR 4/6	DK YL BR	SA SI	NCM
10.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
10.8	2	30-40	10YR 5/4	YL BR	SA SI	NCM
10.9	1	0-24	10YR 3/2	V DK GR BR	LO	NCM
10.9	2	24-37	10YR 5/4	YL BR	SA SI	NCM
10.10	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.10	2	25-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
10.11	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
10.11	2	24-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
10.12	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
10.12	2	25-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
10.13	1	0-27	10YR 4/3	BR	SI LO	NCM
10.13	2	27-40	7.5YR 5/4	BR	LO	NCM
10.14	1	0-28	10YR 4/3	BR	LO	NCM
10.14	2	28-42	10YR 4/6	DK YL BR	SA	NCM
10.15	1	0-26	10YR 4/3	BR	LO	NCM
10.15	2	26-38	10YR 4/6	DK YL BR	SA	NCM
10.16	1	0-32	10YR 4/3	BR	SI	NCM; rocky
10.16	2	32-43	10YR 4/6	DK YL BR	SA	NCM; rocky
10.17	1	0-26	10YR 4/3	BR	SI LO	NCM
10.17	2	26-39	5YR 4/4	RD BR	SA SI	NCM
10.18	1	0-29	10YR 4/3	BR	SI	NCM
10.18	2	29-43	7.5YR 5/4	BR	SA SI	NCM
11.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	27-37	10YR 5/4	YL BR	CL LO	NCM
11.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	25-35	10YR 5/4	YL BR	CL LO	NCM
11.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	30-40	10YR 5/4	YL BR	CL LO	NCM
11.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	26-36	10YR 5/4	YL BR	CL LO	NCM
11.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.5	2	27-37	10YR 5/4	YL BR	CL LO	NCM
11.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.6	2	24-34	10YR 5/4	YL BR	CL LO	NCM
11.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
11.7	2	24-34	10YR 5/4	YL BR	CL LO	NCM
11.8	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
11.8	2	20-30	10YR 5/4	YL BR	CL LO	NCM
11.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.9	2	29-39	10YR 5/4	YL BR	CL LO	NCM
11.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.10	2	29-39	10YR 5/4	YL BR	CL LO	NCM
11.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
11.11	2	27-37	10YR 5/4	YL BR	CL LO	NCM
11.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.12	2	26-36	10YR 5/4	YL BR	CL LO	NCM
11.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
11.13	2	29-39	10YR 5/4	YL BR	CL LO	NCM
11.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.14	2	26-36	10YR 5/4	YL BR	CL LO	NCM
11.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
11.15	2	26-36	10YR 5/4	YL BR	CL LO	NCM
11.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
11.16	2	25-35	10YR 5/4	YL BR	CL LO	NCM
11.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
11.17	2	28-38	10YR 5/4	YL BR	CL LO	NCM
11.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
11.18	2	30-40	10YR 5/4	YL BR	CL LO	NCM
12.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
12.1	2	31-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	28-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.5	2	29-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.6	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.7	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.8	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.9	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.10	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.11	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.12	2	28-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
12.13	2	26-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.14	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
12.15	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	31-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
12.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	27-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	25-35	10YR 5/4	YL BR	CL LO	NCM
13.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	27-37	10YR 5/4	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	29-39	10YR 5/4	YL BR	CL LO	NCM
13.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.5	2	29-39	10YR 5/4	YL BR	CL LO	NCM
13.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.6	2	31-41	10YR 5/4	YL BR	CL LO	NCM
13.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.7	2	25-35	10YR 5/4	YL BR	CL LO	NCM
13.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.8	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.9	2	30-40	10YR 5/4	YL BR	CL LO	NCM
13.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
13.10	2	31-41	10YR 5/4	YL BR	CL LO	NCM
13.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
13.11	2	30-40	10YR 5/4	YL BR	CL LO	NCM
13.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.12	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.13	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
13.14	2	28-38	10YR 5/4	YL BR	CL LO	NCM
13.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.15	2	29-39	10YR 5/4	YL BR	CL LO	NCM
13.16	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.16	2	25-35	10YR 5/4	YL BR	CL LO	NCM
13.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.17	2	27-37	10YR 5/4	YL BR	CL LO	NCM
13.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
13.18	2	27-37	10YR 5/4	YL BR	CL LO	NCM
14.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.1	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
14.2	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
14.3	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.4	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.5	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
14.6	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.7	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.7	2	36-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
14.8	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
14.8	2	36-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
14.9	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.9	2	38-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
14.10	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.11	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
14.11	2	37-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
14.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.13	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
14.13	2	33-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
14.14	2	28-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
14.15	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
14.16	1	0-30	10YR 5/4	YL BR	SI LO	NCM
14.16	2	30-45	5YR 5/4	RD BR	SA LO	NCM
14.17	1	0-23	10YR 5/4	YL BR	SI LO	NCM
14.17	2	23-33	5YR 5/4	RD BR	SA LO	NCM
14.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
14.18	2	27-37	10YR 5/6	YL BR	SI LO	NCM
15.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	23-33	5YR 5/4	RD BR	SA CL	NCM
15.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	26-36	5YR 5/4	RD BR	SA CL	NCM
15.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	26-36	5YR 5/4	RD BR	SA CL	NCM
15.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	27-40	5YR 5/4	RD BR	CL SA	NCM
15.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	25-35	5YR 5/4	RD BR	CL SA	NCM
15.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	27-40	5YR 5/4	RD BR	CL SA	NCM
15.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	27-40	5YR 5/4	RD BR	CL SA	NCM
15.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	24-34	5YR 5/4	RD BR	CL SA	NCM
15.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	27-40	5YR 5/4	RD BR	CL SA	NCM
15.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	26-36	5YR 5/4	RD BR	CL SA	NCM
15.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	30-40	5YR 5/4	RD BR	CL SA	NCM
15.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
15.12	2	25-35	5YR 5/4	RD BR	CL SA	NCM
15.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	30-40	5YR 5/4	RD BR	CL SA	NCM
15.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	27-37	5YR 5/4	RD BR	CL SA	NCM
15.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	26-36	5YR 5/4	RD BR	CL SA	NCM
15.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.16	2	26-36	5YR 5/4	RD BR	CL SA	NCM
15.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	27-37	5YR 5/4	RD BR	CL SA	NCM
15.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	29-39	5YR 5/4	RD BR	CL SA	NCM
16.1	1	0-27	10YR 4/4	DK YL BR	SI LO	NCM
16.1	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.2	1	0-26	10YR 4/4	DK YL BR	SI LO	NCM
16.2	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.3	1	0-33	10YR 4/4	DK YL BR	SI LO	NCM
16.3	2	3-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.4	1	0-25	10YR 4/4	DK YL BR	SI LO	NCM
16.4	2	25-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.5	1	0-29	10YR 4/4	DK YL BR	SI LO	NCM
16.5	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.6	1	0-32	10YR 4/4	DK YL BR	SI LO	NCM
16.6	2	32-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
16.7	1	0-31	10YR 4/3	BR	SI LO	NCM
16.7	2	31-42	10YR 5/4	YL BR	CL LO	NCM
16.8	1	0-29	10YR 4/3	BR	SI LO	NCM
16.8	2	29-42	10YR 5/4	YL BR	CL LO	NCM
16.9	1	0-31	10YR 4/3	BR	SI LO	NCM
16.9	2	31-41	10YR 5/4	YL BR	CL LO	NCM
16.10	1	0-23	10YR 4/1	DK GR	SI LO	NCM
16.10	2	23-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL LO	NCM
16.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.11	2	27-31	10YR 5/4	YL BR	CL LO	NCM
16.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	24-37	10YR 5/4	YL BR	CL LO	NCM
16.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.13	2	28-41	10YR 5/4	YL BR	CL LO	NCM
16.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	29-40	10YR 5/4	YL BR	CL LO	NCM
16.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.15	2	31-44	10YR 5/4	YL BR	CL LO	NCM
16.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	27-39	10YR 5/4	YL BR	SI CL	NCM
16.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	30-40	10YR 5/4	YL BR	SI CL	NCM
16.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	33-45	10YR 5/4	YL BR	SI CL	NCM
17.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	27-38	10YR 5/4	YL BR	SA SI	NCM
17.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	26-38	10YR 5/4	YL BR	SA SI	NCM
17.3	1	0-28	10YR 4/3	BR	SI	NCM
17.3	2	28-38	10YR 4/6	DK YL BR	LO	NCM
17.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	28-38	10YR 4/6	DK YL BR	LO	NCM
17.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.5	2	30-41	10YR 4/6	DK YL BR	LO	NCM
17.6	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; rocky
17.6	2	24-36	10YR 4/6	DK YL BR	LO	NCM; rocky
17.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	30-41	10YR 4/6	DK YL BR	SA SI	NCM
17.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM
17.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	26-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
17.10	1	0-22	10YR 3/2	V DK GR BR	SI	NCM
17.10	2	22-33	10YR 5/4	YL BR	SA SI	NCM
17.11	1	0-31	10YR 3/2	V DK GR BR	SI	NCM
17.11	2	31-42	10YR 5/4	YL BR	SA SI	NCM
17.12	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
17.12	2	28-40	10YR 5/4	YL BR	SA SI	NCM
17.13	1	0-27	10YR 3/2	V DK GR BR	LO	NCM
17.13	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.14	1	0-24	10YR 3/2	V DK GR BR	LO	NCM
17.14	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
17.15	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
17.15	2	26-37	10YR 4/6	DK YL BR	SA SI	NCM
17.16	1	0-33	10YR 4/3	BR	SI LO	NCM
17.16	2	33-45	10YR 4/6	DK YL BR	SA SI	NCM
17.17	1	0-29	10YR 4/3	BR	SI LO	NCM
17.17	2	29-40	5YR 4/4	RD BR	SA SI	NCM
17.18	1	0-27	10YR 4/3	BR	SI LO	NCM
17.18	2	27-37	5YR 4/4	RD BR	SA SI	NCM
18.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	31-42	10YR 5/4	YL BR	CL SA	NCM
18.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.2	2	29-40	10YR 5/4	YL BR	CL SA	NCM
18.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
18.3	2	34-45	10YR 5/4	YL BR	CL SA	NCM
18.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.4	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.5	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.6	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
18.7	2	28-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
18.8	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.10	1	0-31	10YR 3/1	V DK GR	SI LO	NCM
18.10	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
18.11	1	0-30	10YR 3/1	V DK GR	SI LO	NCM
18.11	2	30-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.12	1	0-27	10YR 3/1	V DK GR	SI LO	NCM
18.12	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.16	1	0-29	10YR 4/3	BR	SA LO	NCM
18.16	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.17	1	0-27	10YR 4/3	BR	SA LO	NCM
18.17	2	27-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
18.18	1	0-28	10YR 4/3	BR	SA LO	NCM
18.18	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
Turbine 65						NCM
1.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	29-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.2	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.1	1	0-36	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.1	2	36-52	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.2	1	0-33	10YR 4/3	BR	SI LO	NCM
3.2	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.3	1	0-38	10YR 4/3	BR	SI LO	NCM
3.3	2	38-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.4	1	0-42	10YR 4/3	BR	SI LO	NCM
3.4	2	42-53	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.5	1	0-35	10YR 4/3	BR	SI LO	NCM
3.5	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.1	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
4.1	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
4.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.2	2	32-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
4.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
4.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	33-45	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
5.1	1	0-31	10YR 4/2	DK GR BR	SI	NCM
5.1	2	31-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.2	1	0-32	10YR 4/2	DK GR BR	SI	NCM
5.2	2	32-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.3	1	0-33	10YR 4/2	DK GR BR	SI	NCM
5.3	2	33-53	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
5.4	1	0-32	10YR 4/2	DK GR BR	SI	NCM
5.4	2	32-44	10YR 5/4	YL BR	CL SI	NCM
6.1	1	0-35	10YR 4/2	DK GR BR	SI	NCM
6.1	2	35-45	10YR 5/6	YL BR	SI LO	NCM
6.2	1	0-37	10YR 4/2	DK GR BR	SI	NCM
6.2	2	37-50	10YR 5/6	YL BR	SI LO	NCM
6.3	1	0-40	10YR 4/2	DK GR BR	SI	NCM
6.3	2	40-50	10YR 5/6	YL BR	SI LO	NCM
6.4	1	0-38	10YR 4/2	DK GR BR	SI	NCM
6.4	2	38-50	10YR 5/6	YL BR	SI LO	NCM
7.1	1	0-40	10YR 4/2	DK GR BR	SI CL	NCM
7.1	2	40-48	10YR 5/4	YL BR	SI LO	NCM
7.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	29-39	10YR 5/4	YL BR	SI CL	NCM
7.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	29-39	10YR 5/4	YL BR	SI CL	NCM
7.4	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	28-41	10YR 4/6	DK YL BR	SI CL	NCM
8.1	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	32-45	10YR 5/4	YL BR	SI CL	NCM
8.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
8.2	2	28-38	10YR 5/4	YL BR	SI CL	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
8.3	2	31-41	10YR 5/4	YL BR	SI CL	NCM
8.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	29-39	10YR 5/4	YL BR	SI CL	NCM
9.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.1	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
9.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
9.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	30-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
9.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SA	NCM
10.1	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
10.1	2	39-50	10YR 5/4	YL BR	CL SI	NCM
10.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.2	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
10.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10.3	2	32-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
10.4	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
10.4	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
11.1	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
11.1	2	37-47	10YR 5/4	YL BR	CL SI	NCM
11.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
11.2	2	32-42	10YR 5/4	YL BR	CL SI	NCM
11.3	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
11.3	2	39-50	10YR 5/4	YL BR	CL SI	NCM
11.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
11.4	2	32-44	10YR 5/4	YL BR	CL SI	NCM
12.1	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	35-44	10YR 5/4	YL BR	CL LO	NCM
12.2	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	37-47	10YR 5/4 10YR 6/8	YL BR BR YL	CL LO	NCM
12.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	32-44	10YR 5/4 10YR 6/8	YL BR BR YL	CL LO	NCM
12.4	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
12.4	2	33-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
13.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
13.1	2	29-39	10YR 5/4	YL BR	CL SI	NCM
13.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.2	2	25-35	10YR 5/4	YL BR	CL SI	NCM
13.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
13.3	2	25-35	10YR 5/4	YL BR	CL SI	NCM
13.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
13.4	2	22-32	10YR 5/4	YL BR	CL SI	NCM
Turbine 66						
1.1	1	0-39	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	39-49	10YR 5/4	YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.2	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	34-44	10YR 5/4	YL BR	SI CL LO	NCM
1.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	28-38	10YR 5/4	YL BR	SI CL LO	NCM
1.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	27-37	10YR 5/4	YL BR	SI CL LO	NCM
1.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.12	1	0-34	10YR 4/1	DK GR	SI LO	NCM
1.12	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.13	1	0-28	10YR 4/1	DK GR	SI LO	NCM
1.13	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.14	1	0-23	10YR 4/1	DK GR	SI LO	NCM
1.14	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.15	1	0-25	10YR 4/1	DK GR	SI LO	NCM
1.15	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.16	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
1.16	2	28-38	10YR 5/4	YL BR	SA LO	NCM
1.17	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
1.17	2	29-39	10YR 5/4	YL BR	SA LO	NCM
1.18	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
1.18	2	31-41	10YR 5/4	YL BR	SA LO	NCM
2.1	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	42-57	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.2	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	40-52	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	30-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.4	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	39-48	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	27-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	24-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.8	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	21-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	26-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	31-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.11	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	43-53	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	21-32	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
2.14	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	19-36	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
2.15	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM; rock impasse at 27cm
2.16	1	0-17	10YR 3/2	V DK GR BR	SI LO	NCM
2.16	2	17-32	10YR 4/4	DK YL BR	SA CL	NCM
2.17	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM; root impasse at 26cm
2.18	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
2.18	2	30-40	10YR 4/4	DK YL BR	SA CL	NCM
3.1	1	0-45	10YR 4/2	DK GR BR	SI LO	NCM
3.1	2	45-58	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
3.2	1	0-48	10YR 4/2	DK GR BR	SI LO	NCM
3.2	2	48-59	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
3.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
3.3	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
3.4	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
3.4	2	22-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.5	2	26-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.6	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.7	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
3.7	2	19-23	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.8	2	23-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.9	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	19-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.10	1	0-11	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 11cm
3.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.11	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.12	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
3.12	2	21-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.13	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
3.13	2	19-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.14	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 14cm
3.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.15	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
3.16	1	0-3	10YR 3/2	V DK GR BR	SI LO	NCM; water and rock impasse at 3cm
3.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.17	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
3.18	1	0-7	10YR 4/2	DK GR BR	SI LO	NCM; water and rock impasse at 7cm
4.1	1	0-35	10YR 4/2	DK GR BR	SI LO	whiteware
4.1	2	35-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.2	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 41cm
4.3	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.4	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	37-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.7	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	22-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.9	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	19-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.10	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.11	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.12	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 18cm
4.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.14	1	0-2	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 2cm
4.15	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	16-26	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
4.16	1	0-3	10YR 4/2	DK GR BR	SI LO	NCM; creek impasse/seepage at 3cm
4.17	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 14cm
4.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
5.1	1	0-28	10YR 4/2	DK GR BR	SI	NCM
5.1	2	28-40	10YR 6/2	LT BR GR	SI LO	NCM
5.2	1	0-27	10YR 4/2	DK GR BR	SI	NCM
5.2	2	27-39	10YR 6/2	LT BR GR	SI LO	NCM
5.3	1	0-40	10YR 4/2	DK GR BR	SI	NCM
5.3	2	40-51	10YR 6/2	LT BR GR	SI LO	NCM
5.4	1	0-26	10YR 4/2	DK GR BR	SI	NCM
5.4	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.5	1	0-26	10YR 4/2	DK GR BR	SI	NCM
5.5	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.6	1	0-30	10YR 4/2	DK GR BR	SI	NCM
5.6	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.7	1	0-28	10YR 4/2	DK GR BR	SI	NCM
5.7	2	28-39	10YR 6/2	LT BR GR	SI LO	NCM
5.8	1	0-27	10YR 4/2	DK GR BR	SI	NCM
5.8	2	27-38	10YR 6/2	LT BR GR	SI LO	NCM
5.9	1	0-26	10YR 4/2	DK GR BR	SI	NCM
5.9	2	26-37	10YR 6/2	LT BR GR	SI LO	NCM
5.10	1	0-23	10YR 4/2	DK GR BR	SI	NCM
5.10	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.11	1	0-37	10YR 4/2	DK GR BR	SI	NCM
5.11	2	37-48	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.12	1	0-33	10YR 4/2	DK GR BR	SI	NCM
5.12	2	33-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
5.13	1	0-28	10YR 4/2	DK GR BR	SI	NCM
5.13	2	28-39	10YR 5/4	YL BR	SI LO	NCM
5.14	1	0-37	10YR 4/2	DK GR BR	SI	NCM
5.14	2	37-47	10YR 5/4	YL BR	SI LO	NCM
5.15	1	0-35	10YR 4/2	DK GR BR	SI	NCM
5.15	2	35-45	10YR 5/4	YL BR	SI LO	NCM
5.16	1	0-24	10YR 4/2	DK GR BR	SI	NCM
5.16	2	24-35	10YR 5/4	YL BR	SA CL	NCM
5.17	1	0-25	10YR 4/2	DK GR BR	SI	NCM
5.17	2	25-38	10YR 5/4	YL BR	SA CL	NCM
5.18	1	0-16	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
5.18	2	16-31	10YR 5/4	YL BR	SA CL	NCM
6.1	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
6.1	2	40-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.2	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
6.2	2	43-53	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.3	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
6.3	2	39-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
6.4	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.5	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.6	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
6.7	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
6.8	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
6.9	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.10	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
6.10	2	21-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
6.11	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.12	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
6.12	2	43-53	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
6.13	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
6.14	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
6.15	1	0-9	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 9cm
6.16	1	0-3	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 3cm
6.17	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 23cm
6.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 36cm
7.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.1	2	30-38	10YR 5/4	YL BR	CL LO	NCM
7.2	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
7.2	2	23-29	10YR 5/4	YL BR	CL LO	NCM
7.3	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
7.3	2	19-36	10YR 5/4	YL BR	CL LO	NCM
7.4	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
7.4	2	19-34	10YR 5/4	YL BR	CL LO	NCM
7.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
7.5	2	29-34	10YR 5/4	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
7.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
7.6	2	30-36	10YR 5/4	YL BR	CL LO	NCM
7.7	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
7.7	2	22-34	10YR 5/4	YL BR	CL LO	NCM
7.8	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
7.8	2	20-38	10YR 5/4	YL BR	CL LO	NCM
7.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
7.9	2	28-33	10YR 5/4	YL BR	CL LO	NCM
7.10	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
7.10	2	34-44	10YR 5/4	YL BR	CL LO	NCM
7.11	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
7.11	2	37-47	10YR 5/4	YL BR	CL LO	NCM
7.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
7.12	2	31-41	10YR 5/4	YL BR	CL LO	NCM
7.13	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
7.13	2	20-33	10YR 5/4	YL BR	CL LO	NCM
7.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
7.14	2	25-30	10YR 5/4	YL BR	CL LO	NCM; rock impasse at 30cm
7.15	1	0-26	10YR 3/1	V DK GR	LO	NCM; rocky
7.15	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM; rocky
7.16	1	0-22	10YR 3/1	V DK GR	LO	NCM
7.16	2	22-34	10YR 4/6	DK YL BR	SA SI	NCM
7.17	1	0-37	10YR 3/1	V DK GR	LO	NCM
7.17	2	37-47	10YR 4/6	DK YL BR	SA SI	NCM
7.18	1	0-25	10YR 3/1	V DK GR	LO	NCM
7.18	2	25-39	10YR 4/6	DK YL BR	SA SI	NCM
8.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
8.1	2	30-40	10YR 5/4	YL BR	CL LO	NCM
8.2	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 34cm
8.3	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; cobbles
8.3	2	32-45	10YR 5/6	YL BR	CL LO	NCM; cobbles
8.4	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
8.4	2	35-46	10YR 5/6	YL BR	CL LO	NCM
8.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.5	2	27-37	10YR 5/4	YL BR	CL LO	NCM
8.6	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
8.6	2	23-46	10YR 5/4	YL BR	CL LO	NCM
8.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.7	2	29-40	10YR 5/4	YL BR	CL LO	NCM
8.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
8.8	2	23-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
8.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
8.9	2	27-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
8.10	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
8.10	2	39-51	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
8.11	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
8.12	2	32-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
8.13	1	0-15	10YR 3/2	V DK GR BR	SI LO	NCM
8.13	2	15-25	10YR 5/6	YL BR	CL LO	NCM
8.14	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
8.14	2	21-41	10YR 5/6	YL BR	CL LO	NCM
8.15	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM
8.15	2	22-32	10YR 5/6	YL BR	CL LO	NCM
8.16	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
8.16	2	27-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
8.17	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
8.17	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
8.18	1	0-14	10YR 3/2	V DK GR BR	SI LO	NCM; root/boulder impasse at 14cm
9.1	1	0-36	10YR 4/2 10YR 5/6	DK GR BR YL BR	SI LO	NCM
9.1	2	36-45	10YR 5/4	YL BR	CL LO	NCM
9.2	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
9.2	2	34-45	10YR 5/4	YL BR	CL LO	NCM
9.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.3	2	31-43	10YR 5/4	YL BR	CL LO	NCM
9.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.4	2	29-42	10YR 5/4	YL BR	CL LO	NCM; eroded bedrock at interface
9.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
9.5	2	24-35	10YR 5/4	YL BR	CL LO	NCM
9.6	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.6	2	26-38	10YR 5/4	YL BR	CL LO	NCM
9.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.7	2	28-40	10YR 5/4	YL BR	CL LO	NCM
9.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.8	2	25-37	10YR 5/4	YL BR	CL LO	NCM
9.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
9.9	2	27-41	10YR 5/4	YL BR	CL LO	NCM
9.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
9.10	2	32-42	10YR 5/4	YL BR	CL LO	NCM
9.11	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
9.11	2	29-41	10YR 5/4	YL BR	CL LO	NCM
9.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
9.12	2	31-43	10YR 5/4	YL BR	CL LO	NCM
9.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
9.13	2	28-39	10YR 5/4	YL BR	CL LO	NCM
9.14	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.14	2	25-37	10YR 5/4	YL BR	CL LO	NCM
9.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
9.15	2	26-36	10YR 5/4	YL BR	CL LO	NCM
9.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
9.16	2	23-35	10YR 5/4	YL BR	CL LO	NCM
9.17	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
9.17	2	17-31	10YR 5/4	YL BR	CL LO	NCM
9.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
9.18	2	25-38	10YR 5/4	YL BR	CL LO	NCM
10.1	1	0-34	10YR 4/2	DK GR BR	SI	NCM
10.1	2	34-45	10YR 5/4	YL BR	SI LO	NCM
10.2	1	0-35	10YR 4/2	DK GR BR	SI	NCM
10.2	2	35-45	10YR 5/4	YL BR	SI LO	NCM
10.3	1	0-38	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 30cm
10.4	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.4	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
10.5	2	27-40	10YR 5/6	YL BR	SI LO	NCM
10.6	1	0-26	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10.6	2	26-36	10YR 5/6	YL BR	SI LO	NCM
10.7	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.7	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.8	1	0-34	10YR 4/2	DK GR BR	SI	NCM
10.8	2	34-45	10YR 5/6	YL BR	SI LO	NCM
10.9	1	0-35	10YR 4/2	DK GR BR	SI	NCM
10.9	2	35-45	10YR 5/6	YL BR	SI LO	NCM
10.10	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.10	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.11	1	0-32	10YR 4/2	DK GR BR	SI	NCM
10.11	2	32-42	10YR 5/6	YL BR	SI LO	NCM
10.12	1	0-27	10YR 4/2	DK GR BR	SI	NCM
10.12	2	27-40	10YR 5/6	YL BR	SI LO	NCM
10.13	1	0-30	10YR 4/2	DK GR BR	SI	NCM
10.13	2	30-40	10YR 5/6	YL BR	SI LO	NCM
10.14	1	0-27	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 27cm
10.15	1	0-25	10YR 4/2	DK GR BR	SI	NCM
10.15	2	25-35	10YR 5/6	YL BR	SI LO	NCM
10.16	1	0-27	10YR 4/2	DK GR BR	SI	NCM
10.16	2	27-40	10YR 5/6	YL BR	SI LO	NCM
10.17	1	0-20	10YR 4/2	DK GR BR	SI	NCM
10.17	2	20-30	10YR 5/6	YL BR	SI LO	NCM
10.18	1	0-25	10YR 4/2	DK GR BR	SI	NCM
10.18	2	25-35	10YR 5/6	YL BR	SI LO	NCM
11.1	1	0-38	10YR 4/2	DK GR BR	LO	NCM
11.1	2	38-52	10YR 5/4	YL BR	SA LO	NCM
11.2	1	0-28	10YR 4/2	DK GR BR	LO	NCM
11.2	2	28-40	10YR 5/4	YL BR	SA LO	NCM
11.3	1	0-27	10YR 4/2	DK GR BR	LO	NCM
11.3	2	27-37	10YR 4/6	DK YL BR	SA LO	NCM
11.4	1	0-32	10YR 4/2	DK GR BR	LO	NCM
11.4	2	32-43	10YR 4/6	DK YL BR	SA SI	NCM
11.5	1	0-33	10YR 4/2	DK GR BR	LO	NCM; rocky
11.5	2	33-45	10YR 4/6	DK YL BR	SA SI	NCM; rocky
11.6	1	0-32	10YR 3/2	V DK GR BR	LO	NCM; rocky
11.6	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; rocky
11.7	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
11.7	2	29-41	10YR 4/6	DK YL BR	SA SI	NCM
11.8	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
11.8	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM
11.9	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
11.9	2	25-35	10YR 4/6	DK YL BR	SA SI	NCM
11.10	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM
11.10	2	23-36	10YR 4/6	DK YL BR	SA SI	NCM
11.11	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM
11.11	2	22-32	10YR 4/6	DK YL BR	SA SI	NCM
11.12	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
11.12	2	35-46	10YR 4/6	DK YL BR	SA SI	NCM
11.13	1	0-19	10YR 4/2	DK GR BR	SI	NCM
11.13	2	19-31	10YR 5/4	YL BR	SA SI	NCM
11.14	1	0-22	10YR 4/2	DK GR BR	SI	NCM
11.14	2	22-33	10YR 4/6	DK YL BR	SA SI	NCM
11.15	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
11.15	2	29-42	10YR 4/6	DK YL BR	SA SI	NCM
11.16	1	0-32	10YR 3/1	V DK GR	SI LO	NCM; root impasse at 32cm
11.17	1	0-31	10YR 3/1	V DK GR	SI	NCM; roots

