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## WETLAND MITIGATION PLAN

**Ball Hill Wind Energy, LLC**  
**Hanover, New York**

October 2018  
File No. 21.0056858



**PREPARED FOR:**  
Ball Hill Wind Energy, LLC  
Brookfield, Colorado

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October 18, 2018  
File No. 21.0056858

Mr. Sean Flannery  
Ball Hill Wind Energy, LLC  
11101 West 120<sup>th</sup> Avenue, Suite 400  
Broomfield, Colorado 80021

Re: Wetland Mitigation Plan  
South Dayton Silver Creek Road (Tax Map 118.00-1-29)  
Hanover, New York

Dear Mr. Flannery:

GZA GeoEnvironmental, Inc. (GZA) is pleased to submit the attached Wetland Mitigation Plan for the proposed Ball Hill Wind Energy, LLC project located in the Towns of Villenova and Hanover, New York (i.e., the Site). This report summarizes the results of wetland assessment field work completed during September 2018, as well as mitigation plan development.

Should you have any questions, please feel free to contact Deborah Zarta Gier at 603-232-8718 or Tracy Tarr at 603-232-8720.

Sincerely,

GZA GEOENVIRONMENTAL, INC.

Tracy L. Tarr, CWS, CWB, CESSWI  
Senior Project Manager

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Attachment: Wetland Mitigation Plan



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## 1.0 INTRODUCTION

This report presents the results of the wetland assessment and mitigation design developed by GZA GeoEnvironmental, Inc. (GZA) for the proposed Ball Hill Energy, LLC (Ball Hill) Wind Project mitigation site located in Hanover, New York (i.e., tax identification number 118.00-1-29, the Site). Ball Hill, a company owned by Renewable Energy Systems Americas, Inc. (RES), proposes to construct and operate the 100 MW Ball Hill Wind Project (project) in Villenova and Hanover, New York. The project consists of twenty-nine 3.45 MW wind turbines, approximately 13 miles of access road, approximately 20 miles of collection lines, an operations and maintenance facility, an electrical substation, and approximately 6 miles of 115-kV electrical transmission line. The proposed project includes 0.87 acres of wetland fill under the jurisdiction of the United States Army Corps of Engineers (USACE), and approximately 805 linear feet of stream impact for the installation of the proposed access roads. In addition, the project requires 4.21 acres of forested wetland conversion as part of the construction and maintenance of the transmission line. As a result, based on the Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (40 CFR Part 230), the project requires a Mitigation Plan (Plan) to mitigate for unavoidable loss of wetland functions and values. Given the lack of available in-lieu fee options (e.g., the Ducks Unlimited in-lieu fee program lacks appropriate credits), a permittee-responsible mitigation plan was developed for the project as described in the GZA memorandum titled “Ball Hill Conceptual Mitigation,” dated July 6, 2018. Based on the ratios of proposed wetland impact by habitat type, a minimum of 3.17 acres of compensatory wetland mitigation and 431 linear feet of compensatory stream mitigation is required as part of permitting for the project.

The proposed mitigation parcel (i.e., Site) is located at 10050 South Dayton Silver Creek Road in Hanover, New York and includes approximately 20 acres of a larger 100-acre property (i.e., tax identification number 118.000-1-29, see **Figure 1**, Site Locus). Based on preliminary discussions with Molly Connerton of the USACE, the proposed mitigation package includes a combination of upland and wetland preservation, wetland creation, and wetland enhancement. In order to complete the Plan, GZA conducted field assessment work, identified mitigation concepts and transferred that information into design components. The field assessment included the following components:

- Wetland delineation
- Wetland classification
- Wetland function-value assessment
- Verification of mitigation plan concepts

Following field work, GZA engaged USACE in a discussion of proposed concepts. GZA then developed the final mitigation plan based on our assessment combined with feedback from the USACE.

GZA understands that the following Plan will be submitted to the USACE and the New York State Department of Environmental Conservation (NYSDEC) for review and comments. In addition, GZA understands that the Plan, once approved, will be incorporated into permit conditions associated with the Joint Application for Permit to the USACE and NYSDEC. This report is subject to the Limitations in **Appendix A**.



## 2.0 PROJECT DESCRIPTION

### 2.1 SCOPE OF WORK

Professional services provided by GZA within the work area described below included:

- Delineation and classification of State and federal jurisdictional wetland areas. The wetland delineation was completed by Certified Wetland Scientist (CWS) Ms. Tracy Tarr (CWS No. 281), Julia Braunmueller, and Rachel Radicello on September 4, 2018.
- Assessment of Wetland Functions and Values. Wetland classification and wetland function-value assessment field work was conducted by CWS and Certified Wildlife Biologist Ms. Tracy Tarr (CWS No. 281), Julia Braunmueller, and Rachel Radicello on September 5, 2018.
- Mitigation Plan development. Mitigation plan development was completed by Patrick McCarthy and Tracy Tarr with input and review by Deborah Zarta Gier.

### 2.2 DESCRIPTION OF MITIGATION AREA

The mitigation Site consists of approximately 20 acres and is located on South Dayton Silver Creek Road in Hanover, New York (i.e., tax ID number 118.00-1-29; see **Figure 1**, Site Locus). The Site is part of a larger agricultural property that is used primarily for sheep pasture. The Site is located in an agricultural, rural landscape (see **Figure 2**, Aerial Overview Plan). A barn and other infrastructure is located to the north of the Site, and the Site is accessed directly from South Dayton Silver Creek Road, as well as from an existing gravel farm access road to the north. The Site is located to the west of South Dayton Silver Creek Road and includes approximately 1,138 linear feet of Silver Creek, in the upper portions of its watershed. Evidence of historical ditching and tile drainage is present on the property. Enhancement on the property will seek to restore functions and values impacted by ongoing agriculture.