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
11.17	2	31-43	10YR 4/6	DK YL BR	SI LO	NCM; roots
11.18	1	0-27	10YR 3/1	V DK GR	SI	NCM; roots
11.18	2	27-38	10YR 4/6	DK YL BR	SA SI	NCM; roots
12.1	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
12.1	2	38-43	10YR 5/4	YL BR	SA SI	NCM
12.2	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
12.2	2	36-50	10YR 5/4	YL BR	SA SI	NCM
12.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
12.3	2	28-37	10YR 5/4	YL BR	SA SI	NCM
12.4	1	0-52	10YR 3/2	V DK GR BR	SI LO	NCM
12.4	2	52-62	10YR 5/4	YL BR	SA SI	NCM
12.5	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
12.5	2	34-45	10YR 5/4	YL BR	SA SI	NCM
12.6	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
12.6	2	32-44	10YR 5/4	YL BR	LO	NCM
12.7	1	0-32	10YR 3/1	V DK GR	SI LO	NCM
12.7	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
12.8	1	0-24	10YR 3/1	V DK GR	SI LO	NCM
12.8	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
12.9	1	0-27	10YR 3/1	V DK GR	SI LO	NCM
12.9	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
12.10	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
12.10	2	20-34	10YR 5/4	YL BR	SA SI	NCM
12.11	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
12.11	2	27-37	10YR 5/4	YL BR	SA SI	NCM
12.12	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
12.12	2	26-38	10YR 5/4	YL BR	SA SI	NCM
12.13	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
12.13	2	24-34	10YR 5/4	YL BR	SI CL	NCM
12.14	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
12.14	2	25-38	10YR 5/4	YL BR	SI CL	NCM
12.15	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
12.15	2	32-44	10YR 5/4	YL BR	SI CL	NCM
12.16	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
12.16	2	34-45	10YR 5/4	YL BR	SI CL	NCM
12.17	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
12.17	2	36-46	10YR 5/4	YL BR	SI CL	NCM
12.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
12.18	2	33-45	10YR 5/4	YL BR	SI CL	NCM
13.1	1	0-35	10YR 4/2	DK GR BR	SI	NCM
13.1	2	35-46	10YR 6/2	LT BR GR	CL SI	NCM
13.2	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.2	2	28-40	10YR 6/2	LT BR GR	CL SI	NCM
13.3	1	0-29	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 27cm
13.4	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.4	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.5	1	0-30	10YR 4/2	DK GR BR	SI	NCM
13.5	2	30-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM; rock impasse at 34cm
13.6	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.6	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
13.7	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.8	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.8	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.9	1	0-22	10YR 4/2	DK GR BR	SI	NCM
13.9	2	22-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.10	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.10	2	27-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.11	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.11	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.12	1	0-29	10YR 4/2	DK GR BR	SI	NCM
13.12	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
13.13	1	0-37	10YR 4/2	DK GR BR	SI	NCM
13.13	2	37-47	10YR 5/4	YL BR	CL SI	NCM
13.14	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.14	2	28-40	10YR 5/4	YL BR	CL SI	NCM
13.15	1	0-27	10YR 4/2	DK GR BR	SI	NCM
13.15	2	27-38	10YR 5/4	YL BR	CL SI	NCM
13.16	1	0-26	10YR 4/2	DK GR BR	SI	NCM
13.16	2	26-38	10YR 5/4	YL BR	CL SI	NCM
13.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM
13.17	2	28-40	10YR 5/4	YL BR	CL SI	NCM
13.18	1	0-33	10YR 4/2	DK GR BR	SI	NCM
13.18	2	33-44	10YR 5/4	YL BR	CL SI	NCM
14.1	1	0-35	10YR 4/2	DK GR BR	SI	NCM
14.1	2	35-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.2	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.2	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.3	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.3	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.4	1	0-29	10YR 4/2	DK GR BR	SI	NCM
14.4	2	29-31	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM; rock impasse at 31cm
14.5	1	0-28	10YR 4/2	DK GR BR	SI	NCM
14.5	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.6	1	0-27	10YR 4/2	DK GR BR	SI	NCM
14.6	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.7	1	0-18	10YR 4/2	DK GR BR	SI	NCM
14.7	2	18-31	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
14.8	1	0-25	10YR 4/2	DK GR BR	SI	NCM
14.8	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
14.9	1	0-25	10YR 4/2	DK GR BR	SI	NCM
14.9	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	CL SI	NCM
14.10	1	0-24	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
14.10	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.11	1	0-30	10YR 4/2	DK GR BR	SI	NCM; rock impasse at 30cm
14.12	1	0-32	10YR 4/2	DK GR BR	SI	NCM
14.12	2	32-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL LO	NCM
14.13	1	0-21	10YR 4/2	DK GR BR	SI	NCM
14.13	2	21-32	10YR 5/4	YL BR	CL SI	NCM
14.14	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.14	2	30-40	10YR 5/4	YL BR	CL SI	NCM
14.15	1	0-40	10YR 4/2	DK GR BR	SI	NCM
14.15	2	40-50	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.16	1	0-30	10YR 4/2	DK GR BR	SI	NCM
14.16	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM
14.17	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
14.18	1	0-26	10YR 4/2	DK GR BR	SI	NCM
14.18	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
15.1	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
15.1	2	23-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.2	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
15.2	2	39-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
15.3	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.4	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.5	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.6	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
15.6	2	38-48	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.7	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
15.7	2	21-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.8	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15.8	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.9	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
15.9	2	21-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.10	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
15.10	2	39-49	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.11	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
15.11	2	19-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.12	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15.12	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
15.13	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.14	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15.15	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.16	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
15.16	2	18-29	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
15.17	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
15.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15.18	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
16.1	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
16.1	2	37-47	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.2	2	30-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.3	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.4	2	30-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
16.5	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.6	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.6	2	31-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.7	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
16.7	2	22-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
16.8	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.9	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
16.9	2	17-31	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.10	2	32-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
16.11	2	30-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
16.12	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
16.13	2	25-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
16.14	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
16.15	2	27-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
16.16	2	32-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
16.17	2	31-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
16.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
16.18	2	36-48	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
17.1	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
17.1	2	43-54	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
17.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.2	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.3	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.3	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.4	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.4	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
17.5	2	32-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
17.6	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
17.7	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.8	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
17.8	2	21-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.9	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
17.10	2	29-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.11	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.11	2	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.12	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
17.12	2	20-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL SI	NCM
17.13	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
17.13	2	20-33	10YR 5/4	YL BR	SA SI	NCM
17.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
17.14	2	33-45	10YR 4/6	DK YL BR	CL SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
17.15	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
17.15	2	26-38	10YR 5/4	YL BR	SA SI	NCM
17.16	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
17.16	2	20-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
17.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
17.17	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
17.18	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
17.18	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
18.1	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
18.1	2	36-46	10YR 5/4	YL BR	SA LO	NCM
18.2	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
18.2	2	31-41	10YR 5/4	YL BR	SA LO	NCM
18.3	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
18.3	2	32-42	10YR 4/2 10YR 6/2	DK GR BR LT BR GR	SA CL LO	NCM
18.4	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
18.4	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
18.5	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
18.5	2	32-42	10YR 5/4	YL BR	SI CL LO	NCM
18.6	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
18.6	2	33-43	10YR 5/4	YL BR	CL LO	NCM
18.7	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
18.7	2	27-37	10YR 5/4	YL BR	CL LO	NCM
18.8	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
18.8	2	29-39	10YR 5/4	YL BR	CL LO	NCM
18.9	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
18.9	2	24-34	10YR 5/4	YL BR	CL LO	NCM
18.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
18.10	2	33-43	10YR 5/4	YL BR	CL LO	NCM
18.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
18.11	2	31-41	10YR 5/4	YL BR	SA CL LO	NCM
18.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.12	2	27-37	10YR 5/4	YL BR	CL LO	NCM
18.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
18.13	2	30-40	10YR 5/4	YL BR	CL LO	NCM
18.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
18.14	2	27-37	10YR 5/4	YL BR	CL LO	NCM
18.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
18.15	2	32-42	10YR 5/4	YL BR	CL LO	NCM
18.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
18.16	2	29-39	10YR 5/4	YL BR	CL LO	NCM
18.17	1	0-30	10YR 4/3	BR	SI LO	NCM
18.17	2	30-40	10YR 5/4	YL BR	SI CL LO	NCM
18.18	1	0-32	10YR 4/3	BR	SI LO	NCM
18.18	2	32-42	10YR 5/4	YL BR	CL LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
Linear 3						
1.1	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	24-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.2	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	27-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.3	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
1.3	2	27-39	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.4	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
1.4	2	27-38	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.5	1	0-20	10YR 3/2	V DK GR BR	SI LO	whiteware
1.5	2	20-30	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.6	1	0-18	10YR 3/2	V DK GR BR	SI LO	whiteware; metal fragment
1.6	2	18-33	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.7	1	0-21	10YR 4/2	DK GR BR	SI LO	whiteware
1.7	2	21-31	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.8	1	0-20	10YR 4/2	DK GR BR	SI LO	bottle glass (discarded)
1.8	2	20-30	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.9	1	0-19	10YR 4/2	DK GR BR	SI LO	brick fragment (discarded)
1.9	2	19-30	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.10	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	20-30	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.12	1	0-14	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	14-25	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
1.14	1	0-18	10YR 4/2	DK GR BR	SI LO	brick fragment; cut nail (both discarded)
1.14	2	18-30	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
1.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	17-28	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
1.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	23-43	10YR 5/4	YL BR	SA LO	NCM
1.17	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	10-30	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
1.18	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	17-30	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
1.19	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	12-30	10YR 5/4	YL BR	SA LO	NCM
1.20	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.20	2	24-37	10YR 5/4	YL BR	SA LO	NCM
2.1	1	0-11	10YR 4/2	DK GR BR	SI LO	whiteware
2.1	2	11-23	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	22-32	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.3	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	13-30	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.4	1	0-15	10YR 4/2	DK GR BR	SI LO	red-glazed whiteware
2.4	2	15-27	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.5	1	0-17	10YR 4/2	DK GR BR	SI LO	bottle glass (discarded)
2.5	2	17-29	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.6	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	25-35	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.7	1	0-27	10YR 3/2	V DK GR BR	SI LO	whiteware
2.7	2	27-38	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.8	1	0-19	10YR 3/2	V DK GR BR	SI LO	flat glass (discarded)
2.8	2	19-34	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.9	1	0-21	10YR 3/2	V DK GR BR	SI LO	whiteware; metal pieces
2.9	2	21-32	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.10	1	0-21	10YR 3/2	V DK GR BR	SI LO	NCM
2.10	2	21-34	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.11	1	0-15	10YR 3/2	V DK GR BR	SI LO	NCM
2.11	2	15-32	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.12	1	0-15	10YR 3/2	V DK GR BR	SI LO	NCM
2.12	2	15-28	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.13	1	0-32	10YR 4/2	DK GR BR	SI LO	bottle glass (discarded)
2.13	2	32-42	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.14	1	0-30	10YR 4/2	DK GR BR	SI LO	bottle glass (1 clear, 1 amber)
2.14	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.15	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	23-34	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.16	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	19-29	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	27-38	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	23-35	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.19	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.19	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
2.20	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	26-37	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
Additional Testing at Linear 3						
55S/30W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
55S/30W	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/30W	1	0-28	10YR 5/4	YL BR	SI LO	NCM
60S/30W	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
0N/25W	1	0-26	10YR 4/2	DK GR BR	SA SI LO	NCM
0N/25W	2	26-36	10YR 6/3	PALE BR	SA CL LO	NCM
5S/25W	1	0-38	10YR 4/2	DK GR BR	SA SI LO	NCM
5S/25W	2	38-48	10YR 6/3	PALE BR	SA CL LO	NCM
55S/25W	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
55S/25W	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/25W	1	0-27	10YR 4/2	DK GR BR	SI SA LO	NCM
60S/25W	2	27-37	10YR 6/3 10YR 6/8	LT BR GR BR YL	SA LO	NCM
0N/20W	1	0-31	10YR 4/2	DK GR BR	SA SI LO	NCM
0N/20W	2	31-41	10YR 6/3	PALE BR	SA CL LO	NCM
5S/20W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5S/20W	2	27-37	10YR 6/3 10YR 6/8	LT BR GR BR YL	SI CL	NCM
15S/20W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
15S/20W	2	27-37	10YR 5/6	YL BR	SA LO	NCM
25S/20W	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
25S/20W	2	30-40	10YR 5/6	YL BR	SA LO	NCM
35S/20W	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
35S/20W	2	24-34	10YR 5/6	YL BR	SA LO	NCM
45S/20W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
45S/20W	2	27-37	10YR 5/6	YL BR	SA LO	NCM
55S/20W	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
55S/20W	2	26-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/20W	1	0-30	10YR 5/4	YL BR	SI LO	NCM
60S/20W	2	30-40	10YR 5/6	YL BR	SA LO	NCM
0N/15W	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
0N/15W	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI CL	NCM
5S/15W	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
5S/15W	2	37-47	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/15W	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
55S/15W	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/15W	1	0-30	10YR 5/4	YL BR	SI LO	NCM
60S/15W	2	30-40	10YR 5/6	YL BR	SA LO	NCM
0N/10W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
0N/10W	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI CL	NCM
5S/10W	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5S/10W	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
15S/10W	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
15S/10W	2	26-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
25S/10W	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
25S/10W	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
35S/10W	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
35S/10W	2	27-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
45S/10W	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
45S/10W	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/10W	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
55S/10W	2	26-37	10YR 5/6	YL BR	SA LO	NCM
60S/10W	1	0-29	10YR 4/2	DK GR BR	SA LO	NCM
60S/10W	2	29-39	10YR 5/6	YL BR	SA LO	NCM
0N/5W	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
0N/5W	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SI CL	NCM
5S/5W	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5S/5W	2	29-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/5W	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
55S/5W	2	33-43	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/5W	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
60S/5W	2	28-38	10YR 5/6	YL BR	SA CL LO	NCM
0N/0E	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
0N/0E	2	25-35	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
5S/0N	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
5S/0N	2	32-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
10S/0N	1	0-32	10YR 4/2	DK GR BR	SA SI LO	NCM
10S/0N	2	32-42	10YR 6/3	PALE BR	SA CL LO	NCM
15S/0N	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
15S/0N	2	32-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
20S/0E	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
20S/0E	2	28-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
25S/0E	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
25S/0E	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
30S/0E	1	0-28	10YR 4/2	DK GR BR	SA SI LO	NCM
30S/0E	2	28-38	10YR 6/2 10YR 6/8	LT BR GR BR YL	SA CL LO	NCM
35S/0E	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
35S/0E	2	25-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
40S/0E	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
40S/0E	2	33-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
45S/0E	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
45S/0E	2	36-46	10YR 6/2 10YR 6/8	LT BR GR BR YL	SA CL LO	NCM
50S/0E	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
50S/0E	2	21-34	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/0E	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
55S/0E	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/0E	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
60S/0E	2	22-32	10YR 5/6	YL BR	SA LO	NCM
5N/5E	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
5N/5E	2	31-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
0N/5E	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
0N/5E	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
5S/5E	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
5S/5E	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/5E	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
55S/5E	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/5E	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
60S/5E	2	37-47	10YR 5/6	YL BR	SA CL LO	NCM
10N/10E	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
10N/10E	2	32-42	10YR 5/6	YL BR	SA CL LO	NCM
5N/10E	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5N/10E	2	29-42	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
0N/10E	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
0N/10E	2	28-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
5S/10E	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5S/10E	2	29-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
15S/10E	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
15S/10E	2	35-45	10YR 6/3	PALE BR	SA CL LO	NCM
25S/10E	1	0-31	10YR 4/2	DK GR BR	SA SI LO	NCM
25S/10E	2	31-41	10YR 6/2 10YR 6/8	LT BR GR BR YL	SA CL LO	NCM
35S/10E	1	0-36	10YR 4/2	DK GR BR	SA SI LO	NCM
35S/10E	2	36-46	10YR 6/2 10YR 6/8	LT BR GR BR YL	SA CL LO	NCM
45S/10E	1	0-33	10YR 4/2	DK GR BR	SA SI LO	NCM
45S/10E	2	33-43	10YR 6/2 10YR 6/8	LT BR GR BR YL	SA CL LO	NCM
55S/10E	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
55S/10E	2	30-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/10E	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
60S/10E	2	32-42	10YR 5/6	YL BR	SA CL LO	NCM
25N/15E	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
25N/15E	2	27-37	10YR 5/6	YL BR	SI CL LO	NCM
20N/15E	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
20N/15E	2	29-40	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
15N/15E	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
15N/15E	2	18-31	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
10N/15E	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
10N/15E	2	22-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
5N/15E	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
5N/15E	2	27-38	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
0N/15E	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
0N/15E	2	34-46	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
5S/15E	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
5S/15E	2	29-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
55S/15E	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
55S/15E	2	27-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/15E	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
60S/15E	2	30-40	10YR 5/6	YL BR	SA CL LO	NCM
25N/20E	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
25N/20E	2	29-39	10YR 5/6	YL BR	SI CL LO	NCM
20N/20E	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
20N/20E	2	26-37	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
15N/20E	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
15N/20E	2	20-30	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
55S/20E	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
55S/20E	2	30-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA LO	NCM
60S/20E	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
60S/20E	2	34-44	10YR 5/6	YL BR	SA CL LO	NCM
Linear 4						
1.1	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	21-32	10YR 5/4	YL BR	SA LO	NCM
1.2	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	20-33	10YR 5/4	YL BR	SA LO	NCM
1.3	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	20-34	10YR 5/4	YL BR	SA LO	NCM
1.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	31-42	10YR 5/4	YL BR	SA LO	NCM
1.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	31-41	10YR 5/4	YL BR	SA LO	NCM
1.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	27-37	10YR 5/4	YL BR	SA LO	NCM
1.7	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.7	2	21-31	10YR 5/6	YL BR	SA LO	NCM; gravel
1.8	1	0-18	10YR 4/2	DK GR BR	SI LO	glass; whiteware
1.8	2	18-28	10YR 5/6	YL BR	SA LO	NCM
1.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	23-35	10YR 5/6	YL BR	SA LO	NCM
1.10	1	0-27	10YR 4/2	DK GR BR	SI LO	knife blade; metal pieces; nail
1.10	2	27-37	10YR 4/6	DK YL BR	SA LO	NCM
1.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 30cm
1.12	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	10-20	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.15	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	13-25	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	30-40	10YR 4/6	DK YL BR	SA LO	NCM
1.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	25-37	10YR 4/6	DK YL BR	SA LO	NCM
1.18	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	17-28	10YR 4/6	DK YL BR	SA LO	NCM
1.19	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	25-37	10YR 4/6	DK YL BR	SA LO	NCM
1.20	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	27-40	10YR 4/6	DK YL BR	SA LO	NCM
2.1	1	0-50	10YR 4/2	DK GR BR	SA LO	NCM; seepage up to 30cm
2.2	1	0-35	10YR 4/2	DK GR BR	SA LO	NCM; seepage up to 23cm
2.3	1	0-41	10YR 4/2	DK GR BR	SA LO	NCM; water filled to 30cm
2.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	29-40	10YR 5/4	YL BR	SA LO	NCM; gravel
2.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	27-37	10YR 5/4	YL BR	SA LO	NCM
2.6	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	36-46	10YR 5/4	YL BR	SA LO	NCM
2.7	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	37-48	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.8	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	38-40	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.9	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	37-47	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.10	1	0-36	10YR 4/3	BR	SI LO	NCM
2.10	2	36-48	10YR 4/6	DK YL BR	SA LO	NCM
2.11	1	0-18	10YR 4/3	BR	SI LO	NCM
2.11	2	18-33	10YR 4/6	DK YL BR	SA LO	NCM
2.12	1	0-18	10YR 4/3	BR	SI LO	NCM
2.12	2	18-28	10YR 4/6	DK YL BR	SA LO	NCM
2.13	1	0-12	10YR 4/3	BR	SI LO	NCM
2.13	2	12-27	10YR 4/6	DK YL BR	SA LO	NCM
2.14	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	20-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.15	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.16	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	17-32	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.17	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	23-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.18	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM; gravel; rock impasse at 13cm
2.19	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	13-30	10YR 4/6	DK YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.20	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 24cm
Linear 6						
1.1	1	0-26	10YR 4/2	DK GR BR	SI	NCM
1.1	2	26-36	10YR 5/6	YL BR	SI LO	NCM
1.2	1	0-25	10YR 4/2	DK GR BR	SI	NCM
1.2	2	25-35	10YR 5/6	YL BR	SI LO	NCM
1.3	1	0-26	10YR 4/2	DK GR BR	SI	NCM
1.3	2	26-36	10YR 5/6	YL BR	SI LO	NCM
1.4	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.4	2	28-40	10YR 5/6	YL BR	SI LO	NCM
1.5	1	0-31	10YR 4/2	DK GR BR	SI	NCM
1.5	2	31-44	10YR 5/6	YL BR	SI LO	NCM
1.6	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.6	2	29-40	10YR 5/6	YL BR	SI LO	NCM
1.7	1	0-34	10YR 4/2	DK GR BR	SI	NCM
1.7	2	34-44	10YR 5/6	YL BR	SI LO	NCM
1.8	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.8	2	28-40	10YR 5/6	YL BR	SI LO	NCM
1.9	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.9	2	28-40	10YR 5/6	YL BR	SI LO	NCM
1.10	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.10	2	29-39	10YR 5/6	YL BR	SI LO	NCM
1.11	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.11	2	28-38	10YR 5/6	YL BR	SI LO	NCM
1.12	1	0-30	10YR 4/2	DK GR BR	SI	NCM
1.12	2	30-42	10YR 5/6	YL BR	SI LO	NCM
1.13	1	0-27	10YR 4/2	DK GR BR	SI	NCM
1.13	2	27-37	10YR 5/6	YL BR	SI LO	NCM
1.14	1	0-25	10YR 4/2	DK GR BR	SI	NCM
1.14	2	25-35	10YR 5/6	YL BR	SI LO	NCM
1.15	1	0-23	10YR 4/2	DK GR BR	SI	NCM
1.15	2	23-33	10YR 5/6	YL BR	SI LO	NCM
1.16	1	0-26	10YR 4/2	DK GR BR	SI	NCM
1.16	2	26-39	10YR 5/6	YL BR	SI LO	NCM
1.17	1	0-31	10YR 4/2	DK GR BR	SI	NCM
1.17	2	31-41	10YR 5/6	YL BR	SI LO	NCM
1.18	1	0-27	10YR 4/2	DK GR BR	SI	NCM
1.18	2	27-37	10YR 5/6	YL BR	SI LO	NCM
1.19	1	0-25	10YR 4/2	DK GR BR	SI	NCM
1.19	2	25-35	10YR 5/6	YL BR	SI LO	NCM
1.20	1	0-34	10YR 4/2	DK GR BR	SI	NCM
1.20	2	34-44	10YR 5/6	YL BR	SI LO	NCM
2.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	27-41	10YR 5/4	YL BR	CL LO	NCM
2.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; water at 28cm
2.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	27-37	10YR 5/4	YL BR	CL LO	NCM
2.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	32-42	10YR 5/4	YL BR	CL LO	NCM
2.5	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	27-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	35-47	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.7	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	27-37	10YR 5/4	YL BR	CL SI	NCM
2.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	30-40	10YR 5/4	YL BR	CL SI	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	29-39	10YR 5/4	YL BR	CL SI	NCM
2.11	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	22-32	10YR 5/4	YL BR	CL SI	NCM
2.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	32-46	10YR 5/4	YL BR	CL SI	NCM
2.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	29-40	10YR 5/4	YL BR	CL SI	NCM
2.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	26-38	10YR 5/4	YL BR	CL SI	NCM
2.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	27-37	10YR 5/4	YL BR	CL SI	NCM
2.16	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	24-35	10YR 5/4	YL BR	CL LO	NCM
2.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	32-42	10YR 5/4	YL BR	CL LO	NCM
2.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	32-45	10YR 5/4	YL BR	CL LO	NCM
2.19	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	28-46	10YR 5/4	YL BR	CL LO	NCM
2.20	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	25-36	10YR 5/4	YL BR	CL LO	NCM
Linear 7						
1.1	1	0-18	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	18-35	10YR 5/4	YL BR	SI LO	NCM
1.2	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	20-30	10YR 5/4	YL BR	SI LO	NCM
1.3	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM
1.3	2	23-33	10YR 5/4	YL BR	SI LO	NCM
1.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	28-38	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-38	10YR 4/6	DK YL BR	SI LO	NCM; seepage at 30cm
1.5	2	38-42	10YR 5/4	YL BR	SI LO	NCM; rock impasse at 42cm
1.6	1	0-39	10YR 4/6	DK YL BR	SI LO	NCM
1.6	2	39-49	10YR 5/4	YL BR	SI LO	NCM
1.7	1	0-40	10YR 3/2	V DK GR BR	SI LO	NCM
1.7	2	40-50	10YR 5/4	YL BR	SI LO	NCM
1.8	1	0-36	10YR 3/2	V DK GR BR	SI LO	NCM
1.8	2	36-46	10YR 5/4	YL BR	SI LO	NCM
1.9	1	0-41	10YR 3/2	V DK GR BR	SI LO	NCM
1.9	2	41-51	10YR 5/4	YL BR	SI LO	NCM
1.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.11	2	27-40	10YR 5/4	YL BR	SI LO	NCM; gravel
1.12	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	31-41	10YR 5/6	YL BR	SI LO	NCM
1.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	31-45	10YR 5/6	YL BR	SI LO	NCM
1.14	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	31-41	10YR 5/6	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	30-40	10YR 5/6	YL BR	SI LO	NCM
1.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	29-39	10YR 5/6	YL BR	SI LO	NCM
1.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	30-41	10YR 5/4	YL BR	SI LO	NCM
1.18	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	33-43	10YR 5/4	YL BR	SI LO	NCM
1.19	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	34-44	10YR 5/6	YL BR	SI LO	NCM
1.20	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	38-48	10YR 5/6	YL BR	SI LO	NCM
2.1	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
2.1	2	26-36	10YR 5/4	YL BR	SA SI	NCM
2.2	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
2.2	2	25-40	10YR 5/4	YL BR	SA SI	NCM
2.3	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
2.3	2	24-36	10YR 5/4	YL BR	SA SI	NCM
2.4	1	0-28	10YR 3/2	V DK GR BR	LO	NCM
2.4	2	28-39	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
2.5	1	0-31	10YR 3/2	V DK GR BR	LO	NCM
2.5	2	31-41	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM
2.6	1	0-29	10YR 3/2	V DK GR BR	LO	NCM
2.6	2	29-39	10YR 4/6	DK YL BR	SI	NCM
2.7	1	0-38	10YR 3/2	V DK GR BR	LO	NCM
2.7	2	38-50	10YR 4/6	DK YL BR	SA SI	NCM
2.8	1	0-39	10YR 3/2	V DK GR BR	LO	NCM
2.8	2	39-49	10YR 4/6	DK YL BR	SA SI	NCM
2.9	1	0-37	10YR 3/2	V DK GR BR	LO	NCM; seepage
2.9	2	37-48	10YR 4/6	DK YL BR	SA SI	NCM; seepage
2.10	1	0-33	10YR 3/2	V DK GR BR	LO	clear glass
2.10	2	33-37	10YR 4/6	DK YL BR	SI LO	NCM; water impasse at 37cm
2.11	1	0-30	10YR 3/2	V DK GR BR	LO	NCM; seepage
2.11	2	30-43	10YR 4/6	DK YL BR	SI LO	NCM; seepage
2.12	1	0-22	10YR 3/2	V DK GR BR	LO	NCM
2.12	2	22-33	10YR 4/6	DK YL BR	SI LO	NCM
2.13	1	0-33	10YR 3/2	V DK GR BR	LO	NCM
2.13	2	33-44	10YR 4/6	DK YL BR	SI LO	NCM
2.14	1	0-26	10YR 3/2	V DK GR BR	LO	NCM
2.14	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
2.15	1	0-36	10YR 3/2	V DK GR BR	LO	NCM
2.15	2	36-48	10YR 4/6	DK YL BR	SI LO	NCM
2.16	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
2.16	2	32-45	10YR 6/2 10YR 5/6	LT BR GR YL BR	SA SI	NCM; organic inclusion layer at 37cm
2.17	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.17	2	29-45	10YR 4/6	DK YL BR	SA SI	NCM
2.18	1	0-35	10YR 3/6	DK YL BR	LO	NCM
2.18	2	35-45	10YR 5/4	YL BR	SA SI	NCM
2.19	1	0-29	10YR 3/2	V DK GR BR	SA LO	NCM
2.19	2	29-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
2.20	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	36-47	10YR 4/6	DK YL BR	SA SI	NCM
Linear 8						