View of the existing barn (left photo) and old tile (right photo) used for drainage of the agricultural field looking easterly from the northern edge of the proposed mitigation Site.



### 3.0 METHODOLOGY

#### 3.1 WETLAND DELINEATION

The wetland delineation was conducted in accordance with the USACE Wetlands Delineation Manual using the Routine Determinations Method (the Manual), and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual (see each, below) as required by the USACE. The following standards were used to assess jurisdiction under the Manual and to classify the wetland systems on the site.

- Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*; and *Phytoneuron* 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X;
- U.S. Army Corps of Engineers, Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi;
- U.S. Army Corps of Engineers. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, ed. J. S. Wakely, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center; and
- U.S. Department of Agriculture, Natural Resource Conservation Service, 2017. *Field Indicators of Hydric Soils in the United States*, Version 8.1. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

#### 3.2 WETLAND CLASSIFICATION

Field delineated wetlands were classified according to the *Classification of Wetlands and Deepwater Habitats of the United States*, December 1979, United States Department of the Interior Fish and Wildlife Service FWS/OBS-79/31. For the purpose of this report, wetlands are classified based on their dominant vegetative community and hydrologic regime. See **Table 1** for a listing of each wetland type identified within the study area and its classification.

#### 3.3 WETLAND FUNCTION-VALUE ASSESSMENT

The functions and values of wetlands were assessed by GZA utilizing the USACE Highway Methodology Workbook Supplement (USACE September 1999). The functions and values assessed included: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant retention, nutrient removal, production export, sediment/shoreline stabilization, wildlife habitat, recreation, education/scientific value, visual quality/aesthetics, uniqueness/heritage, and endangered species habitat. Functions and values are considered “principal” if they are determined to be an important physical component of a wetland ecosystem, and/or are considered of special value to society, from a local, regional, and/or national perspective. Functions and values may be considered “capable” if a wetland can provide any given function or value on a limited basis. The rationale for the assignment of functions as principal or capable is based upon professional judgment with guidance provided in a list of considerations outlined in the USACE methodology.



### 3.4 MITIGATION PLAN DEVELOPMENT

The mitigation plan was developed based on concepts presented in GZA’s memorandum titled “Ball Hill Conceptual Mitigation,” dated July 6, 2018, and preliminary review by the USACE on September 27, 2018. The plan components were focused to address USACE plan requirements as outlined in Section 40 CFR Part 230 of the Federal Register (i.e., final rule for compensatory mitigation for losses of aquatic resources). Recent revisions to the project design have resulted in the incorporation of large box culverts and bridge crossings, further minimizing impacts to riverine aquatic resources and associated aquatic passage. As a result of these decreased impacts, the Applicant is no longer seeking to incorporate the stream mitigation project located in Ellington, New York that is currently being designed by the Chautauqua County Soil and Water Conservation District. It is noteworthy that the Ellington Project component would have also required additional permitting on a timeframe that extends beyond the anticipated permitting timeframe of the Ball Hill Wind Energy project. However, the Plan proposed herein incorporates stream mitigation in the form of preservation and enhancement at the primary mitigation Site to fulfill mitigation requirements.

## 4.0 RESULTS

### 4.1 JURISDICTIONAL WETLANDS/CLASSIFICATION

Two wetland systems totaling 12.22 acres were identified on the Site (see **Table 1**, Wetland Classification Summary Table and **Figure 3**, Mitigation Site Delineation). Wetland A consists of a large, diverse wetland system that borders and drains from off-site areas to the east via a culvert under South Dayton Silver Creek Road as well as from East Mud Lake located to the south. Wetland B is an isolated wetland located on the northeastern edge of the Site.

**TABLE 1**  
**Wetland Classification Summary Table**

Wetland Description	Wetland Classification	Existing Habitat Size (Acres)
Wetland A	PEM/SS1E, PEM1F, R2UB, PFO1/4E	12.03 ac
Wetland B	PEM1E	0.19 ac
<b>Total Wetland Acreage</b>		<b>12.22 acres</b>

#### 4.1.1 Wetland A (PEM/SS1E, R2UB, PFO1/4E)

Wetland A totals approximately 12.03 acres on site and consists of a large palustrine, emergent and scrub-shrub system that is seasonally saturated/flooded. The edges of this system are maintained as emergent cover through grazing and mowing. Two forested “island” areas are located on the southwestern edge of the wetland system and are classified as palustrine forested systems that are dominated by broad-leaved deciduous and needle-leaved evergreen vegetation that is seasonally flooded/saturated. These forested areas provided important cover and nesting sites to migratory songbirds. The wetland system also contains approximately 1,138 linear feet of the upper portion of Silver Creek which drains from East Mud Lake from south of the Site, and eventually drains to



the Silver Creek Reservoir, ultimately draining into Lake Erie northwest of the Site. Semi-permanently flooded emergent areas (PEM1F) border the stream and contribute to overall plant diversity in the wetland. Dominant soils in the wetland are classified as Ashville silt loam by the Natural Resource Conservation Service (NRCS, see **Appendix B**, Custom Soil Resource Report). Soils in the outer extent of the system are poorly drained, while very poorly drained soils are present in and adjacent to Silver Creek.