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.1	1	0-37	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	37-49	10YR 5/4	YL BR	SI LO	NCM
1.2	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	31-46	10YR 5/4	YL BR	SI LO	NCM
1.3	1	0-46	10YR 3/2	V DK GR BR	SI LO	NCM
1.3	2	46-56	10YR 5/4	YL BR	SI LO	NCM
1.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	32-45	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	24-34	10YR 5/4	YL BR	SI LO	NCM
1.6	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	15-25	10YR 5/4	YL BR	SI LO	NCM
1.7	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	19-32	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
1.8	1	0-22	10YR 4/2	DK GR BR	SI CL	NCM
1.8	2	22-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI CL	NCM
1.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.10	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	42-52	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.11	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	40-51	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.13	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	31-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.14	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	22-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	26-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.16	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	25-35	10YR 5/1	GR	SI CL	NCM
1.18	3	35-47	10YR 6/3	PALE BR	SI CL	NCM
1.19	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
1.19	2	28-40	10YR 6/3	PALE BR	SI CL	NCM
1.20	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
1.20	2	27-37	10YR 6/3	PALE BR	SI CL	NCM
2.1	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
2.1	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.2	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
2.2	2	33-44	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-22	10YR 3/2	V DK GR BR	SI LO	NCM; rock impasse at 22cm

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.4	1	0-37	10YR 3/2	V DK GR BR	SI LO	NCM
2.4	2	37-47	10YR 5/4	YL BR	SI LO	NCM
2.5	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
2.5	2	25-37	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM
2.6	2	24-35	10YR 5/4	YL BR	SI LO	NCM
2.7	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	24-34	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
2.8	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	27-38	10YR 5/4 10YR 5/6	YL BR YL BR	SI CL	NCM
2.9	1	0-30	10YR 4/2	DK GR BR	SI CL	NCM
2.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.12	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	23-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.14	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	20-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
2.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	31-41	10YR 6/3	PALE BR	SI CL	NCM
2.19	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.19	2	29-39	10YR 6/3	PALE BR	SI CL	NCM
2.20	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
2.20	2	30-40	10YR 6/3	PALE BR	SI CL	NCM
Linear 9						
1.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	34-48	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	22-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.3	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	21-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.4	2	28-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.5	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	37-48	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.8	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	31-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.9	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.10	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	34-47	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.11	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	16-26	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.12	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	40-50	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM; seepage at 42cm
1.13	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	25-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.14	1	0-42	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	42-58	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
1.16	1	0-32	10YR 4/2	DK GR BR	SI	NCM
1.16	2	32-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
1.17	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.17	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
1.18	1	0-24	10YR 4/2	DK GR BR	SI	glazed whiteware (discarded)
1.18	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
1.19	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	27-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
1.20	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	18-32	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
2.1	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	37-47	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.2	1	0-40	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	40-51	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.3	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.3	2	34-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	31-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.5	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	25-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.8	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	29-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.9	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	36-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.10	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.11	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	36-46	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.12	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	34-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	21-31	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.15	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	20-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	CL SI	NCM
2.16	1	0-23	10YR 4/2	DK GR BR	SI	NCM
2.16	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
2.17	1	0-23	10YR 4/2	DK GR BR	SI	NCM
2.17	2	23-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
2.18	1	0-24	10YR 4/2	DK GR BR	SI	NCM
2.18	2	24-34	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
2.19	1	0-25	10YR 4/2	DK GR BR	SI	NCM
2.19	2	25-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
2.20	1	0-21	10YR 4/2	DK GR BR	SI	NCM
2.20	2	21-31	10YR 6/2 10YR 5/4	LT BR GR YL BR	LO	NCM
Linear 10						
1.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	30-41	10YR 5/4	YL BR	CL LO	NCM
1.2	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.2	2	29-40	10YR 5/4	YL BR	CL LO	NCM
1.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	28-48	10YR 5/4	YL BR	CL LO	NCM
1.4	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	30-40	10YR 5/4	YL BR	CL LO	NCM
1.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	32-43	10YR 5/4	YL BR	CL LO	NCM
1.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	35-45	10YR 5/4	YL BR	CL LO	NCM
1.7	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	34-46	10YR 5/6	YL BR	CL LO	NCM
1.8	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	35-46	10YR 5/6	YL BR	CL LO	NCM
1.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	31-41	10YR 5/6	YL BR	CL LO	NCM
1.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	33-45	10YR 5/4	YL BR	CL LO	NCM
1.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	27-37	10YR 5/4	YL BR	CL LO	NCM
1.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	28-39	10YR 5/4	YL BR	CL LO	NCM
1.13	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	21-33	10YR 5/4	YL BR	CL LO	NCM
1.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	32-44	10YR 5/4	YL BR	CL LO	NCM
1.15	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; water impasse at 20cm
1.16	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; water impasse at 15cm
1.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	28-39	10YR 5/6	YL BR	CL LO	NCM
1.18	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	27-37	10YR 5/6	YL BR	CL LO	NCM
1.19	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	27-38	10YR 5/4	YL BR	CL LO	NCM
1.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	31-43	10YR 5/4	YL BR	CL LO	NCM
2.1	1	0-10	10YR 4/2	DK GR BR	SI	NCM; water impasse at 10cm
2.2	1	0-31	10YR 4/2	DK GR BR	SI	NCM
2.2	2	31-41	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-27	10YR 4/2	DK GR BR	SI	NCM
2.3	2	27-37	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-30	10YR 4/2	DK GR BR	SI	NCM
2.4	2	30-40	10YR 5/4	YL BR	SI LO	NCM
2.5	1	0-32	10YR 4/2	DK GR BR	SI	NCM
2.5	2	32-42	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-32	10YR 4/2	DK GR BR	SI	NCM
2.6	2	32-42	10YR 5/4	YL BR	SI LO	NCM
2.7	1	0-30	10YR 4/2	DK GR BR	SI	NCM
2.7	2	30-40	10YR 5/4	YL BR	SI LO	NCM
2.8	1	0-31	10YR 4/2	DK GR BR	SI	NCM
2.8	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.9	1	0-28	10YR 4/2	DK GR BR	SI	NCM
2.9	2	28-40	10YR 5/4	YL BR	SI LO	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI	NCM
2.10	2	29-40	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-27	10YR 4/2	DK GR BR	SI	NCM
2.11	2	27-41	10YR 5/4	YL BR	SI LO	NCM
2.12	1	0-29	10YR 4/2	DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.12	2	29-40	10YR 5/4	YL BR	SI LO	NCM
2.13	1	0-25	10YR 4/2	DK GR BR	SI	NCM
2.13	2	25-37	10YR 5/4	YL BR	SI LO	NCM
2.14	1	0-26	10YR 4/2	DK GR BR	SI	NCM
2.14	2	26-39	10YR 5/4	YL BR	SI LO	NCM
2.15	1	0-15	10YR 4/2	DK GR BR	SI	NCM; water impasse at 15cm
2.16	1	0-10	10YR 4/2	DK GR BR	SI	NCM; water impasse at 10cm
2.17	1	0-23	10YR 4/2	DK GR BR	SI	NCM
2.17	2	23-33	10YR 5/4	YL BR	SI LO	NCM
2.18	1	0-30	10YR 4/2	DK GR BR	SI	NCM
2.18	2	30-44	10YR 5/4	YL BR	SI LO	NCM
2.19	1	0-31	10YR 4/2	DK GR BR	SI	NCM
2.19	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.20	1	0-26	10YR 4/2	DK GR BR	SI	NCM
2.20	2	26-39	10YR 5/4	YL BR	SI LO	NCM
Linear 11						
1.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	25-35	10YR 5/4	YL BR	SI LO	NCM
1.2	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	22-33	10YR 5/4	YL BR	SI LO	NCM
1.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	29-39	10YR 5/4	YL BR	SI LO	NCM
1.4	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	38-48	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	28-38	10YR 5/4	YL BR	SI LO	NCM
1.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	30-43	10YR 5/4	YL BR	SI LO	NCM
1.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	23-33	10YR 5/4	YL BR	SI LO	NCM
1.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	26-36	10YR 5/4	YL BR	CL SI	NCM
1.10	1	0-39	10YR 4/2	DK GR BR	SI LO	glass (discarded)
1.10	2	39-49	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.11	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	34-44	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.12	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 17cm
1.13	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	38-48	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	29-39	10YR 5/4 10YR 6/1	YL BR GR	SI LO	NCM
1.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	26-36	10YR 5/4 10YR 6/1	YL BR GR	SI LO	NCM
1.16	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	39-53	10YR 4/6 10YR 6/1	DK YL BR GR	SI LO	NCM
1.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	29-39	10YR 4/6 10YR 6/1	DK YL BR GR	SI LO	NCM
1.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.18	2	31-41	10YR 4/6 10YR 6/1	DK YL BR GR	SI LO	NCM
1.19	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	29-39	10YR 5/4 10YR 6/1	YL BR GR	SI LO	NCM
1.20	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	34-44	10YR 5/4 10YR 6/1	YL BR GR	SI LO	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	29-41	10YR 5/6	YL BR	SA SI	NCM
2.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	30-42	10YR 5/6	YL BR	SA SI	NCM
2.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	26-36	10YR 5/6	YL BR	SA SI	NCM
2.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	26-36	10YR 5/6	YL BR	SA SI	NCM
2.5	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	35-46	10YR 5/6	YL BR	SA SI	NCM
2.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	27-40	10YR 5/6	YL BR	SA LO	NCM
2.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	28-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	30-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.9	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	28-38	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	24-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.13	1	0-52	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	52-63	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	29-40	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.15	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	35-46	10YR 4/2	DK GR BR	SI LO	NCM
2.16	1	0-28	10YR 4/2	DK GR BR	SI LO	flat glass
2.16	2	28-40	10YR 5/6	YL BR	SA LO	NCM
2.17	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	27-40	10YR 5/6	YL BR	SA LO	NCM
2.18	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	39-46	10YR 5/6	YL BR	SA LO	NCM
2.19	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	22-32	10YR 5/6	YL BR	SA SI	NCM
2.20	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	21-33	10YR 5/6	YL BR	SA SI	NCM
Linear 13						