Dominant vegetation in the shrub layer of the wetland includes arrow-wood (*Viburnum recognitum*), speckled alder (*Alnus incana ssp. rugosa*), red-osier dogwood (*Cornus racemosa*), willow (*Salix* spp.), and sweet gale (*Myrica gale*). The herbaceous layer is diverse and includes sensitive fern (*Onoclea sensibilis*), purple Joe-Pye weed (*Eutrochium purpureum*), boneset (*Eupatorium perfoliatum*), late goldenrod (*Solidago gigantea*), lance-leaved goldenrod (*Euthamia graminifolia*), arrow-leaved tearthumb (*Persicaria sagittata*), wool grass (*Scirpus cyperinus*), New England aster (*Symphotrichum novae-angliae*), horsetail (*Equisetum* spp.), rice cut grass (*Leersia oryzoides*), Canada rush (*Juncus canadensis*), blue vervain (*Verbana hastata*), and marsh skullcap (*Scutellaria galericulata*). Species found in the tree layer include red maple (*Acer rubrum*) and black cherry (*Prunus serotina*). The semi-permanently flooded sections of the emergent marsh also contained pickerelweed (*Pontederia cordata*), broad-leaved cattail (*Typha latifolia*), and American bur-reed (*Sparganium americanum*).



Overall view of Wetland A looking westerly.

#### 4.1.2 Wetland B (PEM1E)

Wetland B totals 0.19 acres and is located in the southeastern corner of the Site. The wetland is classified as a palustrine emergent system that is seasonally saturated/flooded. Dominant vegetation in the wetland includes broad-leaved cattail and late goldenrod. Other plant species present included boneset, soft rush (*Juncus effusus*), and wool grass. Dominant wetland soils are classified as Valois gravelly silt loam by the NRCS and are predominantly poorly drained.





View looking westerly at Wetland B from South Dayton Silver Creek Road.

## 4.2 WETLAND FUNCTION-VALUE ASSESSMENT

### 4.2.1 Wetland A

The principal functions of the wetland system include groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, nutrient removal, production export, and wildlife habitat (see **Appendix C**, Wetland Function-Value Evaluation Forms). The wetland contains the headwaters and upper reaches of Silver Creek. Wetland hydrology appears to be supported by both surface flow and groundwater discharge. As a headwater area, the stream channel is diffuse and lacks well-defined banks in the center of the wetland. The vegetated wetland areas bordering the stream channel are wide and provide floodflow alteration by slowing and detaining water during flood events.



View of dense emergent vegetation in the central section of Wetland A.



The wetland is located in an agricultural area where nutrient sources are contributed from agricultural practices including grazing live stock. High vegetation density is present in portions of the wetland and is providing a high level of nutrient removal in the western and central portion of the wetland system. Ongoing grazing to the east of the wetland is limiting potential nutrient removal, and this function can be improved through mitigation practices including restriction of grazing through land preservation, and plantings associated with wetland enhancement and ditch restoration. Floodflow alternation can also be enhanced through ditch removal by slowing and creating diffuse flows in the wetland. The presence of emergent cover is supporting species such as great blue heron (*Ardea herodias*), meadow vole (*Microtus pensylvanicus*), and white-tailed deer (*Odocoileus virginianus*), which were observed during field work. However, wetland enhancement through plantings has the potential to improve the habitat value for shrubland songbirds, which prefer to dense in dense scrub-shrub cover of varying heights.



View of livestock grazing near Wetland A.

This wetland is also suitable for fish/shellfish habitat and sediment/shoreline stabilization. The stream likely supports fish associated with small, upper watershed systems. Sediment/shoreline stabilization can be improved with the removal and restoration of the ditch located in the eastern portion of the wetland. In addition, shrub plantings along the brook would serve to shade stream flow and improve fish habitat. Although no rare species are known at the Site, the Site has potential to support American bittern (*Botaurus lentiginosus*), which is a special concern marsh bird recently documented in the county (see **Appendix D**, NY Nature Explorer Results).

#### 4.2.2 Wetland B

Wetland B is an isolated wetland located on the on the top of a knoll above Wetland A. Due to adjacency to a road, as well as agricultural land, the principal functions of the wetland system are sediment/toxicant retention and nutrient removal. The wetland contains a shallow basin that allows for retention of nutrients and sediments. The wetland is also suitable for floodflow alteration on a small scale and wildlife habitat. The wetland has some potential to function as a vernal pool, although a spring assessment would be required to assess the wetland for vernal pool species. Preservation of the surrounding uplands would serve to increase possible use by amphibians. Currently, wooded habitat suitable for overwintering amphibians is located in a peninsular piece of uplands on the southern edge of the Site. Preservation of the Site, with management promoting different successional stages of vegetation, would enhance wildlife habitat function of both the wetland and surrounding uplands.



**4.3 WETLAND MITIGATION DESIGN**

**4.3.1 Mitigation Goals and Objectives**

The overriding goal of the wetland mitigation plan is to compensate for functions and values lost/reduced as part of the proposed Project (see **Table 2**, Summary of Proposed Wetland Impacts and **Table 3**, Summary of Required Mitigation Ratios), through a suite of mitigation options including wetland/upland preservation, wetland creation, and wetland enhancement (see **Figure 4**, Wetland Mitigation Plan Concept).