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.1	1	0-23	10YR 4/3	BR	SI LO	NCM
1.1	2	23-36	10YR 4/6	DK YL BR	SI LO	NCM
1.2	1	0-27	10YR 4/3	BR	SI LO	NCM
1.2	2	27-41	10YR 4/6	DK YL BR	SI LO	NCM
1.3	1	0-35	10YR 4/3	BR	SI LO	NCM
1.3	2	35-46	10YR 4/6	DK YL BR	SI LO	NCM
1.4	1	0-31	10YR 4/3	BR	SI LO	NCM
1.4	2	31-43	10YR 4/6	DK YL BR	SI LO	NCM
1.5	1	0-8		HUMUS		NCM
1.5	2	8-13	10YR 4/3	BR	SI LO	NCM
1.5	3	13-39	10YR 4/6	DK YL BR	SI LO	NCM
1.6	1	0-18	10YR 4/3	BR	SI LO	NCM
1.6	2	18-39	10YR 4/6	DK YL BR	SI LO	NCM
1.7	1	0-24	10YR 4/3	BR	SI LO	NCM
1.7	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.8	1	0-36	10YR 4/3	BR	SI LO	NCM
1.8	2	36-46	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.9	1	0-30	10YR 4/3	BR	SI LO	NCM
1.9	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.10	1	0-17	10YR 4/3	BR	LO	NCM
1.10	2	17-36	10YR 4/6	DK YL BR	SA SI	NCM
1.11	1	0-27	10YR 4/3	BR	LO	NCM
1.11	2	27-37	10YR 4/6	DK YL BR	SA SI	NCM
1.12	1	0-34	10YR 4/3	BR	LO	NCM
1.12	2	34-44	10YR 4/6	DK YL BR	SA SI	NCM
1.13	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
1.13	2	26-37	10YR 4/6	DK YL BR	LO	NCM
1.14	1	0-18	10YR 3/2	V DK GR BR	SI LO	NCM
1.14	2	18-30	10YR 4/6	DK YL BR	LO	NCM
1.15	1	0-28	10YR 3/2	V DK GR BR	SI LO	clear glass; brick (discarded)
1.15	2	28-42	10YR 4/6	DK YL BR	LO	NCM
1.16	1	0-23	10YR 3/2	V DK GR BR	SI LO	whiteware; clear glass
1.16	2	23-37	10YR 4/6	DK YL BR	SA SI	NCM
1.17	1	0-23	10YR 3/2	V DK GR BR	SI LO	NCM
1.17	2	23-33	10YR 4/6	DK YL BR	SA SI	NCM
1.18	1	0-30	10YR 3/1	V DK GR	SI	brick (discarded)
1.18	2	30-43	10YR 4/6	DK YL BR	SI LO	NCM
1.19	1	0-30	10YR 3/1	V DK GR	SI	NCM
1.19	2	30-40	10YR 4/6	DK YL BR	SI LO	NCM
2.1	1	0-31	10YR 4/3	BR	SI LO	NCM
2.1	2	31-41	10YR 5/4	YL BR	SI LO	NCM
2.2	1	0-29	10YR 4/3	BR	SI LO	NCM
2.2	2	29-39	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-27	10YR 4/3	BR	SI LO	NCM
2.3	2	27-37	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	27-37	10YR 5/2	GR BR	SI LO	NCM
2.5	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	21-31	10YR 5/2	GR BR	SI LO	NCM
2.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	22-32	10YR 5/2	GR BR	SI LO	NCM
2.7	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	21-31	10YR 5/4	YL BR	SI LO	NCM
2.8	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.8	2	43-53	10YR 5/4	YL BR	SI LO	NCM
2.9	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	23-33	10YR 5/4	YL BR	SI LO	NCM
2.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	33-43	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	18-28	10YR 5/4	YL BR	SI LO	NCM
2.12	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	19-38	10YR 5/4	YL BR	SI LO	NCM
2.13	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	18-29	10YR 5/4	YL BR	SI LO	NCM
2.14	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	34-44	10YR 5/4	YL BR	SI LO	NCM
2.15	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 17cm
2.16	1	0-55	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	55-65	10YR 5/4	YL BR	SI LO	NCM
2.17	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	20-30	10YR 5/6	YL BR	SI LO	NCM
2.18	1	0-28	10YR 4/2	DK GR BR	SI LO	ceramic fragment
2.18	2	28-38	10YR 5/6	YL BR	SI LO	NCM
2.19	1	0-28	10YR 4/2	DK GR BR	SI LO	glass; ceramic fragments
2.19	2	28-39	10YR 5/6	YL BR	SI LO	NCM
2.20	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	29-39	10YR 5/6	YL BR	SI LO	NCM
2.21	1	0-27	10YR 4/2	DK GR BR	SI LO	ceramic doorknob; glass
2.21	2	27-37	10YR 5/6	YL BR	SI LO	NCM
Linear 14						
1.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	27-37	10YR 4/6	DK YL BR	SI LO	NCM
1.2	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	27-40	10YR 4/6	DK YL BR	SI LO	NCM
1.3	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	27-40	10YR 4/6	DK YL BR	SI LO	NCM
1.4	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	32-42	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.6	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	35-45	10YR 5/4	YL BR	SI LO	NCM
1.7	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	33-43	10YR 5/4	YL BR	SI LO	NCM
1.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	24-36	10YR 5/4	YL BR	SI LO	NCM
1.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	31-44	10YR 6/1 10YR 5/4	GR YL BR	SA LO	NCM
1.10	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.10	2	33-45	10YR 5/4	YL BR	SI LO	NCM; gravel
1.11	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	35-45	10YR 5/4	YL BR	SI LO	NCM
1.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	30-40	10YR 5/4	YL BR	SA SI	NCM
1.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	28-40	10YR 5/4	YL BR	SA SI	NCM
1.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.15	2	25-35	10YR 5/4	YL BR	SA SI	NCM
1.16	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	20-30	10YR 5/4	YL BR	SA SI	NCM
1.17	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	20-30	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	25-35	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
1.19	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	27-37	10YR 5/4 10YR 6/3	YL BR PALE BR	SA LO	NCM
1.20	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	39-50	10YR 5/4 10YR 6/3	YL BR PALE BR	SA LO	NCM
2.1	1	0-26	10YR 4/2	DK GR BR	SI	NCM
2.1	2	26-36	10YR 5/6	YL BR	SI LO	NCM
2.2	1	0-27	10YR 4/2	DK GR BR	SI	NCM
2.2	2	27-37	10YR 5/6	YL BR	SI LO	NCM
2.3	1	0-25	10YR 4/2	DK GR BR	SI	NCM
2.3	2	25-36	10YR 5/6	YL BR	SI LO	NCM
2.4	1	0-24	10YR 4/2	DK GR BR	SI	NCM
2.4	2	24-36	10YR 5/6	YL BR	SI LO	NCM
2.5	1	0-29	10YR 4/2	DK GR BR	SI	NCM
2.5	2	29-40	10YR 5/6	YL BR	SI LO	NCM
2.6	1	0-35	10YR 4/2	DK GR BR	SI	NCM
2.6	2	35-46	10YR 5/6	YL BR	SI LO	NCM
2.7	1	0-32	10YR 4/2	DK GR BR	SI	glass
2.7	2	32-43	10YR 5/4	YL BR	SI LO	NCM
2.8	1	0-35	10YR 4/2	DK GR BR	SI	NCM
2.8	2	35-46	10YR 5/4	YL BR	SI LO	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI	NCM
2.9	2	27-39	10YR 5/4	YL BR	SI LO	NCM
2.10	1	0-32	10YR 4/2	DK GR BR	SI	NCM
2.10	2	32-44	10YR 4/6	DK YL BR	SI LO	NCM
2.11	1	0-26	10YR 4/2	DK GR BR	SI	NCM
2.11	2	26-38	10YR 4/6	DK YL BR	SI LO	NCM
2.12	1	0-29	10YR 4/2	DK GR BR	SI	NCM
2.12	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.13	1	0-31	10YR 4/3	BR	SI	NCM
2.13	2	31-41	10YR 5/6	YL BR	SA SI	NCM
2.14	1	0-28	10YR 4/3	BR	SI	NCM
2.14	2	28-38	10YR 5/6	YL BR	SA SI	NCM
2.15	1	0-27	10YR 4/3	BR	SI	NCM
2.15	2	27-39	10YR 5/6	YL BR	SA SI	NCM
2.16	1	0-18	10YR 4/2	DK GR BR	SI	NCM
2.16	2	18-30	10YR 4/6	DK YL BR	SI LO	NCM
2.17	1	0-31	10YR 4/2	DK GR BR	SI	NCM
2.17	2	31-43	10YR 4/6	DK YL BR	SI LO	NCM
2.18	1	0-29	10YR 4/2	DK GR BR	SI	NCM
2.18	2	29-39	10YR 4/6	DK YL BR	SI LO	NCM
2.19	1	0-26	10YR 4/2	DK GR BR	SI	NCM
2.19	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.20	1	0-25	10YR 4/2	DK GR BR	SI	NCM
2.20	2	25-33	10YR 6/1	GR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.20	3	33-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	LO	NCM
Linear 15						
1.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; data for these 3 STPs was extrapolated from adjacent shovel tests and field notes due to missing forms.
1.1	2	24-34	10YR 5/4	YL BR	SI LO	
1.2	1	0-39	10YR 4/2	DK GR BR	SI LO	
1.2	2	39-49	10YR 5/4	YL BR	SI LO	
1.3	1	0-26	10YR 4/2	DK GR BR	SI LO	
1.3	2	26-36	10YR 5/4	YL BR	SI LO	
1.4	1	0-30	10YR 4/2	DK GR BR	SI	NCM
1.4	2	30-42	10YR 4/6	DK YL BR	SA LO	NCM
1.5	1	0-27	10YR 4/2	DK GR BR	SI	NCM
1.5	2	27-40	10YR 4/6	DK YL BR	SA LO	NCM
1.6	1	0-24	10YR 4/2	DK GR BR	SI	NCM
1.6	2	24-34	10YR 4/6	DK YL BR	SA LO	NCM
1.7	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	29-41	10YR 5/4	YL BR	SA SI	NCM
1.8	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	25-36	10YR 5/4	YL BR	SA SI	NCM
1.9	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	37-48	10YR 5/4	YL BR	SA SI	NCM
1.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	30-42	10YR 4/6	DK YL BR	SA SI	NCM
1.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	31-44	10YR 4/6	DK YL BR	SA SI	NCM
1.12	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	27-41	10YR 4/6	DK YL BR	SA SI	NCM
1.13	1	0-33	10YR 4/2	DK GR BR	SI	clear glass (discarded)
1.13	2	33-44	10YR 5/6	YL BR	SI LO	NCM
1.14	1	0-25	10YR 4/2	DK GR BR	SI	NCM
1.14	2	25-37	10YR 5/6	YL BR	SI LO	NCM
1.15	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.15	2	28-40	10YR 5/6	YL BR	SI LO	NCM
1.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	32-43	10YR 5/6	YL BR	SA SI	NCM
1.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	34-44	10YR 5/6	YL BR	SA SI	NCM
1.18	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	30-42	10YR 5/6	YL BR	SA SI	NCM
1.19	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	28-39	10YR 4/6	DK YL BR	SA SI	NCM
1.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	31-42	10YR 4/6	DK YL BR	SA SI	NCM
2.1	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	24-34	10YR 5/4	YL BR	SI LO	NCM
2.2	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	39-49	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	26-36	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	29-39	10YR 5/4	YL BR	SI LO	NCM
2.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	30-40	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	28-38	10YR 5/4	YL BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.8	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	22-32	10YR 5/4	YL BR	SI LO	NCM
2.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	26-36	10YR 5/4	YL BR	SI LO	NCM
2.10	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	25-35	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	30-40	10YR 6/1	GR	SI LO	NCM
2.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	26-36	10YR 6/1	GR	SI LO	NCM
2.13	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	29-39	10YR 5/4	YL BR	SI LO	NCM
2.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	33-43	10YR 5/4	YL BR	SI LO	NCM
2.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	26-36	10YR 5/4	YL BR	SI LO	NCM
2.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.17	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	22-32	10YR 5/4	YL BR	SI LO	NCM
2.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	29-40	10YR 5/4	YL BR	SI LO	NCM
2.19	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	25-35	10YR 5/4	YL BR	SI LO	NCM
2.20	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	18-28	10YR 5/4	YL BR	SI LO	NCM
Linear 16						
1.1	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.2	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	34-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.5	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	22-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.6	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	32-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.8	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.9	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.10	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	18-30	10YR 6/6 10YR 4/6	BR YL DK YL BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	31-41	10YR 6/6 10YR 4/6	BR YL DK YL BR	SA LO	NCM
1.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	3+C9282-4	10YR 6/6 10YR 4/6	BR YL DK YL BR	SA LO	NCM
1.13	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	33-43	10YR 4/6 10YR 6/6	DK YL BR BR YL	SA LO	NCM
1.14	1	0-34	10YR 4/2	DK GR BR	SI LO	clear glass (discarded)
1.14	2	34-45	10YR 4/6 10YR 6/6	DK YL BR BR YL	SA LO	NCM
1.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	25-36	10YR 5/4	YL BR	SA LO	NCM
1.16	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.17	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	21-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.18	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	19-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.19	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	19-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.20	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	21-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.1	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	15-25	10YR 5/4	YL BR	SI LO	NCM
2.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	26-38	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-20	10YR 4/2	DK GR BR	SA SI	NCM
2.4	2	20-31	10YR 5/4	YL BR	SA LO	NCM
2.5	1	0-24	10YR 4/2	DK GR BR	SA SI	NCM
2.5	2	24-40	10YR 5/4	YL BR	SA LO	NCM
2.6	1	0-27	10YR 4/2	DK GR BR	SA SI	NCM
2.6	2	27-37	10YR 5/4	YL BR	SA LO	NCM
2.7	1	0-24	10YR 4/2	DK GR BR	SA SI	NCM
2.7	2	24-34	10YR 5/4	YL BR	SA LO	NCM
2.8	1	0-25	10YR 4/2	DK GR BR	SA SI	NCM
2.8	2	25-35	10YR 5/4	YL BR	SA LO	NCM
2.9	1	0-29	10YR 4/2	DK GR BR	SA SI	NCM
2.9	2	29-40	10YR 5/4	YL BR	SA LO	NCM
2.10	1	0-29	10YR 4/2	DK GR BR	SA SI	NCM
2.10	2	29-39	10YR 5/4	YL BR	SA LO	NCM
2.11	1	0-20	10YR 4/2	DK GR BR	SA SI	NCM
2.11	2	20-44	10YR 5/4	YL BR	SA LO	NCM
2.12	1	0-30	10YR 4/2	DK GR BR	SA SI	NCM
2.12	2	30-40	10YR 5/4	YL BR	SA LO	NCM
2.13	1	0-37	10YR 4/2	DK GR BR	SA SI	NCM
2.13	2	37-48	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.14	1	0-27	10YR 4/2	DK GR BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.14	2	27-40	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.15	1	0-37	10YR 4/2	DK GR BR	SA SI	NCM
2.15	2	37-47	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.16	1	0-33	10YR 4/2	DK GR BR	SA SI	NCM
2.16	2	33-43	10YR 5/4	YL BR	SA LO	NCM
2.17	1	0-33	10YR 4/2	DK GR BR	SA SI	NCM
2.17	2	33-43	10YR 5/4	YL BR	SA LO	NCM
2.18	1	0-31	10YR 4/2	DK GR BR	SA SI	NCM
2.18	2	31-48	10YR 5/4	YL BR	SA LO	NCM
2.19	1	0-29	10YR 4/2	DK GR BR	SA SI	NCM
2.19	2	29-40	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
2.20	1	0-42	10YR 4/2	DK GR BR	SA SI	NCM
2.20	2	42-54	10YR 5/4 10YR 6/1	YL BR GR	SA LO	NCM
Linear 17						
1.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; roots
1.1	2	25-35	10YR 5/4	YL BR	CL LO	NCM; roots
1.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	32-42	10YR 5/4	YL BR	CL LO	NCM
1.3	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM; roots
1.3	2	38-48	10YR 5/4	YL BR	CL LO	NCM; roots
1.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	23-36	10YR 5/4	YL BR	CL LO	NCM
1.5	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.5	2	26-36	10YR 5/4	YL BR	CL LO	NCM; gravel
1.6	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	36-46	10YR 5/4	YL BR	CL LO	NCM
1.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	28-38	10YR 5/4	GR BR	CL LO	NCM
1.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	24-41	10YR 5/4	GR BR	CL LO	NCM
1.9	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	25-40	10YR 5/4	GR BR	CL LO	NCM
1.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	27-37	10YR 5/4	YL BR	CL LO	NCM
1.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	28-41	10YR 5/4	YL BR	CL LO	NCM
1.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	26-43	10YR 5/4	YL BR	CL LO	NCM
1.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	27-37	10YR 5/4	YL BR	CL LO	NCM
1.14	1	0-43	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	43-53	10YR 5/4	YL BR	CL LO	NCM
1.15	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	24-34	10YR 5/4	YL BR	CL LO	NCM
1.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	30-40	10YR 5/4	YL BR	CL LO	NCM
1.17	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	26-40	10YR 5/4	YL BR	CL LO	NCM
1.18	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	15-32	10YR 5/4	YL BR	CL LO	NCM
1.19	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	28-38	10YR 5/4	YL BR	CL LO	NCM
1.20	1	0-29	10YR 4/2	DK GR BR	SI LO	decorated whiteware

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.20	2	29-39	10YR 5/4	YL BR	CL LO	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	LO	NCM
2.1	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.2	1	0-32	10YR 4/2	DK GR BR	LO	NCM
2.2	2	32-45	10YR 5/4	YL BR	SA SI	NCM
2.3	1	0-42	10YR 4/2	DK GR BR	LO	NCM; gravel
2.3	2	42-52	10YR 5/4	YL BR	SA SI	NCM; gravel
2.4	1	0-35	10YR 4/2	DK GR BR	LO	NCM; root impasse at 35cm
2.5	1	0-24	10YR 4/2	DK GR BR	LO	NCM
2.5	2	24-36	10YR 5/4	YL BR	SA SI	NCM
2.6	1	0-30	10YR 4/2	DK GR BR	LO	NCM
2.6	2	30-40	10YR 5/4	YL BR	SA SI	NCM
2.7	1	0-37	10YR 4/2	DK GR BR	LO	NCM
2.7	2	37-47	10YR 5/4	YL BR	SA SI	NCM
2.8	1	0-34	10YR 4/2	DK GR BR	LO	NCM
2.8	2	34-45	10YR 5/4	YL BR	SA SI	NCM
2.9	1	0-30	10YR 4/2	DK GR BR	LO	NCM
2.9	2	30-42	10YR 5/4	YL BR	SA SI	NCM
2.10	1	0-28	10YR 4/2	DK GR BR	LO	NCM
2.10	2	28-40	10YR 5/4	YL BR	SA SI	NCM
2.11	1	0-33	10YR 4/2	DK GR BR	LO	NCM
2.11	2	33-45	10YR 5/4	YL BR	SA SI	NCM
2.12	1	0-33	10YR 4/2	DK GR BR	LO	NCM
2.12	2	33-44	10YR 5/4	YL BR	SA SI	NCM
2.13	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 20cm
2.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	33-43	10YR 5/4	YL BR	SA SI	NCM
2.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	31-42	10YR 5/4	YL BR	SA SI	NCM
2.16	1	0-41	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	41-52	10YR 5/4	YL BR	SA SI	NCM
2.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	32-43	10YR 5/4	YL BR	SA SI	NCM
2.18	1	0-29	10YR 4/2	DK GR BR	SI LO	brick fragment (discarded)
2.18	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.19	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	27-40	10YR 5/6	YL BR	CL LO	NCM
2.20	1	0-33	10YR 4/2	DK GR BR	SI LO	glazed redware
2.20	2	33-45	10YR 5/6	YL BR	CL LO	NCM
Linear 18						
1.1	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	26-36	10YR 5/2	GR BR	SI LO	NCM
1.2	1	0-52	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	52-62	10YR 5/2	GR BR	SI LO	NCM
1.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	28-38	10YR 5/2	GR BR	SI LO	NCM
1.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	31-43	10YR 5/4	YL BR	SI LO	NCM
1.5	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.6	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	32-42	10YR 5/4	YL BR	SI LO	NCM
1.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	30-42	10YR 5/4	YL BR	SI LO	NCM
1.9	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.9	2	36-46	10YR 5/4	YL BR	SI LO	NCM
1.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	30-40	10YR 5/4	YL BR	SI LO	NCM
1.11	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	28-43	10YR 5/4	YL BR	SI LO	NCM
1.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	26-37	10YR 5/4	YL BR	SI LO	NCM
1.13	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	34-44	10YR 5/4	YL BR	SI LO	NCM
1.14	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	33-43	10YR 5/4	YL BR	SI LO	NCM
1.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	28-42	10YR 5/4	YL BR	SI LO	NCM
1.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	32-42	10YR 5/4	YL BR	SI LO	NCM
1.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	30-40	10YR 4/6 10YR 5/4	DK YL BR YL BR	SI LO	NCM
1.18	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM
1.19	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	30-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SI LO	NCM
1.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	31-43	10YR 5/4	YL BR	SI LO	NCM
2.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	34-45	10YR 5/4	YL BR	SA SI	NCM
2.2	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	33-43	10YR 5/4	YL BR	SA SI	NCM
2.3	1	0-30	10YR 4/2	DK GR BR	SI LO	ceramic fragment
2.3	2	30-42	10YR 5/4	YL BR	SA SI	NCM
2.4	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	38-52	10YR 5/4	YL BR	SA SI	NCM
2.5	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	36-48	10YR 5/4	YL BR	SA SI	NCM
2.6	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	21-34	10YR 5/4	YL BR	SA SI	NCM
2.7	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	37-48	10YR 5/4	YL BR	SA SI	NCM
2.8	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	32-43	10YR 5/4	YL BR	SA SI	NCM
2.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	31-43	10YR 5/4	YL BR	SA SI	NCM
2.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	27-37	10YR 4/6	DK YL BR	SA SI	NCM
2.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	26-36	10YR 4/6	DK YL BR	SA SI	NCM
2.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	29-39	10YR 4/6	DK YL BR	SA SI	NCM
2.13	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	26-38	10YR 5/4	YL BR	SA SI	NCM
2.14	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	37-47	10YR 5/4	YL BR	SA SI	NCM
2.15	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.16	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	38-49	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.17	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	34-44	10YR 5/4	YL BR	SA SI	NCM
2.18	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	25-37	10YR 5/4	YL BR	SA SI	NCM
2.19	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	30-41	10YR 5/4	YL BR	SA SI	NCM
2.20	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	29-40	10YR 5/4	YL BR	SA SI	NCM
Linear 21						
1.1	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
1.1	2	35-45	10YR 5/4	YL BR	SA SI	NCM
1.2	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
1.2	2	30-41	10YR 5/4	YL BR	SA SI	NCM
1.3	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
1.3	2	26-36	10YR 5/4	YL BR	SA SI	NCM
1.4	1	0-27	10YR 3/2	V DK GR BR	SI LO	NCM
1.4	2	27-39	10YR 5/6	YL BR	SA SI	NCM
1.5	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
1.5	2	30-45	10YR 5/6	YL BR	SA SI	NCM
1.6	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
1.6	2	29-40	10YR 5/6	YL BR	SA SI	NCM
1.7	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
1.7	2	30-41	10YR 5/6	YL BR	SA SI	NCM
1.8	1	0-33	10YR 3/2	V DK GR BR	SI LO	NCM
1.8	2	33-44	10YR 5/6	YL BR	SA SI	NCM
1.9	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
1.9	2	34-45	10YR 5/6	YL BR	SA SI	NCM
1.10	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
1.10	2	31-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.11	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
1.11	2	34-44	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.12	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
1.12	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.13	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
1.13	2	32-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.14	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
1.14	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.15	1	0-30	10YR 4/2	DK GR BR	LO	NCM
1.15	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	32-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.17	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	28-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.18	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	23-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.19	1	0-33	10YR 4/2	DK GR BR	LO	NCM
1.19	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.20	1	0-35	10YR 3/2	V DK GR BR	SI LO	NCM
1.20	2	35-45	10YR 6/1 10YR 5/6	GR YL BR	CL SA SI	NCM
2.1	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.1	2	29-40	10YR 6/1 10YR 6/3	GR PALE BR	SI LO	NCM
2.2	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
2.2	2	32-42	10YR 6/1 10YR 6/3	GR PALE BR	SI LO	NCM
2.3	1	0-25	10YR 3/2	V DK GR BR	SI LO	NCM
2.3	2	25-36	10YR 6/1 10YR 6/3	GR PALE BR	SI LO	NCM
2.4	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM
2.4	2	26-47	10YR 6/2 10YR 5/2	LT BR GR GR BR	SI LO	NCM
2.5	1	0-23	10YR 3/3	DK BR	SI LO	NCM
2.5	2	23-33	10YR 6/2 10YR 5/2	LT BR GR GR BR	SI LO	NCM
2.6	1	0-29	10YR 3/3	DK BR	SI LO	NCM
2.6	2	29-40	10YR 6/2 10YR 5/2	LT BR GR GR BR	SI LO	NCM
2.7	1	0-30	10YR 3/2	V DK GR BR	SI LO	NCM
2.7	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.8	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
2.8	2	31-41	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.9	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM
2.9	2	32-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.10	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
2.10	2	28-38	10YR 6/1 10YR 6/3	GR PALE BR	SA SI	NCM
2.11	1	0-36	10YR 3/2	V DK GR BR	SI LO	NCM
2.11	2	36-46	10YR 6/1 10YR 6/3	GR PALE BR	SA SI	NCM
2.12	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.12	2	29-40	10YR 6/1 10YR 6/3	GR PALE BR	SA SI	NCM
2.13	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.13	2	29-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.14	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
2.14	2	29-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.15	1	0-31	10YR 4/3	BR	SI LO	NCM
2.15	2	31-41	10YR 5/4	YL BR	SA SI	NCM
2.16	1	0-33	10YR 4/3	BR	SI LO	NCM
2.16	2	33-45	10YR 5/4	YL BR	SA SI	NCM
2.17	1	0-30	10YR 4/3	BR	SI LO	NCM
2.17	2	30-45	10YR 4/6	DK YL BR	SA LO	NCM
2.18	1	0-32	10YR 4/3	BR	SI LO	NCM
2.18	2	32-42	10YR 4/6	DK YL BR	SA LO	NCM
2.19	1	0-34	10YR 4/3	BR	SI LO	NCM
2.19	2	34-44	10YR 4/6 10YR 6/1	DK YL BR GR	SA LO	NCM
2.20	1	0-32	10YR 4/3	BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.20	2	32-42	10YR 4/6 10YR 5/1	DK YL BR GR	SA LO	NCM
Linear 22						
1.1	1	0-23	10YR 4/2	DK GR BR	SI	NCM
1.1	2	23-35	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.2	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.2	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.3	1	0-31	10YR 4/2	DK GR BR	SI	NCM
1.3	2	31-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.4	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.4	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.5	1	0-22	10YR 4/2	DK GR BR	SI	NCM
1.5	2	22-34	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.6	1	0-21	10YR 4/2	DK GR BR	SI	NCM
1.6	2	21-33	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.7	1	0-27	10YR 4/2	DK GR BR	SI	NCM
1.7	2	27-37	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.8	1	0-30	10YR 4/2	DK GR BR	SI	NCM
1.8	2	30-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI	NCM
1.9	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.10	1	0-33	10YR 4/2	DK GR BR	SI	NCM
1.10	2	33-43	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.11	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.11	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.12	1	0-29	10YR 4/2	DK GR BR	SI	NCM
1.12	2	29-41	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.13	1	0-38	10YR 4/2	DK GR BR	SI	NCM
1.13	2	38-50	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.14	1	0-30	10YR 4/2	DK GR BR	SI	NCM
1.14	2	30-42	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.15	1	0-32	10YR 4/2	DK GR BR	SI	NCM
1.15	2	32-43	10YR 5/1	GR	CL	NCM
1.16	1	0-23	10YR 4/2	DK GR BR	SI	NCM
1.16	2	23-33	10YR 6/2	LT BR GR	CL	NCM
1.17	1	0-34	10YR 4/2	DK GR BR	SI	NCM
1.17	2	34-45	10YR 6/2	LT BR GR	CL	NCM
1.18	1	0-16	10YR 4/2	DK GR BR	LO	NCM
1.18	2	16-28	10YR 4/6	DK YL BR	SA SI	NCM
1.19	1	0-21	10YR 4/2	DK GR BR	SI	NCM
1.19	2	21-32	10YR 4/6	DK YL BR	SA	NCM
1.20	1	0-28	10YR 4/2	DK GR BR	SI	NCM
1.20	2	28-38	10YR 4/6	DK YL BR	SA	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	30-40	10YR 6/2	LT BR GR	SI SA	NCM
2.2	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	25-36	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	29-39	10YR 5/6 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.5	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	27-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	32-42	10YR 6/3	PALE BR	SI	NCM
2.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	31-41	10YR 7/1	LT GR	SA	NCM
2.12	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	32-42	10YR 6/3	PALE BR	SA SI	NCM
2.13	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	33-44	10YR 6/4	LT YL BR	SA	NCM
2.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	32-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
2.15	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	31-41	10YR 6/2 10YR 5/2	LT BR GR GR BR	SI SA	NCM
2.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.16	2	27-38	10YR 5/1	GR	SI CL	NCM; gravel
2.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	29-39	10YR 6/1 10YR 4/6	GR DK YL BR	SA SI	NCM
2.18	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	18-28	10YR 6/1 10YR 4/6	GR DK YL BR	SA SI	NCM
2.19	1	0-5	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	5-21	10YR 6/3 10YR 6/1	PALE BR GR	SI CL	NCM
2.20	1	0-17	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	17-30	10YR 6/3 10YR 6/1	PALE BR GR	SI CL	NCM
Linear 23						
1.1	1	0-27	10YR 4/1	DK GR	SI LO	NCM
1.1	2	27-44	10YR 5/6	YL BR	SA SI	NCM; seepage at 40cm

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.2	1	0-32	10YR 4/1	DK GR	SI LO	NCM
1.2	2	32-44	10YR 5/6	YL BR	SA SI	NCM
1.3	1	0-31	10YR 4/1	DK GR	SI LO	NCM; water filled at 31cm
1.4	1	0-31	10YR 4/1	DK GR	SI LO	NCM
1.4	2	31-43	10YR 5/6	YL BR	SA SI	NCM
1.5	1	0-26	10YR 4/1	DK GR	SI LO	NCM
1.5	2	26-36	10YR 5/6	YL BR	SA SI	NCM
1.6	1	0-37	10YR 4/1	DK GR	SI LO	NCM
1.6	2	37-47	10YR 5/6	YL BR	SA SI	NCM
1.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	27-39	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
1.8	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	34-45	10YR 5/4 10YR 6/1	YL BR GR	SA SI	NCM
1.9	1	0-22	10YR 4/1	DK GR	SI LO	NCM
1.9	2	22-34	10YR 5/4	YL BR	SA SI	NCM
1.10	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	39-49	10YR 5/4	YL BR	SA SI	NCM
1.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	27-38	10YR 5/4	YL BR	SA SI	NCM
1.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	29-40	10YR 5/4	YL BR	SA SI	NCM
1.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	30-40	10YR 5/4	YL BR	SA SI	NCM
1.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.14	2	24-38	10YR 4/6 10YR 5/4	DK YL BR YL BR	SA SI	NCM; gravel
1.15	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	33-44	10YR 5/4	YL BR	SA SI	NCM
1.16	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	27-40	10YR 5/4	YL BR	SA SI	NCM
1.17	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	23-33	10YR 5/4	YL BR	SA SI	NCM
1.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	32-42	10YR 5/4	YL BR	SA SI	NCM
1.19	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	30-40	10YR 5/4	YL BR	SA SI	NCM
1.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	31-41	10YR 5/4	YL BR	SA SI	NCM
2.1	1	0-28	10YR 3/2	V DK GR BR	SI	NCM
2.1	2	28-38	10YR 5/4	YL BR	SA SI	NCM
2.2	1	0-29	10YR 3/2	V DK GR BR	SI	NCM
2.2	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.3	1	0-31	10YR 3/2	V DK GR BR	SI	NCM
2.3	2	31-42	10YR 5/4	YL BR	SA SI	NCM
2.4	1	0-35	10YR 3/2	V DK GR BR	SI	NCM
2.4	2	35-46	10YR 5/4	YL BR	SA SI	NCM
2.5	1	0-34	10YR 3/2	V DK GR BR	SI	NCM
2.5	2	34-46	10YR 5/4	YL BR	SA SI	NCM
2.6	1	0-27	10YR 3/2	V DK GR BR	SI	NCM
2.6	2	27-37	10YR 5/4	YL BR	SA SI	NCM
2.7	1	0-29	10YR 3/2	V DK GR BR	SI	NCM
2.7	2	29-39	10YR 5/4	YL BR	SA SI	NCM
2.8	1	0-27	10YR 3/2	V DK GR BR	SI	NCM
2.8	2	27-38	10YR 5/4	YL BR	SA SI	NCM
2.9	1	0-38	10YR 3/2	V DK GR BR	SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.9	2	38-49	10YR 5/4	YL BR	SA SI	NCM
2.10	1	0-37	10YR 3/2	V DK GR BR	SI	NCM
2.10	2	37-50	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
2.11	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM
2.12	1	0-21	10YR 4/1	DK GR	SI LO	NCM
2.12	2	21-41	10YR 5/4	YL BR	SA SI	NCM
2.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	27-37	10YR 5/4	YL BR	SA SI	NCM
2.14	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	27-38	10YR 5/4	YL BR	SA SI	NCM
2.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	30-41	10YR 5/4	YL BR	SA SI	NCM
2.16	1	0-26	10YR 4/2	DK GR BR	SA LO	NCM
2.16	2	26-38	10YR 4/6	DK YL BR	SA SI	NCM
2.17	1	0-33	10YR 4/2	DK GR BR	SA LO	NCM
2.17	2	33-43	10YR 4/6	DK YL BR	SA SI	NCM
2.18	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
2.18	2	27-37	10YR 4/6	DK YL BR	SA SI	NCM
2.19	1	0-29	10YR 4/2	DK GR BR	SA LO	NCM
2.19	2	29-40	10YR 4/6	DK YL BR	SA SI	NCM
2.20	1	0-26	10YR 4/2	DK GR BR	SA LO	NCM
2.20	2	26-37	10YR 4/6	DK YL BR	SA SI	NCM
Linear 26						
1.1	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 28cm
1.2	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 15cm
1.3	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	23-34	10YR 5/4	YL BR	SI LO	NCM
1.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 26cm
1.5	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	18-30	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	27-37	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.7	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	34-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.8	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.10	1	0-9	10YR 4/2	DK GR BR	SI LO	NCM; root impasse at 9cm
1.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	29-39	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.13	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	32-42	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM; seepage at 40cm
1.14	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; seepage and gravel

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.14	2	30-40	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM; seepage and gravel
1.15	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	22-33	10YR 6/1 10YR 5/4	GR YL BR	SI LO	NCM
1.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	33-43	10YR 5/8 10YR 5/1	YL BR GR	CL LO	NCM
1.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	30-40	10YR 5/8 10YR 5/1	YL BR GR	CL LO	NCM
1.18	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	31-41	10YR 5/8 10YR 5/1	YL BR GR	CL LO	NCM
1.19	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	28-35	10YR 5/8 10YR 5/1	YL BR GR	CL LO	NCM; seepage at 35cm
1.20	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	28-48	10YR 5/8 10YR 5/1	YL BR GR	CL LO	NCM
2.1	1	0-15	10YR 4/1	DK GR BR	LO	NCM; water impasse at 15cm
2.2	1	0-5	10YR 4/1	DK GR BR	LO	NCM; water impasse at 5cm
2.3	1	0-26	10YR 4/1	DK GR BR	LO	NCM
2.3	2	26-38	10YR 5/6	YL BR	SI LO	NCM
2.4	1	0-27	10YR 4/2	DK GR BR	LO	NCM; seepage
2.4	2	27-39	10YR 4/6	DK YL BR	SI	NCM; seepage
2.5	1	0-10	10YR 4/1	DK GR BR	SI LO	NCM; water impasse at 10cm
2.6	1	0-8	10YR 4/1	DK GR BR	LO	NCM; water impasse at 8cm
2.7	1	0-11	10YR 4/1	DK GR BR	LO	NCM; water impasse at 11cm
2.8	1	0-20	10YR 4/2	DK GR BR	LO	NCM; seepage
2.8	2	20-31	10YR 5/6	YL BR	SI LO	NCM; seepage
2.9	1	0-21	10YR 4/2	DK GR BR	LO	NCM
2.9	2	21-32	10YR 5/6	YL BR	SI LO	NCM
2.10	1	0-32	10YR 4/2	DK GR BR	LO	NCM
2.10	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.11	1	0-25	10YR 4/2	DK GR BR	LO	NCM
2.11	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.12	1	0-24	10YR 4/2	DK GR BR	LO	NCM
2.12	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.13	1	0-28	10YR 4/2	DK GR BR	LO	NCM; water impasse at 28cm
2.14	1	0-23	10YR 4/2	DK GR BR	LO	NCM
2.14	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	CL LO	NCM
2.15	1	0-23	10YR 4/2	DK GR BR	LO	NCM; water impasse at 23cm
2.16	1	0-5	10YR 4/1	DK GR	LO	NCM; water impasse at 5cm
2.17	1	0-20	10YR 4/1	DK GR	CL LO	NCM; water impasse at 20cm
2.18	1	0-24	10YR 4/1	DK GR	CL LO	NCM; water impasse at 24cm
2.19	1	0-12	10YR 3/2	V DK GR BR	LO	NCM; water impasse at 12cm
2.20	1	0-15	10YR 3/2	V DK GR BR	LO	NCM; water impasse at 15cm
Linear 28						
1.1	1	0-30	10YR 4/2	DK GR BR	SA LO	NCM
1.1	2	30-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
1.2	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.2	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
1.3	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
1.3	2	27-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
1.4	1	0-37	10YR 4/3	BR	LO	NCM
1.4	2	37-48	10YR 5/4	YL BR	SA LO	NCM
1.5	1	0-32	10YR 4/3	BR	LO	NCM
1.5	2	32-44	10YR 5/4	YL BR	SA LO	NCM
1.6	1	0-29	10YR 4/3	BR	LO	NCM
1.6	2	29-40	10YR 5/4	YL BR	SA LO	NCM
1.7	1	0-25	10YR 4/3	BR	LO	NCM
1.7	2	25-37	10YR 5/4	YL BR	SA SI	NCM
1.8	1	0-30	10YR 4/3	BR	LO	NCM
1.8	2	30-36	10YR 5/4	YL BR	SA LO	NCM
1.9	1	0-26	10YR 4/3	BR	LO	NCM
1.9	2	26-37	10YR 5/4	YL BR	SA LO	NCM
1.10	1	0-27	10YR 4/3	BR	LO	NCM
1.10	2	27-39	10YR 5/4	YL BR	SA LO	NCM
1.11	1	0-26	10YR 4/3	BR	LO	NCM
1.11	2	26-38	10YR 5/4	YL BR	SA LO	NCM
1.12	1	0-26	10YR 4/3	BR	LO	NCM
1.12	2	26-37	10YR 5/4	YL BR	SA LO	NCM
1.13	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
1.13	2	25-36	10YR 5/6	YL BR	SA SI	NCM
1.14	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
1.14	2	27-39	10YR 5/6	YL BR	SA SI	NCM
1.15	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
1.15	2	28-39	10YR 5/6	YL BR	SA SI	NCM
1.16	1	0-24	10YR 4/2	DK GR BR	SA LO	NCM
1.16	2	24-35	10YR 5/6	YL BR	SA SI	NCM
1.17	1	0-23	10YR 4/2	DK GR BR	SA LO	NCM
1.17	2	23-34	10YR 5/6	YL BR	SA SI	NCM
1.18	1	0-25	10YR 4/3	BR	SA LO	NCM
1.18	2	25-37	10YR 5/6 10YR 4/1 10YR 4/2	YL BR DK GR DK GR BR	SA SI	NCM
1.19	1	0-27	10YR 4/3	BR	SA LO	NCM
1.19	2	27-39	10YR 5/6	YL BR	SA SI	NCM
1.20	1	0-26	10YR 4/3	BR	SA LO	NCM
1.20	2	26-37	10YR 5/6	YL BR	SA SI	NCM
2.1	1	0-29	10YR 4/2	DK GR BR	SI L	NCM
2.1	2	29-40	10YR 5/4	YL BR	SA SI	NCM
2.2	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	21-31	10YR 5/4	YL BR	SA SI	NCM
2.3	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	24-34	10YR 5/4	YL BR	SA SI	NCM
2.4	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
2.5	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	32-43	10YR 5/4	YL BR	SI SA	NCM
2.6	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	22-32	10YR 5/4	YL BR	SI SA	NCM
2.7	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	25-39	10YR 5/4	YL BR	SA LO	NCM
2.8	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.8	2	24-34	10YR 5/4	YL BR	SA LO	NCM
2.9	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	34-45	10YR 5/4	YL BR	SA LO	NCM
2.10	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	18-28	10YR 5/4	YL BR	SI SA	NCM
2.11	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	34-45	10YR 5/4	YL BR	SI SA	NCM
2.12	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	20-30	10YR 5/4	YL BR	SI SA	NCM
2.13	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	28-39	10YR 5/4	YL BR	SI SA	NCM
2.14	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	20-30	10YR 5/4	YL BR	SI SA	NCM
2.15	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	35-46	10YR 5/4	YL BR	SI SA	NCM
2.16	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	32-42	10YR 5/4	YL BR	SI SA	NCM
2.17	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	29-40	10YR 5/4	YL BR	SI SA	NCM
2.18	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	24-34	10YR 5/4	YL BR	SI SA	NCM
2.19	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	25-37	10YR 5/4	YL BR	SI SA	NCM
2.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	31-42	10YR 5/3	BR	CL SI	NCM
28A						
1.1	1	0-15	10YR 4/2	DK GR BR	SA LO	NCM; gravel; rock impasse at 15cm
1.2	1	0-16	10YR 4/2	DK GR BR	SA LO	NCM; gravel; rock impasse at 16cm
1.3	1	0-22	10YR 4/2	DK GR BR	SA LO	NCM
1.3	2	22-34	10YR 5/4	YL BR	SA CL	NCM; gravel
1.4	1	0-23	10YR 4/2	DK GR BR	SA LO	NCM; gravel
1.4	2	23-33	10YR 5/4	YL BR	SA LO	NCM
1.5	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
1.5	2	28-38	10YR 5/4	YL BR	SA LO	NCM
1.6	1	0-24	10YR 4/2	DK GR BR	SA LO	NCM
1.6	2	24-34	10YR 5/4	YL BR	SA CL LO	NCM
1.7	1	0-23	10YR 4/2	DK GR BR	SA LO	NCM
1.7	2	23-34	10YR 5/4	YL BR	SA CL LO	NCM
1.8	1	0-27	10YR 4/3	BR	SA LO	NCM
1.8	2	27-37	10YR 5/4	YL BR	CL LO	NCM
1.9	1	0-26	10YR 4/3	BR	SA LO	NCM
1.9	2	26-36	10YR 5/4	YL BR	SI CL LO	NCM
1.10	1	0-29	10YR 4/3	BR	SA LO	NCM
1.10	2	29-40	10YR 5/4	YL BR	SA SI	NCM
1.11	1	0-32	10YR 4/3	BR	SA LO	NCM
1.11	2	32-42	10YR 5/4	YL BR	SA SI	NCM
1.12	1	0-29	10YR 4/3	BR	SA LO	NCM
1.12	2	29-39	10YR 6/2	LT BR GR	SA CL LO	NCM
1.13	1	0-21	10YR 4/3	BR	SA LO	NCM
1.13	2	21-33	10YR 6/2	LT BR GR	SI CL LO	NCM
1.14	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
1.14	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.15	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
1.15	2	28-38	10YR 6/2	LT BR GR	SA CL	NCM
1.16	1	0-28	10YR 4/3	BR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.16	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL LO	NCM
1.17	1	0-27	10YR 4/3	BR	SA LO	NCM
1.17	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL LO	NCM
1.18	1	0-26	10YR 4/3	BR	SA LO	NCM
1.18	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA CL LO	NCM
1.19	1	0-23	10YR 4/3	BR	SA LO	NCM
1.19	2	23-33	10YR 6/2	LT BR GR	SA CL LO	NCM
1.20	1	0-26	10YR 4/3	BR	SA LO	NCM
1.20	2	26-36	10YR 5/4	YL BR	SA CL LO	NCM
2.1	1	0-2				gravel impasse at 2cm
2.2	1	0-10				gravel impasse at 10cm
2.3	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	33-45	10YR 5/4	YL BR	SI CL	NCM
2.4	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	37-47	10YR 5/4	YL BR	SI CL	NCM
2.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	31-43	10YR 5/4	YL BR	SI CL	NCM
2.6	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	28-39	10YR 5/4	YL BR	SI CL	NCM
2.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	28-38	10YR 5/4	YL BR	SI CL	NCM
2.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	33-44	10YR 5/4	YL BR	SI CL	NCM
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	27-38	10YR 5/4	YL BR	SI CL	NCM
2.10	1	0-39	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	39-49	10YR 5/4	YL BR	SI CL	NCM
2.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	30-41	10YR 5/4	YL BR	SI CL	NCM
2.12	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	30-40	10YR 5/4	YL BR	SI CL	NCM
2.13	1	0-31	10YR 4/3	BR	SI LO	NCM
2.13	2	31-43	10YR 5/4	YL BR	SI CL	NCM
2.14	1	0-30	10YR 4/3	BR	SI LO	NCM
2.14	2	30-40	10YR 5/4	YL BR	SI CL	NCM
2.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	28-39	10YR 5/4	YL BR	SI CL	NCM
2.16	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	23-33	10YR 5/4	YL BR	SI CL	NCM
2.17	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	24-35	10YR 5/4	YL BR	SI CL	NCM
2.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	28-38	10YR 5/4	YL BR	SI CL	NCM
2.19	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	29-40	10YR 5/4	YL BR	CL LO	NCM
2.20	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	16-29	10YR 5/4	YL BR	CL LO	NCM
Linear 29						
1.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	30-42	10YR 5/4	YL BR	SA SI	NCM
1.2	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	32-43	10YR 5/4	YL BR	SA SI	NCM
1.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	29-41	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	28-38	10YR 5/4	YL BR	SA SI	NCM
1.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	31-42	10YR 5/4	YL BR	SA SI	NCM
1.6	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	27-39	10YR 5/4	YL BR	SA SI	NCM
1.7	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.8	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	20-31	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.9	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.9	2	30-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.10	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	31-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.12	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.14	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.15	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.17	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	29-39	10YR 5/6	YL BR	SI LO	NCM
1.19	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	31-41	10YR 5/6	YL BR	SI LO	NCM
1.20	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	27-37	10YR 5/6	YL BR	SI LO	NCM
1.21	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.21	2	30-40	10YR 5/6	YL BR	SI LO	NCM; gravel
1.22	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.22	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.23	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
1.23	2	33-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.24	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM
1.24	2	13-23	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.25	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.25	2	27-37	10YR 5/4	YL BR	SI LO	NCM
1.26	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.26	2	32-37	10YR 5/4	YL BR	SI LO	NCM
1.27	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.27	2	31-42	10YR 5/4	YL BR	SI LO	NCM
1.28	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.28	2	28-38	10YR 5/4	YL BR	SI LO	NCM
1.29	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM; eroded sandstone
1.29	2	28-39	10YR 5/4	YL BR	SI LO	NCM; eroded sandstone
1.30	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.30	2	28-40	10YR 5/4	YL BR	SI LO	NCM
1.31	1	0-29	10YR 4/1	DK GR	SI LO	NCM
1.31	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.32	1	0-30	10YR 4/1	DK GR	SI LO	NCM
1.32	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.33	1	0-31	10YR 4/1	DK GR	SI LO	NCM
1.33	2	31-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.34	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.34	2	31-42	10YR 5/6	YL BR	SA SI	NCM
1.35	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.35	2	29-40	10YR 4/6	DK YL BR	SI LO	NCM
1.36	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.36	2	27-37	10YR 4/6	DK YL BR	SI LO	NCM
1.37	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.37	2	32-44	10YR 5/6	YL BR	SI LO	NCM
1.38	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.38	2	31-41	10YR 5/6	YL BR	SI LO	NCM
1.39	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.39	2	24-34	10YR 5/6	YL BR	SI LO	NCM
1.40	1	0-26	10YR 4/2	DK GR BR	LO	NCM
1.40	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM
1.41	1	0-33	10YR 4/2	DK GR BR	LO	NCM
1.41	2	33-43	10YR 4/6	DK YL BR	SI LO	NCM
1.42	1	0-28	10YR 4/2	DK GR BR	LO	NCM
1.42	2	28-38	10YR 4/6	DK YL BR	SI LO	NCM
1.43	1	0-29	10YR 4/2	DK GR BR	LO	NCM
1.43	2	29-39	10YR 6/8 10YR 5/2	BR YL GR BR	SI LO	NCM
1.44	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.44	2	26-36	10YR 6/8 10YR 5/2	BR YL GR BR	SA LO	NCM
1.45	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.45	2	27-37	10YR 6/8 10YR 5/2	BR YL GR BR	SA LO	NCM
1.46	1	0-27	10YR 4/2	DK GR BR	LO	NCM
1.46	2	27-40	10YR 4/6	DK YL BR	SA LO	NCM
1.47	1	0-31	10YR 4/2	DK GR BR	LO	NCM
1.47	2	31-41	10YR 4/6	DK YL BR	SA LO	NCM
1.48	1	0-32	10YR 4/2	DK GR BR	LO	NCM
1.48	2	32-42	10YR 4/6	DK YL BR	SA LO	NCM
1.49	1	0-26	10YR 4/2	DK GR BR	LO	NCM; rocky
1.49	2	26-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM; rocky
1.50	1	0-33	10YR 4/2	DK GR BR	LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.50	2	33-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
1.51	1	0-22	10YR 4/2	DK GR BR	LO	NCM
1.51	2	22-33	10YR 4/6	DK YL BR	SA LO	NCM
1.52	1	0-38	10YR 4/2	DK GR BR	LO	NCM
1.52	2	38-48	10YR 4/6	DK YL BR	SA LO	NCM
1.53	1	0-35	10YR 4/2	DK GR BR	LO	NCM
1.53	2	35-45	10YR 4/6	DK YL BR	SA LO	NCM
1.54	1	0-25	10YR 4/2	DK GR BR	LO	NCM
1.54	2	25-35	10YR 4/6	DK YL BR	SA LO	NCM
1.55	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.55	2	24-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
1.56	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.56	2	26-37	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
1.57	1	0-32	10YR 3/2	V DK GR BR	SI LO	NCM; rock impasse at 32cm
1.58	1	0-34	10YR 3/2	V DK GR BR	SI LO	NCM
1.58	2	34-45	10YR 4/6	DK YL BR	SA LO	NCM
1.59	1	0-18	10YR 3/2	V DK GR BR	SI LO	NCM
1.59	2	18-30	10YR 4/6	DK YL BR	SA LO	NCM
1.60	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM; rock impasse at 26cm
1.61	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
1.61	2	20-30	10YR 5/4	YL BR	SA SI	NCM
1.62	1	0-24	10YR 3/2	V DK GR BR	SI LO	wire
1.62	2	24-36	10YR 5/4	YL BR	SA SI	NCM
1.63	1	0-29	10YR 3/2	V DK GR BR	SI LO	NCM
1.63	2	29-39	10YR 5/4	YL BR	SA SI	NCM
1.64	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM; gravel
1.64	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
1.65	1	0-24	10YR 3/2	V DK GR BR	SI LO	NCM; heavily disturbed
1.65	2	24-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; heavily disturbed
1.66	1	0-24	10YR 3/2	V DK GR BR	SA SI	NCM
1.66	2	24-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA	NCM
1.67	1	0-24	10YR 4/2	DK GR BR	LO	NCM
1.67	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.68	1	0-20	10YR 4/2	DK GR BR	LO	NCM
1.68	2	20-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.69	1	0-18	10YR 4/2	DK GR BR	LO	NCM
1.69	2	18-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.70	1	0-26	10YR 4/2	DK GR BR	LO	NCM
1.70	2	26-37	10YR 5/4	YL BR	SA SI	NCM
1.71	1	0-30	10YR 4/2	DK GR BR	LO	NCM
1.71	2	30-40	10YR 5/4	YL BR	SA SI	NCM
1.72	1	0-9	10YR 4/2	DK GR BR	LO	NCM; rock impasse at 9cm
1.73	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.73	2	18-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.74	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.74	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.75	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.75	2	25-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
1.76	1	0-23	10YR 4/2	DK GR BR	SA LO	NCM; gravel
1.76	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
1.77	1	0-24	10YR 4/2	DK GR BR	SA LO	NCM
1.77	2	24-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; rock impasse at 30cm
1.78	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
1.78	2	27-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; rock impasse at 32cm
1.79	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.79	2	15-20	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; rock impasse at 20cm
1.80	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM; gravel
1.80	2	21-32	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM; gravel
1.81	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.81	2	16-28	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.82	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM; gravel impasse at 15cm
1.83	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM; gravel impasse at 12cm
1.84	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.84	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
1.85	1	0-18	10YR 4/2	DK GR BR	SI LO	NCM
1.85	2	18-28	10YR 5/4	YL BR	SA SI	NCM
1.86	1	0-12	10YR 4/2	DK GR BR	SI LO	NCM
1.86	2	12-20	10YR 5/4	YL BR	SA SI	NCM; rock impasse at 20cm
1.87	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
1.87	2	20-30	10YR 5/4	YL BR	SA SI	NCM
1.88	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
1.88	2	15-30	10YR 5/4	YL BR	SA SI	NCM
1.89	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.89	2	26-38	10YR 5/4	YL BR	SA SI	NCM
1.90	1	0-32	10YR 4/2	DK GR BR	SA SI	ear glass (discarded); rock impasse at 32c
1.91	1	0-5	10YR 4/2	DK GR BR	SI LO	NCM
1.91	2	5-15	10YR 5/4	YL BR	SA SI	NCM; eroded bedrock
2.1	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	34-47	10YR 5/4	YL BR	SI LO	NCM
2.2	1	0-37	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	37-47	10YR 5/4	YL BR	SI LO	NCM
2.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.4	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	28-38	10YR 5/4	YL BR	SI LO	NCM
2.5	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	36-46	10YR 5/4	YL BR	SI LO	NCM
2.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	29-39	10YR 5/4	YL BR	SI LO	NCM
2.7	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	27-37	10YR 5/2	GR BR	SI LO	NCM
2.8	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 30cm
2.9	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM; disturbed
2.9	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM; disturbed