**TABLE 2**  
**Summary of Proposed Impacts**

Watershed	Permanent Fill (acres)	Permanent Forest Conversion (acres)
Conewango	0.47	0.08
Chautauqua-Conneaut	0.4	4.13
		<b>12.4 acres</b>

The project is specifically focused to mitigate for flood and stormwater control (i.e., floodflow alteration), wildlife habitat, water quality, fish/shellfish habitat, production export, recreation, aesthetics, and education/scientific value. The application of a diverse mitigation package increases the likelihood of success in mitigation. The goals of the Plan, as outlined in the Ball Hill Wind Project Conceptual Mitigation Plan (Fisher 2016) are to:

1. Re-establish forested wetlands on the Site and enhance diversity in plant species/communities;
2. Re-establish natural hydrology through the restoration of ditches;
3. Improve on-site water quality by removing pastured animals from the wetland;
4. Improve nutrient cycling through maintenance of diverse plant communities and natural hydrology;
5. Enhance habitat diversity and associated wildlife use through plantings; and
6. Improve educational/recreational opportunities and land protection through appropriate legal protections.

**TABLE 3**  
**Summary of Required Mitigation Ratios**

Wetland Resource (Cowardin Classification)	Impact Type	Mitigation Ratio	Required Compensatory Mitigation
PEM	Permanent fill	1:1	0.44 acres
PSS	Permanent fill	1:1	0.24 acres
PFO	Permanent fill	2:1	0.38 acres
PFO	Conversion	0.5:1	2.11 acres
Riverine	Permanent fill	1:1	431 linear feet
<b>Total</b>			<b>3.17 acres, 431 linear ft of stream</b>





4.3.2 Site Selection

In the Joint Application for Permit, submitted in May 2017, Ball Hill initially proposed to mitigate for proposed wetland impacts through purchasing credits from the in-lieu fee program offered by Ducks Unlimited. Ball Hill now understands that sufficient credits to mitigate for the proposed project are no longer available. As a result, Ball Hill identified a permittee-responsible mitigation option located with the Chautauqua-Conneaut watershed. This Site is ideal as it provides a diverse suite of mitigation options including wetland/upland preservation, wetland creation, and wetland enhancement (see **Table 4**, Summary of Proposed Mitigation). Historical agricultural practices on the property have included ditching in the eastern portion of the Site, as well as tiling, to promote drier conditions. To enhance wetland functions and values, Ball Hill is proposing to preserve 20.22 acres of the larger 100-acre property, which will remove livestock grazing on the property. Livestock grazing artificially creates short, maintained emergent communities and can lead to soil compaction, increased runoff, and nutrient pollution, where manure best management practices are not followed.

**TABLE 4**  
**Summary of Proposed Mitigation**

Wetland Classification	Mitigation Type	Proposed Compensatory Mitigation	Mitigation Ratio and Notes
PEM/SS (Wetland A)	Preservation	11.45 acres	
PFO (Wetland A)	Preservation	0.21 acres	
Riverine (Wetland A)	Preservation	0.23 acres, 1,138 l.f./	2.64:1 (l.f. stream)
PEM (Wetland B)	Preservation	0.33 acres	
Upland Buffer	Preservation	6.73 acres	
Created wetlands	Preservation	1.27 acres	
Total Wetland Preservation		13.49	4:25:1 (Wetland Preservation)
<b>Total Land Preservation</b>		<b>20.22 acres TOTAL/1,138 l.f. stream</b>	<b>6.38:1 (Total Preservation)</b>
PEM	Creation	0.44 acres	
PFO	Creation	0.83 acres	
PFO	Enhancement	1.14 acres	
PSS	Enhancement	0.37 acres	
PEM/SS - ditch removal	Enhancement	0.15 acres	
PSS – stream buffer enhancement	Enhancement	0.24 acres	
<b>Total Creation/Enhancement</b>		<b>3.17 acres</b>	<b>Meets mitigation requirement</b>

The selected property is uniquely located in the upper watershed of Silver Creek, which ultimately drains to Lake Erie. Preservation and enhancement of wetlands on the Site will serve to protect water quality for on-site and



downstream areas of Silver Creek, including wetlands recognized under the New York State Freshwater Wetlands Act (i.e., NYS wetlands). Land preservation in the upper watershed also serves to limit impervious surfaces and moderate flood events in downstream areas. The project will also improve wildlife habitats in an approximate 1,138-linear-foot reach of Silver Creek. Proposed plantings along the stream will serve to create nesting and feeding areas, and moderate stream temperatures for fish and other aquatic species.

#### 4.3.3 Site Protective Instrument

Values of the mitigation area are proposed to be protected in a Site Protective Instrument (SPI) through a declaration of restrictive covenant in advance of implementation of the Plan, to ensure long-term protection of the Site. The terms of the SPI will be developed with input and review by the USACE and NYSDEC. Upon approval by the USACE, NYSDEC, and underlying land owner, the SPI will be recorded within 60 days at the Chautauqua County courthouse.