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.10	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	30-45	10YR 5/4	YL BR	SI LO	NCM
2.11	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	30-40	10YR 5/6	YL BR	SI LO	NCM
2.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	28-38	10YR 5/6	YL BR	SI LO	NCM
2.13	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	23-35	10YR 5/6	YL BR	SI LO	NCM
2.14	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM; seepage at 32cm
2.15	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	27-37	10YR 6/4 10YR 5/4	LT YL BR YL BR	SI LO	NCM; seepage at 37cm
2.16	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM; filled with water at 30cm
2.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	30-40	10YR 5/6	YL BR	SI LO	NCM
2.18	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	28-38	10YR 5/6	YL BR	SI LO	NCM
2.19	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	28-38	10YR 5/4	YL BR	SA LO	NCM
2.20	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	31-41	10YR 5/4	YL BR	SA LO	NCM
2.21	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.21	2	28-39	10YR 6/4 10YR 5/4	LT YL BR YL BR	SA LO	NCM
2.22	1	0-27	10YR 4/2	DK GR BR	SA LO	NCM
2.22	2	27-37	10YR 5/4 10YR 6/4	YL BR LT YL BR	SI LO	NCM
2.23	1	0-25	10YR 4/2	DK GR BR	SA LO	NCM
2.23	2	25-35	10YR 5/4 10YR 6/4	YL BR LT YL BR	SI LO	NCM
2.24	1	0-28	10YR 4/2	DK GR BR	SA LO	NCM
2.24	2	28-38	10YR 5/4 10YR 6/4	YL BR LT YL BR	SI LO	NCM
2.25	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM; rocks
2.25	2	22-32	10YR 5/6	YL BR	SA	NCM; rocks
2.26	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.26	2	25-35	10YR 5/6	YL BR	SA	NCM
2.27	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.27	2	34-44	10YR 5/6	YL BR	SA	NCM
2.28	1	0-36	10YR 4/2	DK GR BR	SI LO	NCM; rocky
2.28	2	36-48	10YR 5/6	YL BR	SA	NCM; rocky
2.29	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.29	2	32-42	10YR 5/6	YL BR	SA	NCM
2.30	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.30	2	24-34	10YR 5/6	YL BR	SA LO	NCM
2.31	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.31	2	28-38	10YR 5/4	YL BR	SA	NCM
2.32	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.32	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
2.33	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.33	2	30-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
2.34	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.34	2	28-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.35	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.35	2	29-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.36	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.36	2	30-41	10YR 6/3 10YR 5/4	PALE BR YL BR	SA LO	NCM
2.37	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.37	2	35-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.38	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.38	2	30-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.39	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.39	2	34-44	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.40	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.40	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.41	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
2.41	2	33-43	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.42	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.42	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.43	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.43	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.44	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.44	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.45	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.45	2	32-33	10YR 5/2 10YR 6/4	GR BR LT YL BR	SA LO	NCM
2.46	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.46	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.47	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.47	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.48	1	0-35	10YR 4/2	DK GR BR	SI LO	NCM
2.48	2	35-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.49	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.49	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.50	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.50	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.51	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.51	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.52	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.52	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.53	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.53	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.54	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.54	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.55	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM
2.55	2	20-30	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA LO	NCM
2.56	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; rocks
2.56	2	25-37	10YR 6/1	GR	SI LO	NCM; rocks
2.57	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.57	2	24-36	10YR 5/1	GR	SI LO	NCM
2.58	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.58	2	29-39	10YR 5/1	GR	SI LO	NCM
2.59	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.59	2	25-35	10YR 5/1	GR	SI LO	NCM
2.60	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.60	2	32-42	10YR 5/1	GR	SI LO	NCM
2.61	1	0-31	10YR 3/2	V DK GR BR	SI LO	NCM
2.61	2	31-41	10YR 6/2	LT BR GR	SI LO	NCM
2.62	1	0-20	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 20cm
2.63	1	0-20	10YR 3/2	V DK GR BR	SI LO	NCM
2.63	2	20-30	10YR 5/4	YL BR	SI LO	NCM
2.64	1	0-26	10YR 3/2	V DK GR BR	SI LO	NCM; rocks/slag/gravel
2.64	2	26-36	10YR 4/6	DK YL BR	SI LO	NCM; rocks/slag/gravel
2.65	1	0-28	10YR 3/2	V DK GR BR	SI LO	NCM
2.65	2	28-38	10YR 4/6	DK YL BR	SI LO	NCM
2.66	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
2.66	2	34-44	10YR 5/6	YL BR	SI LO	NCM
2.67	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.67	2	26-36	10YR 5/6	YL BR	SI LO	NCM; gravel
2.68	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.68	2	28-38	10YR 5/6	YL BR	SI LO	NCM
2.69	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; rocky
2.69	2	25-35	10YR 5/6	YL BR	SI LO	NCM; rocky
2.70	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.70	2	26-36	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.71	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.71	2	25-35	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.72	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
2.72	2	21-31	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.73	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.73	2	24-34	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.74	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.74	2	22-32	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.75	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.75	2	24-40	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.76	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
2.76	2	19-22	10YR 4/6	DK YL BR	SI LO	NCM; rock impasse at 22cm
2.77	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 25cm
2.78	1	0-3	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 3cm
2.79	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM; rocks
2.79	2	19-29	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM; rocks

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.80	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.80	2	26-36	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.81	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
2.81	2	23-33	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
2.82	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM; rock impasse at 21cm
2.83	1	0-15	10YR 4/2	DK GR BR	SI LO	NCM
2.83	2	15-30	10YR 5/4 10YR 4/6	YL BR DK YL BR	SA LO	NCM
2.84	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.84	2	13-23	10YR 6/2 10YR 4/6	LT BR GR DK YL BR	SA LO	NCM; gravel
2.85	1	0-15	10YR 3/2	V DK GR BR	SI LO	NCM; gravel/rock inclusions
2.85	2	15-27	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM; gravel/rock inclusions
2.86	1	0-15	10YR 3/2	V DK GR BR	SI LO	NCM
2.86	2	15-25	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI LO	NCM
2.87	1	0-18	10YR 3/2	V DK GR BR	SI LO	NCM
2.87	2	18-21	10YR 6/2	LT BR GR	SI LO	NCM; rock impasse at 21 cm
2.88	1	0-10	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.88	2	10-20	10YR 6/2 10YR 4/6	LT BR GR DK YL BR	SA	NCM; gravel
2.89	1	0-8	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.89	2	8-19	10YR 6/2 10YR 4/6	LT BR GR DK YL BR	SA	NCM; gravel
2.90	1	0-13	10YR 4/2	DK GR BR	SI LO	NCM; gravel
2.90	2	13-23	10YR 6/2 10YR 4/6	LT BR GR DK YL BR	SA	NCM; gravel
2.91	1	0-7	10YR 3/2	V DK GR BR	SI LO	NCM
2.91	2	7-17	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA LO	NCM
Linear 30						
1.1	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.1	2	27-37	10YR 5/4	YL BR	SA LO	NCM
1.2	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.2	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.3	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.3	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.4	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.4	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL	NCM
1.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.5	2	29-39	10YR 5/4	YL BR	SA CL LO	NCM
1.6	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.6	2	34-44	10YR 5/4	YL BR	SA CL LO	NCM
1.7	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.7	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.8	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.8	2	23-33	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.9	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.10	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.10	2	32-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.11	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
1.11	2	31-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
1.12	2	26-36	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI LO	NCM
1.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
1.13	2	27-37	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
1.14	2	28-38	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.15	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.15	2	30-40	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.16	1	0-34	10YR 4/2	DK GR BR	SI LO	NCM
1.16	2	34-44	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.17	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
1.17	2	32-42	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.18	2	29-39	10YR 6/3 10YR 5/4	PALE BR YL BR	SI CL LO	NCM
1.19	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
1.19	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.20	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
1.20	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.21	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.21	2	25-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI CL LO	NCM
1.22	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.22	2	22-32	10YR 5/6	YL BR	SI CL	NCM
1.23	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
1.23	2	25-35	10YR 6/3	PALE BR	SA LO	NCM
1.24	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
1.24	2	24-34	10YR 6/3	PALE BR	SA LO	NCM
1.25	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
1.25	2	22-32	10YR 4/1 10YR 5/4	DK GR YL BR	SI CL	NCM
1.26	1	0-19	10YR 4/2	DK GR BR	SI LO	NCM
1.26	2	19-29	10YR 4/1 10YR 5/4	DK GR YL BR	SI CL	NCM
1.27	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.27	2	21-31	10YR 5/4	YL BR	SI CL	NCM
1.28	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
1.28	2	23-33	10YR 5/4	YL BR	SI CL LO	NCM
1.29	1	0-21	10YR 4/2	DK GR BR	SI LO	NCM
1.29	2	21-31	10YR 5/4	YL BR	SI CL LO	NCM
1.30	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
1.30	2	24-34	10YR 5/4	YL BR	SA LO	NCM
1.31	1	0-22	10YR 4/1	DK GR	SI LO	NCM
1.31	2	22-32	10YR 5/4	YL BR	SI CL LO	NCM
1.32	1	0-21	10YR 4/1	DK GR	SI LO	NCM
1.32	2	21-31	10YR 5/4	YL BR	SI CL LO	NCM
1.33	1	0-25	10YR 4/1	DK GR	SI LO	NCM
1.33	2	25-35	10YR 5/4	YL BR	SI CL	NCM
1.34	1	0-16	10YR 4/2	DK GR BR	SI LO	NCM
1.34	2	16-26	10YR 5/4	YL BR	SI CL LO	NCM
2.1	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.1	2	22-33	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.2	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.2	2	24-36	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.3	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.3	2	25-36	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.4	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.4	2	26-37	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.5	2	29-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.6	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.6	2	30-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.7	2	30-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.8	2	28-38	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.9	2	31-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.10	2	27-38	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.11	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.11	2	25-36	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.12	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.12	2	26-38	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.13	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.13	2	24-36	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.14	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.14	2	26-37	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.15	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.15	2	25-35	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.16	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.16	2	28-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
2.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
2.17	2	25-37	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
2.18	2	29-41	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.19	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.19	2	31-43	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.20	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.20	2	28-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.21	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.21	2	30-41	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.22	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.22	2	30-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.23	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.23	2	32-42	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.24	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.24	2	28-40	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.25	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
2.25	2	31-43	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.26	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
2.26	2	32-44	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.27	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.27	2	26-38	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.28	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.28	2	27-38	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.29	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
2.29	2	24-35	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.30	1	0-22	10YR 4/2	DK GR BR	SI LO	NCM
2.30	2	22-32	10YR 6/8 10YR 6/2	BR YL LT BR GR	SA SI	NCM
2.31	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
2.31	2	26-38	10YR 5/4	YL BR	SA SI	NCM
2.32	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
2.32	2	28-38	10YR 5/4	YL BR	SA SI	NCM
2.33	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
2.33	2	27-39	10YR 5/4	YL BR	SA SI	NCM
2.34	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
2.34	2	30-43	10YR 5/4	YL BR	SA SI	NCM
3.1	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.1	2	25-35	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.2	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.2	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.3	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.3	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.4	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.4	2	29-40	10YR 5/4	YL BR	SA SI	NCM
3.5	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
3.5	2	31-41	10YR 5/4	YL BR	SA SI	NCM
3.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.6	2	29-41	10YR 5/4	YL BR	SA SI	NCM
3.7	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
3.7	2	32-42	10YR 5/4	YL BR	SA SI	NCM
3.8	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.8	2	33-45	10YR 5/4	YL BR	SA SI	NCM
3.9	1	0-26	10YR 4/2	DK GR BR	SI LO	NCM
3.9	2	26-36	10YR 5/4	YL BR	SA SI	NCM
3.10	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.10	2	29-40	10YR 5/4	YL BR	SA SI	NCM
3.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.11	2	27-40	10YR 5/4	YL BR	SA SI	NCM
3.12	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.12	2	24-35	10YR 5/4	YL BR	SA SI	NCM
3.13	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
3.13	2	30-40	10YR 5/4	YL BR	SA SI	NCM
3.14	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.14	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.15	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
3.15	2	32-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.16	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
3.16	2	33-45	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.17	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.17	2	25-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.18	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.18	2	29-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.19	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.19	2	25-38	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.20	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
3.20	2	28-40	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.21	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
3.21	2	32-42	10YR 6/2 10YR 5/4	LT BR GR YL BR	SA SI	NCM
3.22	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.22	2	27-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.23	1	0-24	10YR 4/2	DK GR BR	SI LO	NCM
3.23	2	24-35	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.24	1	0-23	10YR 4/2	DK GR BR	SI LO	NCM
3.24	2	23-34	10YR 5/4 10YR 6/2	YL BR LT BR GR	SA SI	NCM
3.25	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.25	2	25-35	10YR 5/4	YL BR	SA SI	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
3.26	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.26	2	29-40	10YR 5/4	YL BR	SA SI	NCM
3.27	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.27	2	29-39	10YR 5/4	YL BR	SA SI	NCM
3.28	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
3.28	2	27-40	10YR 5/4	YL BR	SA SI	NCM
3.29	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
3.29	2	29-40	10YR 5/4	YL BR	SA SI	NCM
3.30	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
3.30	2	31-44	10YR 5/4	YL BR	SA SI	NCM
3.31	1	0-38	10YR 4/2	DK GR BR	SI LO	NCM
3.31	2	38-50	10YR 5/4	YL BR	SA SI	NCM
3.32	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
3.32	2	31-42	10YR 5/4	YL BR	SA SI	NCM
3.33	1	0-25	10YR 4/2	DK GR BR	SI LO	NCM
3.33	2	25-35	10YR 5/4	YL BR	SA SI	NCM
4.1	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.1	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.2	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.2	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.3	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.3	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.4	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.4	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.5	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.5	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.6	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.6	2	29-37	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.7	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.7	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.8	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.8	2	28-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.9	1	0-31	10YR 4/2	DK GR BR	SI LO	NCM
4.9	2	31-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.10	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.10	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.11	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.11	2	27-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.12	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.12	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.13	1	0-27	10YR 4/2	DK GR BR	SI LO	NCM
4.13	2	27-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.14	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
4.14	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.15	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.15	2	28-38	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.16	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.16	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.17	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.17	2	30-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.18	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.18	2	32-45	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.19	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.19	2	33-42	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.20	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.20	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.21	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.21	2	33-44	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.22	1	0-32	10YR 4/2	DK GR BR	SI LO	NCM
4.22	2	32-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI SA	NCM
4.23	1	0-33	10YR 4/2	DK GR BR	SI LO	NCM
4.23	2	33-43	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI SA	NCM
4.24	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.24	2	28-39	10YR 6/2 10YR 5/4	LT BR GR YL BR	SI SA	NCM
4.25	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.25	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.26	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.26	2	29-41	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.27	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM
4.27	2	30-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.28	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.28	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.29	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.29	2	29-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.30	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.30	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.31	1	0-28	10YR 4/2	DK GR BR	SI LO	NCM
4.31	2	28-39	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.32	1	0-29	10YR 4/2	DK GR BR	SI LO	NCM
4.32	2	29-40	10YR 5/4 10YR 6/2	YL BR LT BR GR	SI SA	NCM
4.33	1	0-30	10YR 4/2	DK GR BR	SI LO	NCM

Shovel Test Log for Noble Ball Hill Windpark, Phase I

Shovel Test	Stratum	Depth (cm)	Munsell	Soil Color	Soil Description	Comments
			10YR 5/4	YL BR		
4.33	2	30-40	10YR 6/2	LT BR GR	SI SA	NCM

Appendix C
ARTIFACT CATALOG

Artifact Catalog for Noble Ball Hill Windpark, Phase I

Element	STP	Stratum	Material	Artifact Type	Count	Secondary Type	Comments
Turbine 31	Surface near STP 5.6	Surface	Glass	marble	1		
Turbine 32	6.12	1	Ceramic	ironstone, undecorated	1		footrim of plate
Turbine 41	3.14	1	Other	flake, tertiary, broken	1		
Turbine 42	6.18	1	Other	flake, tertiary	1		
Turbine 66	4.1	1	Ceramic	whiteware, undecorated	1		
Linear 3	1.5	2	Ceramic	whiteware, undecorated	1		rim of plate
Linear 3	1.6	1	Ceramic	whiteware, undecorated	1		
Linear 3	1.6	1	Ceramic	ironstone, undecorated	1		rim of small vessel
Linear 3	1.6	1	Metal	sheet iron	1		curved
Linear 3	Surface between 1.6 and 1.10	Surface	Ceramic	whiteware, undecorated	1		footrim, possibly from serving vessel
Linear 3	Surface between 1.6 and 1.10	Surface	Ceramic	ironstone, undecorated	1		body fragment
Linear 3	Surface between 1.6 and 1.10	Surface	Glass	medicine bottle	1	aqua	base, rectangular cross-section, paneled
Linear 3	1.7	1	Glass	window glass	1	clear	
Linear 3	1.7	1	Ceramic	whiteware, undecorated	1		
Linear 3	1.7	1	Ceramic	stoneware, salt-glazed	1		possibly from ginger bottle
Linear 3	1.7	1	Ceramic	porcelain, undecorated	1		thick-walled, possibly large serving vessel or bathroom fixture
Linear 3	2.1	1	Ceramic	whiteware, undecorated	1		rim of plate
Linear 3	2.4	1	Ceramic	yellow ware, slipped	1		wheel-thrown, dark brown slipped exterior
Linear 3	2.7	1	Ceramic	whiteware, undecorated	2		
Linear 3	2.9	1	Ceramic	whiteware, undecorated	1		footrim of plate
Linear 3	2.9	1	Metal	wire	1		iron
Linear 3	2.9	1	Metal	nail, indeterminant	1		
Linear 3	2.14	1	Glass	container glass	1	amber	
Linear 3	2.14	1	Glass	bottle glass	1	clear	base, rectangular cross-section, light impressed lettering on base, possibly an 8 and a 7
Linear 3	Inside Foundation	Surface	Glass	bottle, whole	1	blue	PHILLIPS MILK OF MAGNESIA TABLETS, with small marks of 9 and M, rectangular cross-section, threaded rim
Linear 3	Near positive tests	Surface	Ceramic	ironstone, undecorated	22		
Linear 3	Near positive tests	Surface	Ceramic	ironstone, blue transfer	3		
Linear 3	Near positive tests	Surface	Ceramic	ironstone, black transfer	1		
Linear 3	Near positive tests	Surface	Ceramic	ironstone, flow-black transfer	1		
Linear 3	Near positive tests	Surface	Ceramic	ironstone, molded	1		possible bowl rim
Linear 3	Near positive tests	Surface	Ceramic	porcelain, undecorated	1		
Linear 3	Near positive tests	Surface	Ceramic	porcelain, green band	1	green	possible figurine
Linear 3	Near positive tests	Surface	Glass	window glass	5		

Artifact Catalog for Noble Ball Hill Windpark, Phase I

Element	STP	Stratum	Material	Artifact Type	Count	Secondary Type	Comments
Linear 3	Near positive tests	Surface	Glass	milkglass	1		
Linear 3	Near positive tests	Surface	Other	brick	1		
Linear 4	1.8	1	Glass	bottle glass	1	amber	
Linear 4	1.8	1	Glass	jar, canning	3	aqua	possible ball canning jar
Linear 4	1.8	1	Glass	flat glass	1	clear	
Linear 4	1.8	1	Ceramic	whiteware, undecorated	4		2 footrim fragments, possible large serving vessel
Linear 4	1.8	1	Metal	railroad spike	1		
Linear 4	1.10	1	Metal	file	1		iron
Linear 4	1.10	1	Metal	knife blade	1		iron
Linear 4	1.10	1	Metal	nail, indeterminant	1		
Linear 4	1.10	1	Metal	nail, wire	1		
Linear 4	1.10	1	Metal	hardware	1		iron, possibly part of door hinge or plate
Linear 11	Surface, between STP 1.15 and 2.15	Surface	Ceramic	whiteware, maker's mark	1		footrim of plate, partial mark is transfer-printed, black, with laurel leaves
Linear 13	Surface, 2ft from STP 1.15	Surface	Ceramic	stoneware, salt-glazed	1		
Linear 13	1.16	1	Ceramic	whiteware, undecorated	1		
Linear 13	1.16	1	Glass	container glass	1	clear	
Linear 13	2.13	1	Ceramic	art pottery	1	green	molded and slipped, green, tea cup
Linear 13	2.13	1	Ceramic	ironstone, molded	1		rim and footrim fragment of large plate, possible serving vessel
Linear 13	2.13	1	Glass	container glass	1	clear	base, jar or bottle
Linear 13	2.16	1	Ceramic	pearlware, maker's mark	1		circular impressed mark, "SHIRE," with crown in center
Linear 13	2.16	1	Ceramic	whiteware, undecorated	1		
Linear 13	2.16	1	Ceramic	redware, salt-glazed	4		red glaze, wheel-thrown, base of large dish
Linear 13	2.16	1	Ceramic	redware, black matte glaze	2		
Linear 13	2.16	1	Metal	nail, cut	1		
Linear 13	2.19	1	Ceramic	pearlware, hand-painted	1	blue and white	small vessel, rim
Linear 13	2.19	1	Ceramic	whiteware, undecorated	1		
Linear 13	2.19	1	Glass	canning jar lid	2		
Linear 13	2.21	1	Ceramic	door knob	1	white	porcelain
Linear 13	2.21	1	Glass	window glass	1	aqua	
Linear 17	1.20	2	Ceramic	whiteware, undecorated	2		
Linear 17	1.20	2	Ceramic	whiteware, slipped	1		gray-blue cabling, above pumpkin field
Linear 17	1.20	2	Ceramic	pearlware, shell-edge	1	blue	poor condition, strong angle of rim, serving vessel
Linear 17	1.20	2	Ceramic	whiteware, transfer-print	1	blue	
Linear 17	2.20	1	Ceramic	whiteware, undecorated	1		
Linear 17	2.20	1	Ceramic	redware, salt-glazed	1		red slip
Linear 17	2.20	1	Ceramic	whiteware, transfer-print	1	black	rim of small plate
Linear 17	2.20	1	Ceramic	pearlware, polychrome	1	blue, yellow, green	
Linear 18	2.3	1	Ceramic	whiteware, shell-edge	1	blue	rim of plate, burned, poor condition

Appendix D
SITE FORMS

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

For Office Use Only--Site Identifier _____

Project Identifier _____ **Date** August 1, 2008
Your Name Robert J. Hanley **Phone** (716) 821-1650
Address 2390 Clinton Street
Buffalo, NY 14227

Organization (if any) Panamerican Consultants, Inc.