#### 4.3.4 Mitigation Work Plan

Wetland creation is proposed adjacent to a large existing emergent and scrub-shrub wetland (see **Figure 5**, Mitigation Detail Plan). The contours of the natural wetland inform the mitigation design on appropriate ranges of topography to support hydrology and blend in with existing, native communities. In the existing wetland, elevations range from as high as approximately 1350 feet down to a low of 1334 feet. This large range is due in part to off-site hydrology that contributes surficial flow from the east and south. Seeps, stream flow from Silver Creek, and a seasonally high-water table are the source of hydrology for the adjacent natural wetland. Historical agricultural practices on the property were directed at channelizing diffuse wetland seeps and surficial drainage. Tiles were also installed in the field to limit hydrology through drainage of excess water from below ground surface. The following Mitigation Plan takes advantage of existing natural seeps and drainage, and seeks to restore previously altered hydrology. As a result, wetland hydrology in the creation area is attainable and has a high likelihood of success. As part of the Plan, the Applicant proposes to restore natural topography in two ditch lines to create diffuse wetland overland sheet flow in the creation area, where ditching and historical tiling altered hydrology near in the eastern portion of the Site. In addition, the project proposes to adjust contours in the creation area, to match the adjacent existing natural grades, through strategic excavation and grading in uplands in the outer approximate 100-foot area of the creation zone. Soil will be used to restore the grades in approximately 705 linear feet of ditch line. Off-site soil removal is not proposed as part of the project. Existing clay tiles are proposed to be broken up during rough grading of the creation areas. To contribute to high diversity, two creation areas are proposed in the eastern portion of the Mitigation Area (herein referred to as the northern and southern creation areas, see Mitigation Detail Plan, **Figure 5**).

Plant succession has been artificially prevented by long-term grazing on the Site. The Mitigation Plan proposes to create two forested wetland plant communities to mitigate for wetland conversion on the project site, and to enhance functions and values of the Mitigation Area. The Mitigation Plan targets specific forested wetland plant communities to increase diversity and habitat stratification. In addition, the Plan includes enhancement of existing emergent areas.

#### **Southern Creation Area:**

The Southern Creation Area totals 0.28 acres and is specifically designed to create forested wetland on the border of an existing emergent/scrub-shrub wetland where forested wetland has been removed by prior agriculture. The area is proposed to be rough-graded to meet the elevation of the natural wetland, grading from elevation 1346. The southern creation area will be planted as a Red Maple-Swamp White Oak community (Edinger et al., eds. 2014). Red



maple (*Acer rubrum*), swamp white oak (*Quercus bicolor*), and black gum (*Nyssa sylvatica*) trees (approximately 10-gallon) are proposed to be planted on 15-foot centers along the edge of the existing emergent and scrub-shrub wetland. This zone will provide a forested ecotone to the existing wetland and create additional forested wetland on an area currently mowed.

As part of plant establishment, individual trees are proposed to be wrapped with hardware cloth as they establish to reduce overall plant loss from browsing. Given the presence of white-tailed deer, plant protection will be required to protect trees while they are establishing on the Site. The creation area will be over-seeded with a Northeast Wetland Shrub/Herb Mix,<sup>1</sup> or comparable seed mix, to supplement diversity and ensure soil stabilization.

#### **Northern Creation Area:**

The Northern Wetland Creation Area totals 0.99 acres and is located in an area with basin topography suitable for wetland creation, adjacent to an existing emergent wetland area. The northern wetland creation area is proposed to be planted as a Red maple – hardwood Swamp. This is a common forested wetland that occurs in poorly drained depressions or basins. Red maple, American elm (*Ulmus americana*), and yellow birch (*Betula alleghaniensis*) trees (approximately 10-gallon size) will be planted on 15-foot centers. Individual trees are proposed to be wrapped with hardware cloth as they establish to reduce overall plant loss from browsing. The creation area will be seeded with a Northeast Wetland Shrub/Herb Mix, or comparable seed mix, to supplement diversity and ensure soil stabilization.

#### **Enhancement Areas:**

The enhancement areas consist of five existing wetland areas totaling 1.9 acres in the northern and eastern portions of the Mitigation Area (see **Figure 4**, Wetland Mitigation Plan Concept). Enhancement measures are specifically targeted at restoring hydrology and forested wetland communities in native wetland areas. Native soil material from the creation area will be used to restore the grades in two long ditches located in the northeastern corner of the Site near an existing barn (300 linear feet) and in the eastern, central portion of the Site (405 linear feet). This restoration of grades will serve to create diffuse water flow. The restoration of the southern ditch will create natural flow patterns in the existing wetland, while the redirection of flows from an existing artesian well discharge location will serve to promote hydrology in the northern creation area. Given the observed flows in the southern ditch, temporary erosion control blankets are proposed in the flow path after grade restoration, while vegetation is becoming established. In addition, flow will be carefully monitored during enhancement/creation measures. If necessary, flow will be re-directed to stable areas using sand bags and dewatering with a small pump, while the ditch grades are restored.

The following construction sequence was designed to provide for adaptive construction sequencing and detailed construction monitoring consistent with USACE standards to ensure performance standards are met (see **Figure 6**, Erosion Control Notes and **Figure 7**, Planting Notes for additional details).

1. All key project personnel involved in the wetland creation and enhancement will attend a pre-construction meeting. A project wetland scientist will monitor the construction of the creation/enhancement areas and monitor compliance with the approved plan, and any additional project conditions required by the USACE and NYDEC.

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<sup>1</sup> Seed mix is available through Southern Tier Consulting. <http://www.southern-tierconsulting.com/seedmix.htm>.