1. **Site Identifier(s)** Site PCI/Ball Hill-1
2. **County** Chautauqua **One of following: City** _____
Township Hanover
Incorporated Village _____
Unincorporated Village or Hamlet _____

3. **Present Owner**
Address

4. **Site Description (check all appropriate categories):**
Structure/site
Superstructure: complete__ partial_ collapsed_ not evident X
Foundation: above X **below_(ground level) not evident** _
X **Structural subdivisions apparent**
__ **Only surface traces visible**
X **Buried traces detected**

List construction materials (be as specific as possible):
The intact foundation is stone with eroded mortar giving it the appearance of dry stacking. The dimensions of the foundation are 20 ft (6 m) north-to-south, and 36 ft (11 m) east-to-west. In the center was a foundation or footer (approximately 2ft by 2ft [6.5 m x 6.5 m]) for a fireplace or central floor support. The boundaries of this historic site, possibly including below-surface evidence of outbuildings not identified during the field investigation, may extend to the south and east of the APE (the western portion of the side is outside of the APE and was not shovel tested). No cultural materials were found in tests or in surface reconnaissance beyond 30 m (100 ft) south and southeast of the foundation.

Grounds __Upland _Floodplain
X **Under cultivation __Never cultivated __Previously cultivated _Sustaining erosion**
__Woodland _Pastureland _ Mowed lawn
Soil Drainage: excellent X **good _ fair _ poor __**
Slope: flat_ gentle X **moderate __ steep __**
Distance to nearest water from site (approx.) 305m (1000 ft) **Elevation:** 1350 ft amsl

5. **Site Investigation (append additional sheets, if necessary):**
Surface X **date(s)** 5/2008
X **Site Map (Submit with form*) see attachment**
_Collection

Subsurface--date(s) 5/2008
Testing: shovel X **coring_ other_unit size_ no. of units** 40 **(Submit plan of units*)**

Excavation: unit size__ no. of units__ (Submit plan of units with form*)
*** Submission should be 8½"x11", if feasible.**

Investigator Robert J. Hanley

Manuscript or published report(s) (reference fully):

Hanley, Robert J., Mark A. Steinback, Michael A. Cinquino, Rebecca J. Emans, Edwin Button, Sharon Jenkins, Donald Smith

2008 *Phase I Cultural Resources Investigation for the Proposed Noble Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York, (OPRHP #08PR01814)*. Panamerican Consultants, Inc., Buffalo Branch. Prepared for Noble Ball Hill Windpark, LLC, Essex, CT.

Present repository of materials Panamerican Consultants, Inc.

6. Site inventory:

a. date constructed or occupation period mid- to late- 19th century

b. previous owners, if known

The foundation appears to represent an MDS shown on three historic maps: Stewart 1867, labeled T. Bayley; Beers1881, labeled E. Bagley; USGS 1900.

c. modifications, if known

Recent additions to the exterior and modifications to the interior (append additional sheets, if necessary)

7. Site documentation (append additional sheets, if necessary):

a. Historic map references

1) Name Stewart, William
Date 1867 **Source** *New Topographical Atlas of Chautauqua County, New York*. William Stewart, Publisher, Philadelphia.
Present location of original, if known Buffalo and Erie County Library.

2) Name Beers, Frederick W.
Date 1881 **Source** *Illustrated Historical Atlas of the County of Chautauqua, New York*. F.W. Beers, New York.
Present location of original, if known Buffalo and Erie County Library.

3) Name U.S. Geological Survey
Date 1900 **Source** *Cherry Creek, NY. 15 Minute Series Quadrangle*, U.S. Government Printing Office, Washington, D.C. Historic USGS Maps of New England & New York, Documents Department & Data Center, Dimond Library, University of New Hampshire, Durham [online www].
Present location of original, if known Available URL:
http://docs.unh.edu/nhtopos/CherryCreek.htm [accessed 13 March 2008]

b. Representation in existing photography

1) Photo date ____ Where located
2) Photo date ____ Where located

c. Primary and secondary source documentation (reference fully)

d. Persons with memory of site:

1) Name Address

8. List of material remains other than those used in construction (be as specific as possible in identifying object and material): See Attachment _____
If prehistoric materials are evident, check here and fill out prehistoric site form.___

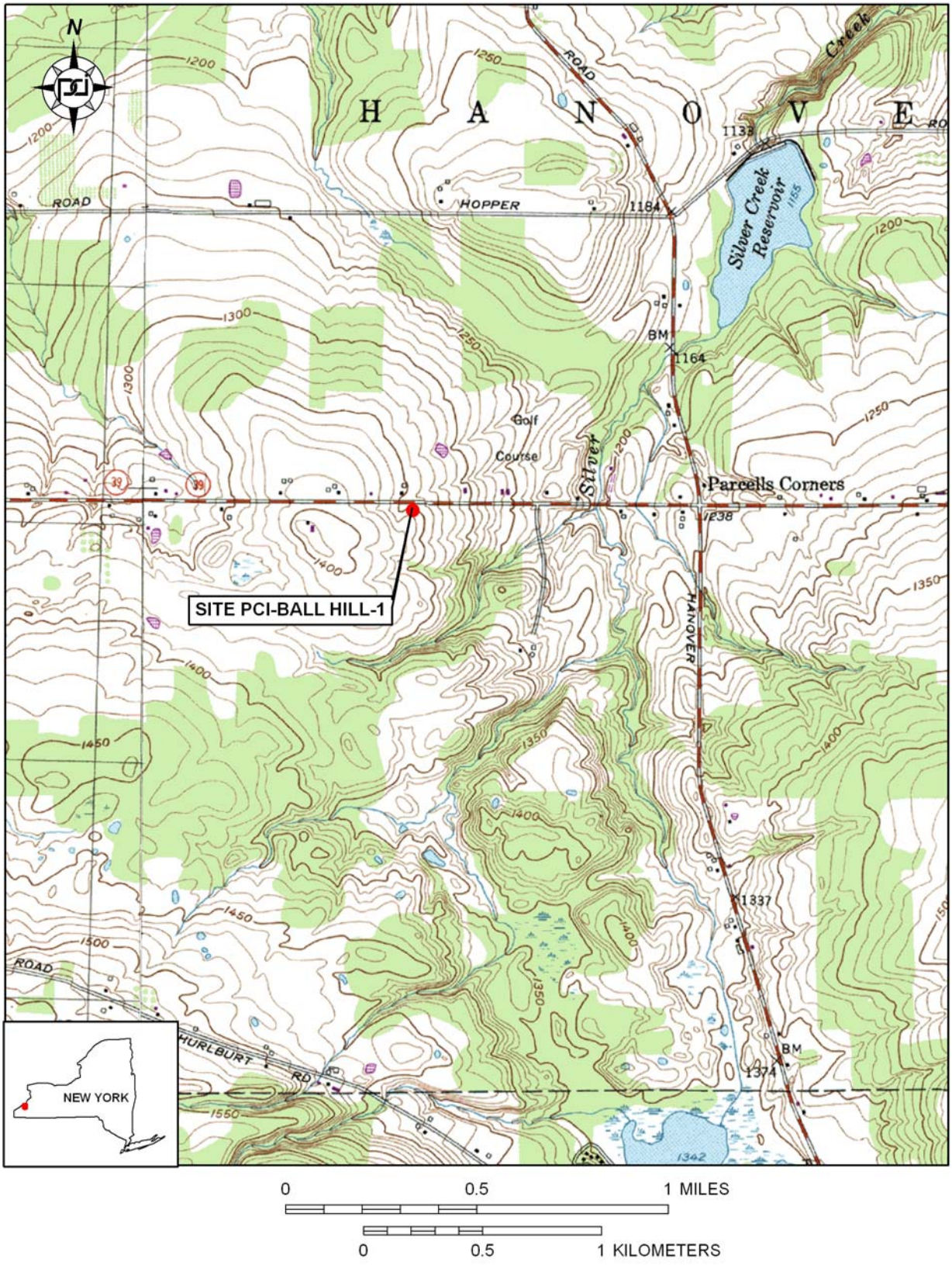
Historic artifacts were found on the surface and in eight shovel tests (STPs 1.5, 1.6, 1.7, 2.1, 2.4, 2.7, 2.9, 2.14) dug in proximity of the MDS. A total of 57 artifacts were found, consisting mostly of ceramic and glass household items. Of the artifact total, 43 ceramics were found including: 8 undecorated whiteware, 24 undecorated ironstones, 3 blue transfer ironstones, 1 black transfer ironstone, 1 flow-black ironstone, 1 molded ironstone (probable bowl rim), 2 undecorated porcelain, 1 green-banded porcelain (probable figurine), 1 salt-glazed stoneware, and 1 slipped yellowware. Ten glass artifacts were found, including: 3 container glass shards (amber and clear), 6 window glass, and 1 milkglass. Three metal artifacts were found, including: 1 cut nail, 1 wire fragment, and 1 sheet iron fragment. In addition, one brick fragment was found. The artifact sample is mostly non diagnostic and is too small to determine a meaningful mean artifact date. The large presence of ironstone and lesser amounts of whiteware and yellow ware fragments can be indicative of the late 19th to early 20th centuries. A complete cobalt-glass Milk of Magnesia bottle was found inside the MDS foundation (located adjacent to the APE) on the surface. The bottle dates from 1931 and later. The presence of the bottle provides limited evidence that the house was occupied as late as the 1930s. However, property owner Mr. Allen Gage stated that the house burned down ca. 1925 due to a fire set by a steam engine (personal communication with Mr. Gage).

9. Map References: Map or maps showing exact location and extent of identified site must accompany this form and must be identified by source and date. Keep this submission to 8½"x11", if possible.

USGS 7½ Minute Series Quad. Name Perrysburg, NY 1980
For or Office Use Only—UTM Coordinates _____

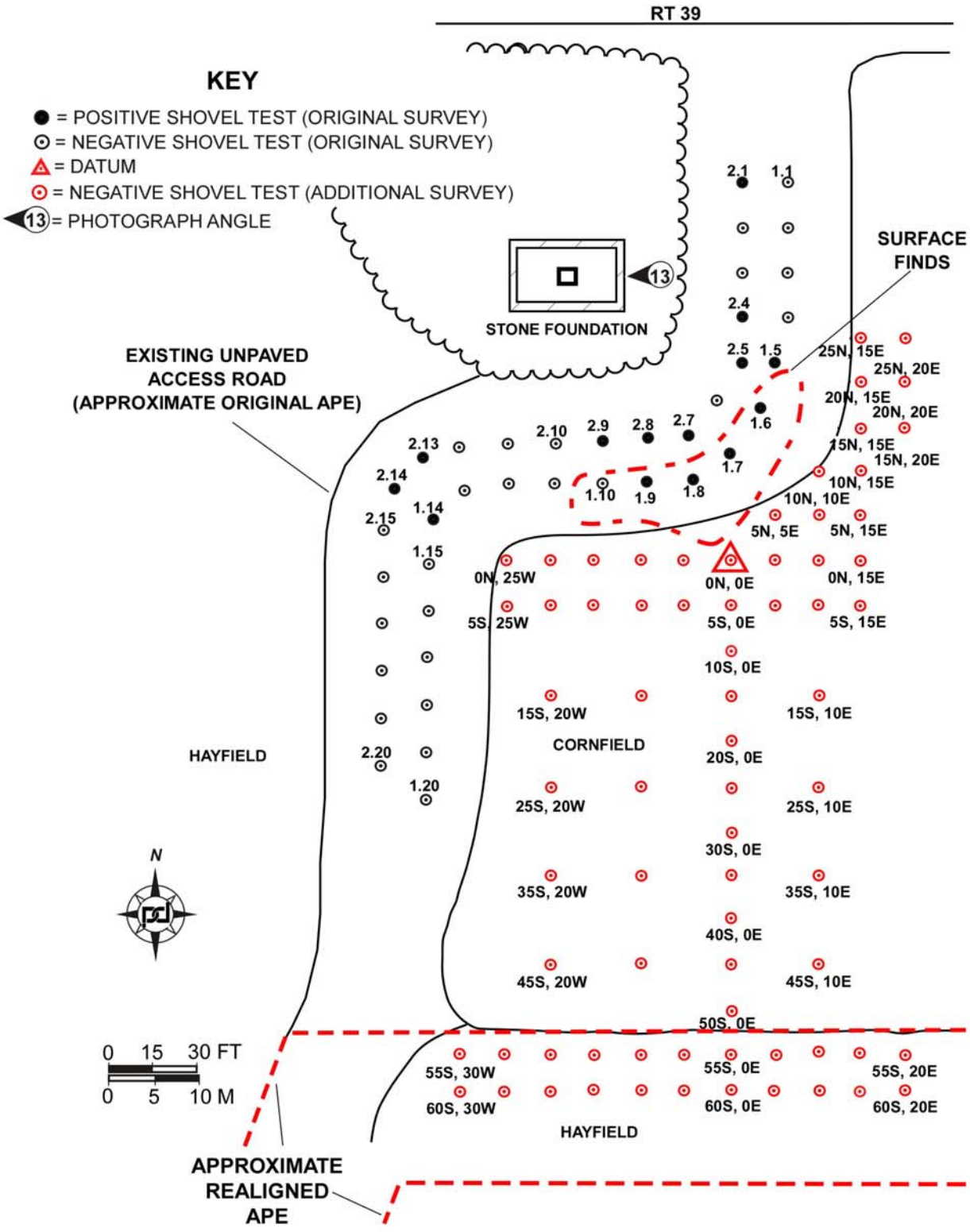
10. Photography (optional for environmental impact survey):
Please submit a 5"x 7" black and white print(s) showing the current state of the site.
Provide a label for the print(s) on a separate sheet.

See attached sheets.



Location of Site PCI/Ball Hill-1 *(USGS Forestville, NY 1980; Perrysburg, NY 1980).*

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
SITE PCI/BALL HILL-1



Shovel testing at Site PCI/Ball Hill-1. The extent of the site is undetermined.

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
SITE PCI/BALL HILL-1

General view of Site PCI/Ball Hill-1, located within cluster of trees, facing north.

Foundation at Site PCI/Ball Hill-1, facing west.

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
SITE PCI/BALL HILL-1

Close-up of foundation at Site PCI/Ball Hill-1, facing southwest. Note: central pile of stones represents footer (approximately 2ft by 2ft [6.5 m x 6.5 m]) for a fireplace or central floor support.

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

For Office Use Only--Site Identifier _____

Project Identifier _____ **Date** August 1, 2008
Your Name Robert J. Hanley **Phone** (716) 821-1650
Address 2390 Clinton Street
Buffalo, NY 14227

Organization (if any) Panamerican Consultants, Inc.

1. **Site Identifier(s)** Site PCI/Ball Hill-2
2. **County** Chautauqua **One of following: City** _____
Township Villanova
Incorporated Village _____
Unincorporated Village or Hamlet _____

3. **Present Owner**
Address

4. **Site Description (check all appropriate categories):**
Structure/site
Superstructure: complete__ partial_ collapsed_ not evident X
Foundation: above X **below_(ground level) not evident** _
X **Structural subdivisions apparent**
__ **Only surface traces visible**
__ **Buried traces detected**

List construction materials (be as specific as possible):
A partially intact cut-stone foundation, disturbed with portions of the walls not intact. At the time of the field investigation, the foundation had standing water.

Grounds __Upland _Floodplain
X **Under cultivation __Never cultivated __Previously cultivated _Sustaining erosion**
__Woodland _Pastureland _ Mowed lawn
Soil Drainage: excellent__ good _ fair _ poor X
Slope: flat_ gentle X **moderate __ steep __**
Distance to nearest water from site (approx.) 1585 m (5200 ft) **Elevation:** 1650 ft amsl

5. **Site Investigation (append additional sheets, if necessary):**
Surface X **date(s)** 5/2008
X **Site Map (Submit with form*) see attachment**
_Collection

Subsurface--date(s) 5/2008
Testing: shovel X **coring_ other_unit size_ no. of units** 40 **(Submit plan of units*)**

Excavation: unit size__ no. of units__ (Submit plan of units with form*)
*** Submission should be 8½"x11", if feasible.**

Investigator Robert J. Hanley

Manuscript or published report(s) (reference fully):

Hanley, Robert J., Mark A. Steinback, Michael A. Cinquino, Rebecca J. Emans, Edwin Button, Sharon Jenkins, Donald Smith

2008 *Phase I Cultural Resources Investigation for the Proposed Noble Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York, (OPRHP #08PR01814)*. Panamerican Consultants, Inc., Buffalo Branch. Prepared for Noble Ball Hill Windpark, LLC, Essex, CT.

Present repository of materials Panamerican Consultants, Inc.

6. Site inventory:

a. date constructed or occupation period mid- to late- 19th century

b. previous owners, if known

The foundation appears to represent an MDS shown on three historic maps: Stewart 1867, labeled L. Congdon; Beers1881, labeled L. Congdon; USGS 1900.

c. modifications, if known

Recent additions to the exterior and modifications to the interior (append additional sheets, if necessary)

7. Site documentation (append additional sheets, if necessary):

a. Historic map references

1) Name Stewart, William
Date 1867 **Source** *New Topographical Atlas of Chautaugua County, New York*. William Stewart, Publisher, Philadelphia.
Present location of original, if known Buffalo and Erie County Library.

2) Name Beers, Frederick W.
Date 1881 **Source** *Illustrated Historical Atlas of the County of Chautaugua, New York*. F.W. Beers, New York.
Present location of original, if known Buffalo and Erie County Library.

3) Name U.S. Geological Survey
Date 1900 **Source** *Cherry Creek, NY. 15 Minute Series Quadrangle Maps*, U.S. Government Printing Office, Washington, D.C. Historic USGS Maps of New England & New York, Documents Department & Data Center, Dimond Library, University of New Hampshire, Durham [online www].
Present location of original, if known Available URL:
http://docs.unh.edu/nhtopos/CherryCreek.htm [accessed 13 March 2008]

b. Representation in existing photography

1) Photo date ____ Where located
2) Photo date ____ Where located

c. Primary and secondary source documentation (reference fully)

d. Persons with memory of site:

1) Name Address

8. List of material remains other than those used in construction (be as specific as possible in identifying object and material): See Attachment _____
If prehistoric materials are evident, check here and fill out prehistoric site form.___

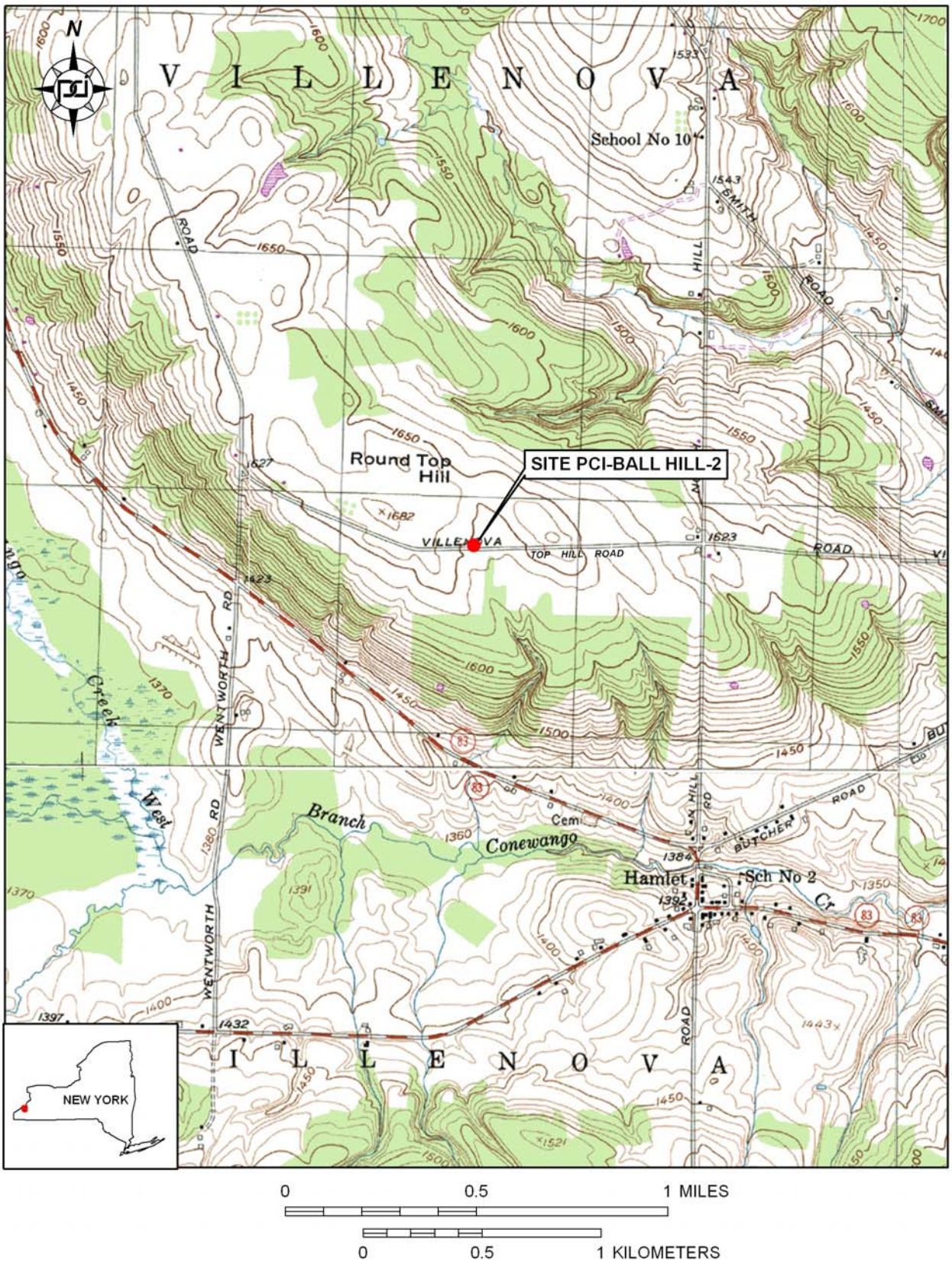
A total of 21 artifacts were found in six shovel tests (STPs 1.15, 1.16, 1.18, 2.18, 2.19 and 2.21). The light scatter of artifacts includes ceramic, glass, and metal. The ceramics include four salt-glazed redware, three undecorated whiteware, two fragments of black matter glaze redware, and one salt-glazed stoneware, one molded ironstone, one molded green glazed art pottery, one blue hand-painted pearlware, one undecorated pearlware with a maker's mark. Also was found a white porcelain door knob fragment. Glass included two fragments of a lightning canning jar lid, two clear container glass, and one aqua window glass fragment. A cut nail was also found. These artifacts generally date to the late 19th to early 20th century, and are consistent with the historic map analysis results.

9. Map References: Map or maps showing exact location and extent of identified site must accompany this form and must be identified by source and date. Keep this submission to 8½"x11", if possible.

USGS 7½ Minute Series Quad. Name Silver Creek 1962; Farnham 1963; Forestville 1980; and Perrysburg 1980
For or Office Use Only--UTM Coordinates _____

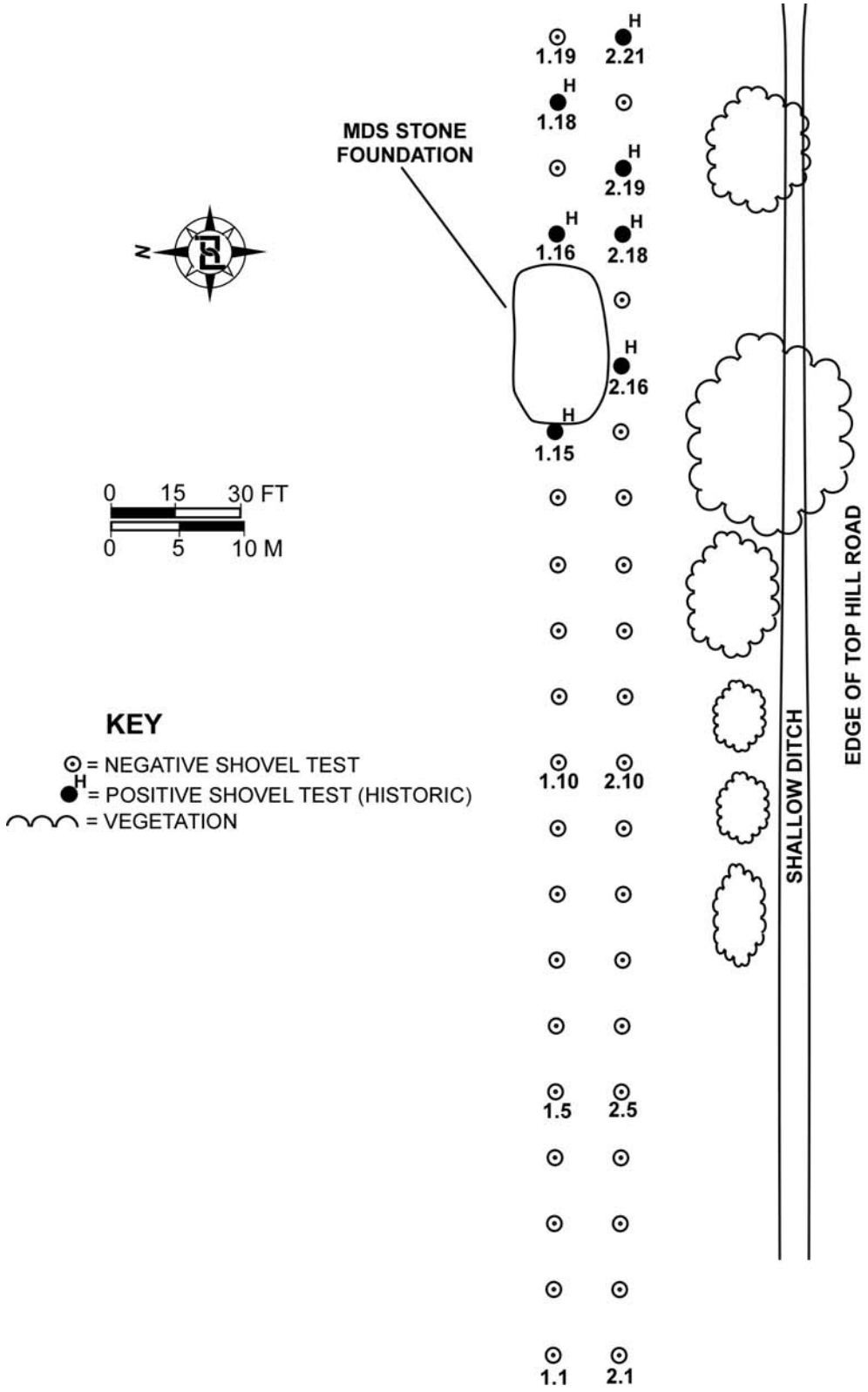
10. Photography (optional for environmental impact survey):
Please submit a 5"x 7" black and white print(s) showing the current state of the site.
Provide a label for the print(s)on a separate sheet.

See attached sheets.



Location of Site PCI/Ball Hill-2 *(USGS Forestville, NY 1980; Perrysburg, NY 1980).*

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
SITE PCI/BALL HILL-2



Shovel testing at Site PCI/Ball Hill-2.

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM
SITE PCI/BALL HILL-2

General location of Site PCI/Ball Hill-2, facing northeast

Remnants of foundation at Site PCI/Ball Hill-2, facing southeast

Close-up of foundation at Site PCI/Ball Hill-2, facing northwest.

NEW YORK STATE PREHISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

For Office Use Only--Site Identifier _____

Project Identifier _____ **Date** August 1, 2008
Your Name Robert J. Hanley **Phone** (716) 821-1650
Address 2390 Clinton Street
Buffalo, NY 14227

Organization (if any) Panamerican Consultants, Inc.

1. Site Identifier(s) Site PCI/Ball Hill Prehistoric Stray Finds
2. County Chautauqua **One of following: City** _____
Township Villenova
Incorporated Village _____
Unincorporated Village or Hamlet _____

3. Present Owner
Address

4. Site Description (check all appropriate categories):

Site

X **Stray Find,** 2 loci	__ **Cave/rockshelter**	__ **Workshop**
__ **Pictograph**	__ **Quarry**	__ **Mound**
__ **Burial**	__ **Shell Midden**	__ **Village**
__ **Surface Evidence**	__ **Camp**	__ **Material in plowzone**
__ **Single Component**	__ **Buried Evidence**	__ **Intact occupation floor**
__ **Multicomponent**	__ **Evidence of features**	__ **Stratified**

Location

__ **Under cultivation**	__ **Never cultivated**	__ **Previously cultivated**
X **Pastureland**	X **Woodland**	__ **Floodplain**
X **Upland**	__ **Sustaining erosion**	

Drainage: excellent __ **good** X **fair** __ **poor** __
Slope: flat __ **gentle** __ **moderate** X **steep** __
Distance to nearest water from site (approx.) Locus 1 and 2: 1585 m (5200 ft),
Elevation: Locus 1 and 2: 1,710 ft (521 m)

5. Site Investigation (append additional sheets, if necessary):
Surface X **date(s)** 5/2008
X **Site Map (Submit with form*)**
__ **Collection**

Subsurface--date(s) 5/2008
Testing: shovel X **coring** __ **other** _____ **unit size**
Locus 1 (T41) : no. of units 149 **(Submit plan of units with form*)**
of these, 8 **were radials, Isolated Find in** 1 **of the shovel tests.**
Locus 2 (T42) : no. of units 324 **(Submit plan of units with form*)**
of these, 8 **were radials, Isolated Find in** 1 **of the shovel tests.**

Excavation: unit size __**no. of units (Submit plan of units with form*)**
*** Submission should be 82"x11", if feasible.**

Investigator Robert J. Hanley

Manuscript or published report(s) (reference fully):

Hanley, Robert J., Mark A. Steinback, Michael A. Cinquino, Rebecca J. Emans, Edwin Button, Sharon Jenkins, Donald Smith

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Present repository of materials: Panamerican Consultants, Inc.

6. Component(s) (cultural affiliation/dates): undetermined, non-diagnostic

List of material remains (be as specific as possible in identifying object and material):

Locus 1 (Turbine 41). A single broken tertiary reduction flake was found in Stratum 1 of one shovel test. Eight radial shovel tests were dug at 1-m and 3-m (3.3-ft and 9.8-ft) in cardinal directions centered on the positive shovel test. No additional cultural materials were found in the close-interval tests.

Locus 2 (Turbine 42). A single tertiary reduction flake was found in Stratum 1 of one shovel test. Eight radial shovel tests were dug at 1-m and 3-m (3.3-ft and 9.8-ft) interval in cardinal directions centered on the positive shovel test. No additional cultural material was found in the close-interval tests.

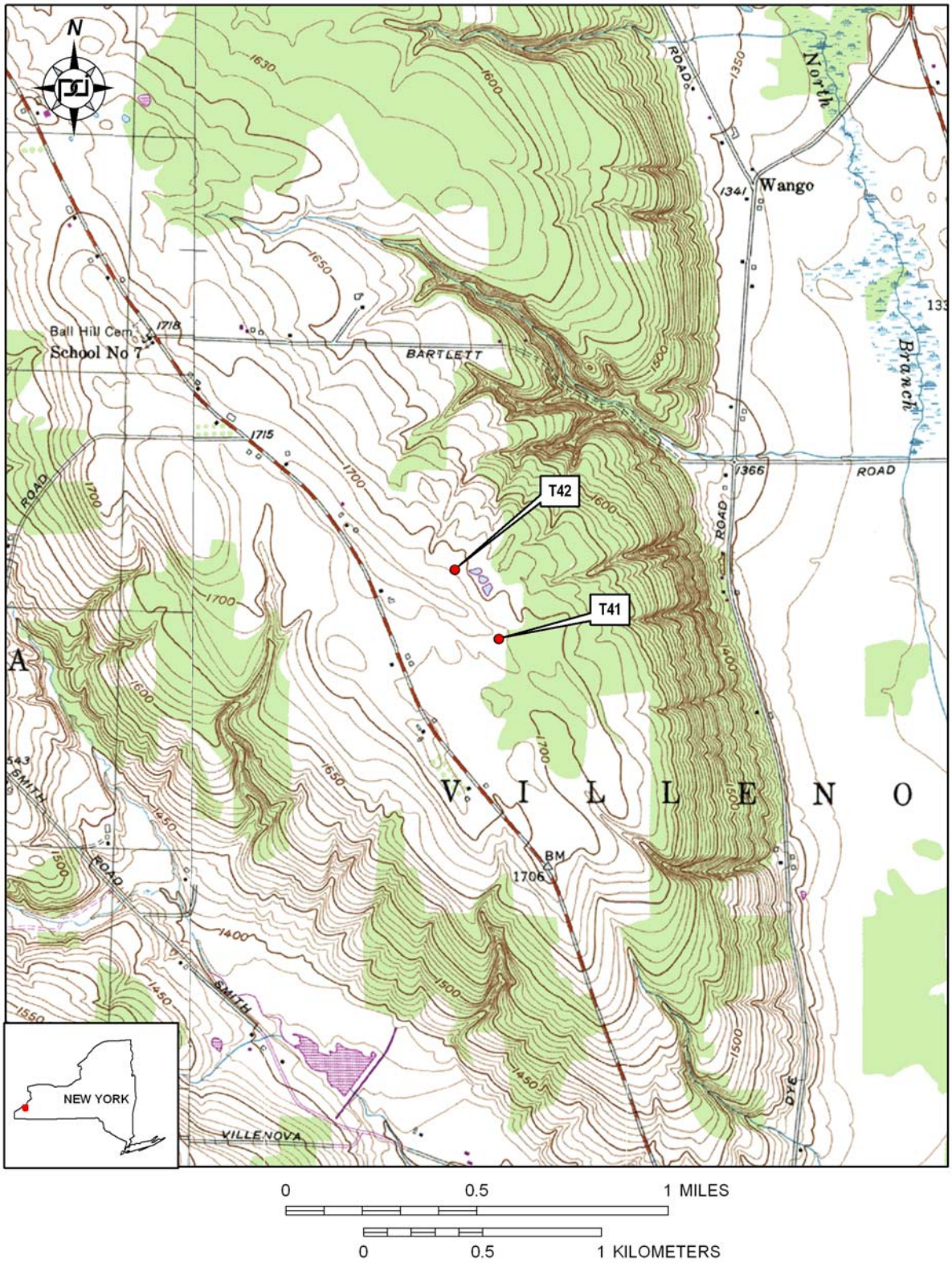
Map References: Map or maps showing exact location and extent of site must accompany this form and must be identified by source and date. Keep this submission to 8½"x 11", if possible.

USGS 7½ Minute Series Quad. Name Silver Creek 1962; Farnham 1963; Forestville 1980; and Perrysburg 1980

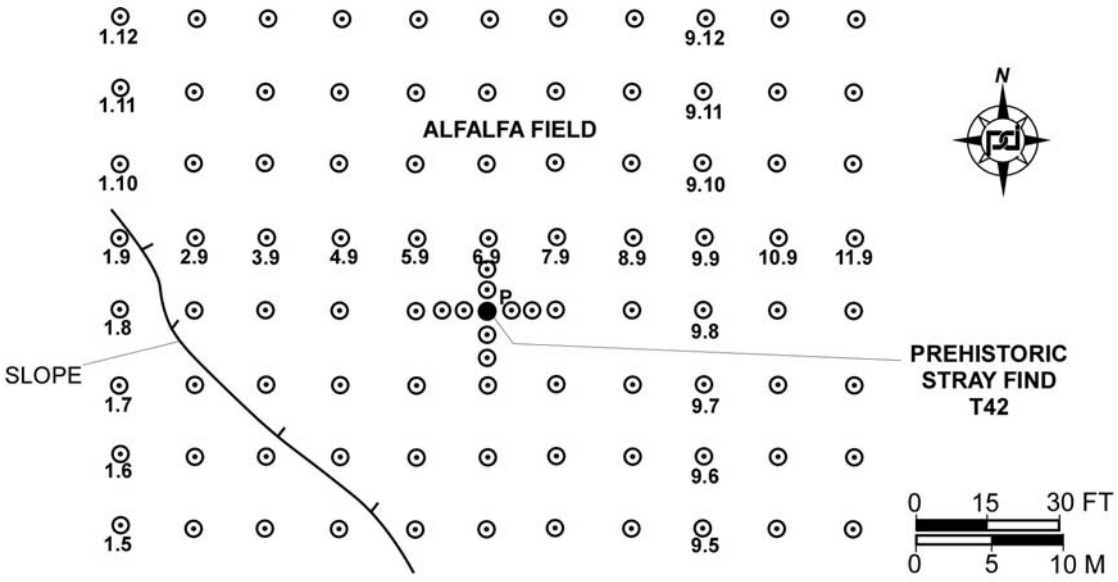
For or Office Use Only--UTM Coordinates _____

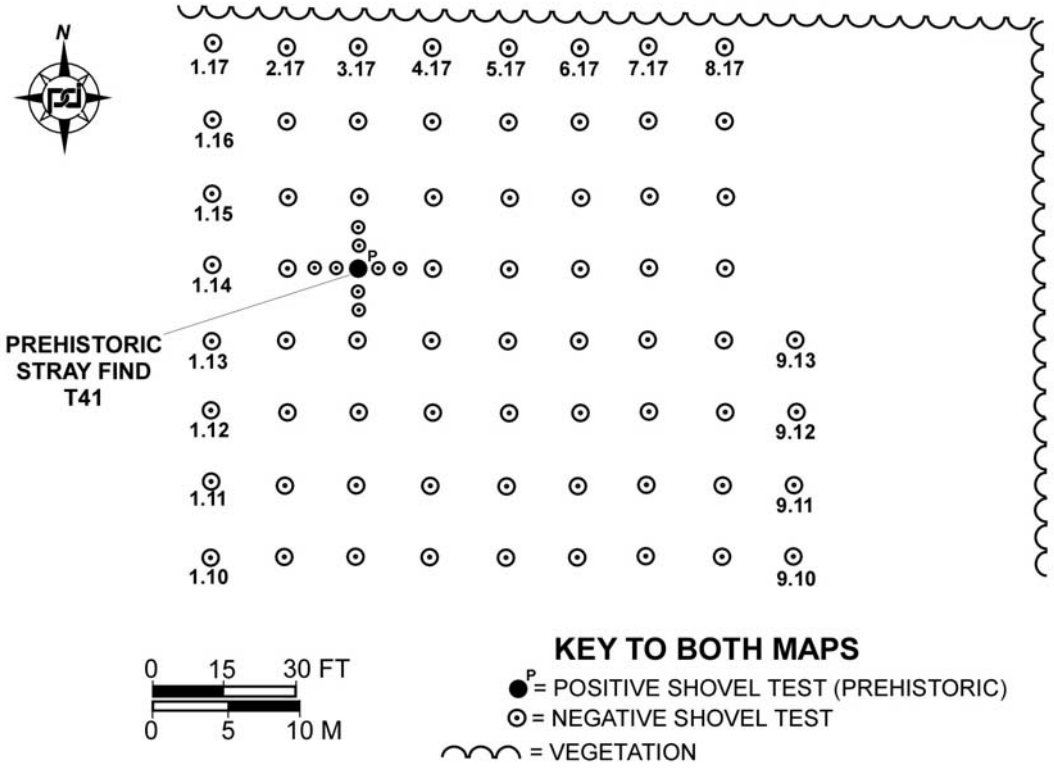
9. Photography (optional for environmental impact survey):
Please submit a 5" x 7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.

See attached sheets.



Location of Site PCI/Ball Hill Prehistoric Stray Finds *(USGS Forestville, NY 1980; Perrysburg, NY 1980).*





Shovel testing at locations of Prehistoric Stray Finds T41 and T42.

General vicinity of Site PCI/Ball Hill Prehistoric Stray Finds, showing terrain and nearby pond, facing east.

Radials being dug at Locus 1 of Site PCI/Ball Hill Prehistoric Stray Finds, facing east.

Vicinity of stray find, Locus 2, of Site PCI/Ball Hill Prehistoric Stray Finds, facing north.

Pond near Locus 2 of Site PCI/Ball Hill Prehistoric Stray Finds, facing east.

Plan for Unanticipated Discoveries

Plan for Unanticipated Discoveries

Given the nature of the archaeological testing methodology employed to test the Area of Potential Effect (APE), there are many areas that have not been previously examined and that may contain archaeological deposits. If any such deposits are encountered during construction they should be considered unanticipated discoveries. The following procedures will be used in the event that previously unreported and unanticipated archaeological resources or human remains are found during construction. The procedures differ depending on whether unanticipated non-human cultural materials or human remains are encountered.

The goals of the unanticipated discoveries plan are to:

- Establish the commitment of the Project team to the appropriate action in the event of the unanticipated discovery of cultural resources;
- Create an understanding of the procedures for cultural resource identification and processing so that Project construction schedules are not adversely impacted; and
- Develop, within the on-site construction employees and supervisors, a sense of stewardship for and participation in the potential recovery and understanding of cultural resources.

Cultural resource discoveries that require reporting and notification to the Environmental Monitor include:

- Any human remains; and
- Any recognizable, potentially significant concentrations of artifacts, features, or other evidence of human occupation in areas that were not previously examined

Procedures

The following procedures will always be adhered to if unanticipated potential discovery of artifacts or historic property remains occurs during construction:

1. The Contractor must stop work immediately in the area of the find to protect the integrity of the find. The Contractor will not restart work in the area of the find until granted clearance.

2. The Contractor will immediately notify, the designated on-site Environmental Monitor/Project Manager of the find.

3. The Project Manager will promptly notify the Project Archaeological Consultant, who will coordinate an on-site archaeological consultation to evaluate the find. Notification will include: specific location of discovery within the disturbed area of the Project site and the nature of the discovery.

4. The Project Archaeological Consultant will immediately notify the Project Manager by telephone regarding the preliminary significance of the find.

5. The Project Manager will promptly notify SHPO of the find.

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6. The notification to SHPO will either (a) explain why the Project Archaeologist believes the resource is not significant and request approval for construction to proceed or (b) describe a scope of work for evaluating the significance of the resource and evaluating Project effects on it. In the latter case, the notification to SHPO will include a request for authorization to implement the scope of work. All work to evaluate significance will be confined to the Project's area of effect.

7. The Project Manager will notify other parties, as directed by SHPO, or as indicated by state/federal law.

8. If the find is determined to be significant, and continuing construction may damage more of the site, then the Project Manager will request recommendations from SHPO and other parties regarding appropriate measures for site treatment. These measures may include:

   - Formal archaeological evaluation of the site;
   - Visits to the site by SHPO and other parties;
   - Preparation of a mitigation plan for approval by SHPO;
   - Implementation of the mitigation plan; and
   - Approval to resume construction following completion of the fieldwork component of the mitigation plan.

9. If the find is determined to be isolated, not eligible for the NRHP, or that additional data recovery will not provide significant information, the Project Manager will consult with SHPO and other parties, and will request approval to resume construction, subject to any further mitigation that may be required.

10. The Project Manager will notify the on-site Environmental Monitor who will grant clearance to the Contractor to start work.

Discovery of Human Remains

If the unanticipated discovery includes potential human remains, the attached "Human Remains Discovery Protocol" developed by SHPO should be followed.

State Historic Preservation Office
New York State Office of Parks, Recreation and Historic Preservation
Human Remains Discovery Protocol

In the event that human remains are encountered during construction or archaeological investigations, the State Historic Preservation Office (SHPO) requires that the following protocol is implemented:

- At all times human remains must be treated with the utmost dignity and respect. Should human remains be encountered, work in the general area of the discovery will stop immediately and the location will be immediately secured and protected from damage and disturbance.

- Human remains or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.

- The county coroner and local law enforcement as well as SHPO and the involved agency will be notified immediately. The coroner and local law enforcement will make the official ruling on the nature of the remains, being either forensic or archeological. If the remains are archeological in nature, a bioarchaeologist will confirm the identification as human.

- If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a plan for their protection or removal can be generated. The involved agency will consult SHPO and appropriate Native American groups to determine a plan of action that is consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) guidance.

- If human remains are determined to be Euro-American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated. Consultation with SHPO and other appropriate parties will be required to determine a plan of action.