- a. The key personnel will develop a construction schedule with all parties involved.
  - b. Areas of responsibility will be assigned (e.g. excavation, plantings, and erosion control).
  - c. The following construction sequence will be reviewed and may need to be altered depending on site conditions. All parties must approve changes in the construction sequence, and changes may require review by the USACE and NYSDEC.
2. All work must be completed in accordance with the project specifications and approved final figures.
  3. Erosion controls will be installed prior to the commencement of excavation. Straw wattle or similar perimeter control will be installed between the existing wetland and creation areas.
  4. Prior to excavation, the plant zones (forested creation, forested enhancement, and scrub-shrub enhancement) will be staked in the field and approved by the project Wetland Scientist prior to initiation of grading and plant installation.
  5. The project Wetland Scientist will conduct a pre-construction inspection, followed by regular monitoring inspections throughout excavation and plant installation. Adjustments to the Plan may be requested by the Wetland Scientist to ensure proper conditions for plant growth.
  6. Construction activities will take place during low water, whenever possible.
  7. The creation area will be excavated approximately 10 inches below final grade (approximately elevation 1345 at the uppermost extent of the mitigation area). Top soil will be stockpiled for re-use in the creation area and ditch restoration areas.
  8. The creation area will be excavated down to approximately elevations 1346 to 1342 using a small excavator, to create a connection to the adjacent natural wetland.
  9. Excavated mineral and top soil material from the creation areas will be used to restore the northern and southern ditch lines. If necessary, sand bags will be used to temporarily isolate ditch flow from construction areas. If flow is present, clean water will be pumped around active construction in the ditch lines.
  10. Erosion control blankets/jute matting will be installed in the previous ditch lines, prior to water being redirected over restored grades.
  11. The creation area will be rough-graded to brake existing surficial clay tiles, and to create natural hummock wetland topography. Top-soil will be replaced to established final grades. Hummocks will vary from 1 to 2 feet in height to create varying microtopography in the creation areas, and support a diversity of herbaceous plant species.
  12. A 12-inch PVC pipe will be installed at the existing artesian well to direct natural discharge from the artesian well into the creation area. Topography will be rough-grade to create natural flow paths in the creation area. Flow paths will be temporarily stabilized with jute matting.
  13. Red maple, swamp white oak, and black gum (10-gallon size) will be planted on approximate 15-foot centers in the southerly forested wetland zone. The understory will be seeded with a Northeast Wetland Shrub/Herb Mix. Exposed soil will be lightly mulched with weed free hay for stabilization and to maintain moisture for seed growth.
  14. The northerly forested wetland zone will be planted with red maple, American elm, and yellow birch (10-gallon size) on 8-foot centers. The understory will be seeded with a Northeast Wetland Shrub/Herb Mix. Exposed soil will be lightly mulched with weed free hay for stabilization and to maintain moisture for seed growth.



15. Two- to three-foot-tall speckled alder, highbush blueberry (*Vaccinium corymbosum*), winterberry holly (*Ilex verticillata*), and nannyberry (*Viburnum lentago*) will be planted on approximate eight foot centers in the scrub-shrub creation zone. The understory will be seeded with a Northeast Wetland Shrub/Herb Mix. Exposed soil will be lightly mulched with weed free hay for stabilization and to maintain moisture for seed growth.
16. The stream enhancement planting areas will be planted with 2- to 3-foot tall winterberry holly, buttonbush (*Cephalanthus occidentalis*), and streamco willow (*Salix purpurea*). These species tolerate wet conditions and will serve to create a thick shrub thicket adjacent to the stream. Shrub plantings in the enhancement areas will be installed with hand-held, gas-powered augers to avoid machine access in the existing wetland.
17. Where possible, woody debris or boulders will be placed in the creation areas to create variable topography and cover sites.
18. Temporary erosion controls will be maintained until adjacent creation areas are considered stabilized with 75% or greater herbaceous vegetation.

#### 4.3.5 Maintenance Plan

The Mitigation area will be monitored annually by a Wetland Scientist designated by the Applicant. Based on observations made during monitoring, the Wetland Scientist will make maintenance recommendations to the Applicant. Routine annual maintenance will be undertaken by the Applicant and will be documented in the annual monitoring reports as described in **Section 4.3.7**. It is anticipated that routine maintenance may include replacement of easement signage, protection of plants from browsing, and/or manual invasive species removal. Two to three visits per year, for the first 3 years of the monitoring period, are anticipated to monitor and maintain the Mitigation Area. It is anticipated that maintenance requirements should decline in Year 4 and 5 of monitoring, as wetland communities become established in the Mitigation Area.

#### 4.3.6 Performance Standards

As required by the USACE, the Mitigation Plan includes the following performance standards (i.e., measures of success) to determine whether the creation and enhancement areas are considered successful.

1. The creation areas will exhibit at least one primary or two secondary hydrology indicators by the end of the monitoring period.
2. The creation areas will contain hydric soils and/or have evidence of the formation of redoximorphic features by the end of the monitoring period.
3. The creation areas will be dominated by a minimum of 50% hydrophytes using the Dominance Test or exhibit a Prevalence Index of  $\leq$ three by the end of the monitoring period.
4. Herbaceous zones will have a minimum aerial coverage of 50% within two growing seasons and 75% with three growing seasons.
5. Survivorship of planted and/or naturalized trees and shrubs in the enhancement areas will be at least 50% by the end of the monitoring period.
6. A density of approximately 200 trees per acre will be achieved in the forested zone of the creation area by the end of the monitoring period.



7. The creation and enhancement areas will exhibit at least two vegetative stratification layers, with evidence of shrubs maturing into saplings.
8. The creation and enhancement areas will exhibit less than 5% coverage of invasive species by the end of the monitoring period.
9. If performance standards are not met by Year 3 of the monitoring period, the Applicant will be required to develop a Remediation Plan for the relevant performance standards. Remedial measures may include stabilization, re-grading, re-seeding, re-planting, and/or invasive species removal.

#### 4.3.7 Monitoring Requirements

The Permittees designated Wetland Scientist will monitor the Mitigation Site annually for 5 years following construction to inspect the condition of the mitigation area and signage to demonstrate compliance with the Performance Standards. During annual monitoring, the Wetland Scientist will document wetland hydrology, plant diversity, and soil conditions. Observations in the creation areas will occur at least two times during the growing season in later spring/early summer and again in late summer/early fall, to document the development of the mitigation area, and make recommendations for remedial measures, if necessary. The Wetland Scientist will establish six permanent plots in the creation and enhancement areas to document hydrology, soils, and vegetation. Wetland Determination Data Forms will be completed at plot locations annually to document the anticipated development of hydric soils and hydrophytic vegetation. Plot locations will be staked and photographed during each visit.

##### 4.3.7.1 Hydrology Monitoring

Water depth measurements and secondary hydrology indicators will be assessed to document hydrology in the mitigation area. The Wetland Scientist will document the presence of any observed indicators including surficial water patterns, water depth, depth to soil saturation, and presence of reduced iron.

##### 4.3.7.2 Vegetation Monitoring

The Wetland Scientist will document plant diversity and estimate approximate aerial coverage of plants within each permanent plot. In addition, plant diversity will be documented through random traverse of the overall Mitigation Area, and compared to random traverse routes in the adjacent native wetland. Any observed invasive plant species will be noted. Dominance tests and prevalence indices will be tabulated to determine the presence/absence of hydrophytic vegetation. In addition, as vegetative communities develop, communities will be classified according to criteria outlined in "Ecological Communities of New York State." Observed invasive species will be noted, and if required, an Invasive Species Removal Plan will be developed. However, where feasible, invasive plants will be manually removed and properly disposed of if observed. During vegetative monitoring, observations of wildlife use will also be documented.

##### 4.3.7.3 Soil Monitoring

The Wetland Scientist will document soil conditions by assessing soil profiles at permanent plot locations. Soil profile information will be recorded including soil depth, matrix color, and redoximorphic features (color, type, location, and percentage). Soils will be classified according to hydric soil indicators.



#### 4.3.7.4 Reporting

Throughout the 5-year monitoring period, the Wetland Scientist will prepare an annual report at the end of each monitoring year (by December 31<sup>st</sup>) to document conditions within the wetland creation and enhancement areas, and determine if performance standards are being met. The post-construction assessment appendices will include a functions and values assessment of the mitigation Site, calculation of the created/enhanced wetland areas, an as-built plan of the created areas, and photos of each creation/enhancement area, from permanent photo plots established during monitoring. The final post-construction assessment will also:

1. Summarize the original and modified mitigation goals and level of attainment of the goals;
2. Describe significant problems and solution during construction and maintenance (monitoring) of the creation/enhancement areas;
3. Identify agency procedures or policies that influenced implementation of the mitigation plan; and
4. Recommend measures to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects.

#### 4.3.8 Adaptive Management Plan

If wetland performance standards have not been achieved after the Year 5 post-construction monitoring event, Ball Hill will develop a Wetland Mitigation Remedial Plan for review by USACE and NYSDEC which discusses the performance standards, corrective actions, an assessment of risks, and a schedule for conducting the remedial work. Once approved, the Wetland Remedial Plan will be implemented by Ball Hill according to the approved schedule.

## **5.0 FINDINGS AND CONCLUSIONS**

GZA has completed wetland delineation, wetland classification, wetland function-value assessment, and mitigation plan development for the Site. The following is a summary of our findings and conclusions:

- Ball Hill proposes to construct and operate the 100 MW Ball Hill Wind Project. The proposed project includes 0.87 acres of wetland fill, approximately 805 linear feet of stream impact, and approximately 4.21 acres of forested wetland conversion.
- Based on the ratios of proposed stream impact, the project requires 3.17 acres of compensatory wetland mitigation. As mitigation, the Applicant is proposing to conserve 20.4 acres, create 1.4 acres of wetland, and enhance 3.4 acres of wetland.
- The Mitigation Area contains two wetland systems. Wetland A is a diverse emergent/scrub shrub system that contains approximately 1,138 linear feet of the upper portion of Silver Creek. Wetland B is an isolated wetland with vernal pool potential. The wetlands provide groundwater discharge, floodflow alteration, nutrient removal, sediment/toxicant retention, production export, and wildlife habitat as principal functions.
- The preservation component of the project will provide long-term protection for these wetland functions. The proposed land preservation component of the project will provide a long-term legal instrument to protect the existing functions and values of the wetland systems, as well as functions and values proposed to be enhanced by the project.





- The creation and enhancement components of the Mitigation Plan will serve to improve the functions and values of Wetland A. Specifically, ditch removal and dismantling of drainage tile will serve to improve floodflow alteration, nutrient removal, sediment/toxicant retention, and protect the water quality of NYS wetlands as well as Silver Creek.
- The Mitigation Plan includes extensive planting areas which will increase habitat diversity through the installation and maintenance of Red Maple-Hardwood Swamp, and Red Maple Swamp White Oak communities. This will enhance production export, wildlife habitat, visual quality, and recreation potential.
- As required by the USACE, the Mitigation Plan includes a Maintenance Plan and performance standards. Nine performance standards have been identified to document whether mitigation is successful.
- The Plan includes extensive construction and post-construction monitoring requirements, and an adaptive management plan, spanning 5 years after construction. The project Wetland Scientist will complete annual hydrology, vegetative, soil monitoring, and reporting to document whether performance standards are being met, and to make maintenance recommendations to achieve performance standards.
- The combination of significant land preservation (approximately 20 acres), combined with wetland creation and enhancement of wetlands in an agricultural area, will mitigate for impacts proposed as part of the project and serve to benefit and improve the functions and values of Silver Creek and associated NYS wetlands. Due to the presence of the Site in the upper watershed of Silver Creek, the project will serve to benefit downstream wetland resources that eventually drain to Lake Erie.





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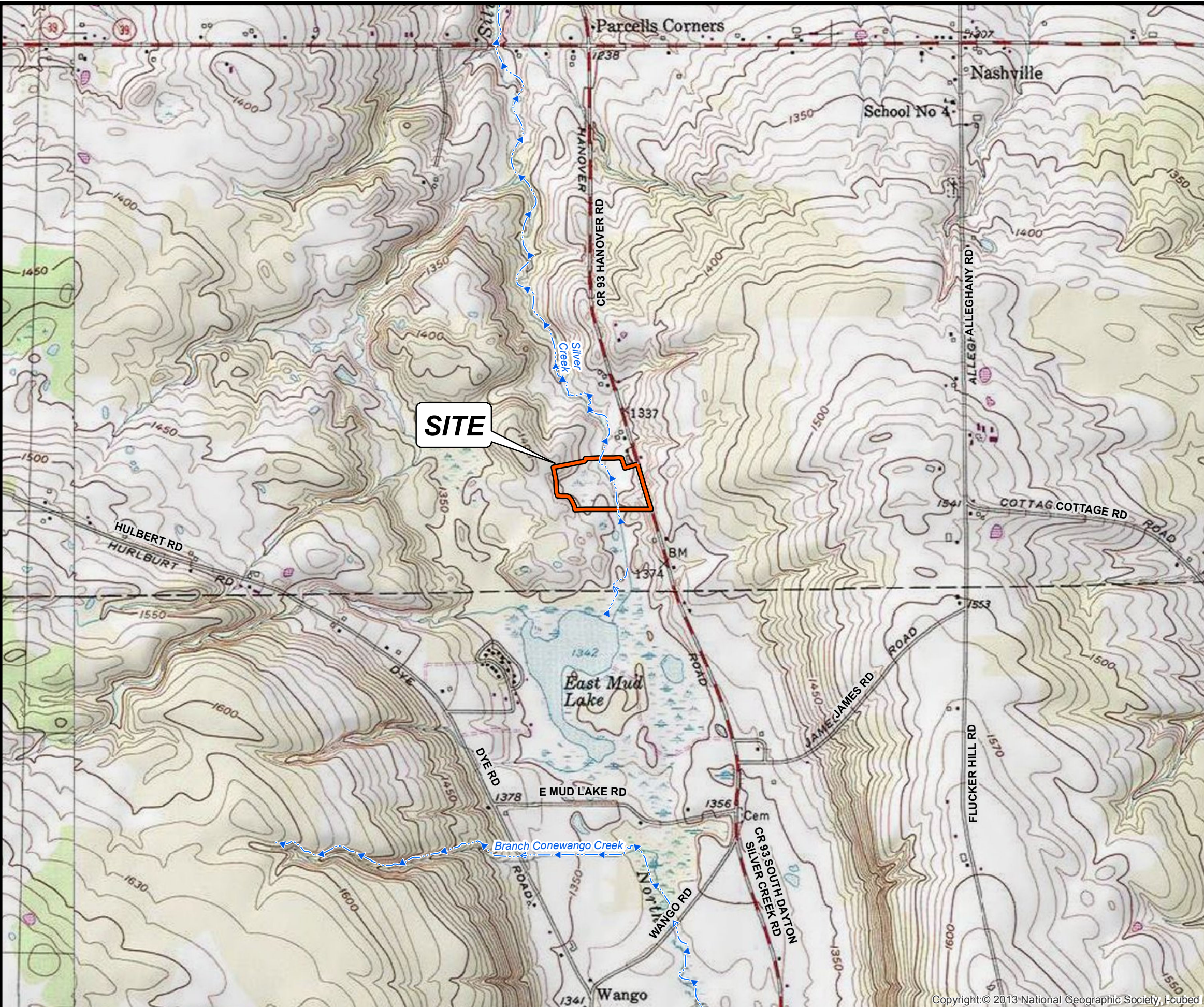
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**Figure 1 - Site Locus**



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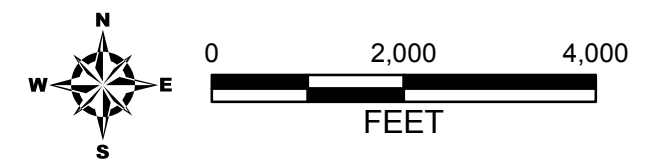
**LEGEND**

- MITIGATION AREA BOUNDARY
- - - FLOWLINES

**SITE DETAILS**

-COUNTY:	CHAUTAUQUA
-TOWN:	HANOVER
-LAT/LONG:	42.440119°, -79.095652° (WGS 1984)
-STUDY AREA SIZE:	20.22 ACRES
-HUC12 CODE:	0412010101
-WATERBODIES:	SILVER CREEK
-USGS QUAD MAP:	PERRYSBURG
-USDA SOILS MAP:	CHAUTAUQUA COUNTY

- NOTES**
- 1) DATA IN CLUDING "FLOWLINES" WAS DERIVED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.
  - 2) THIS MAP CONTAINS THE USGS 1:24,000 SCALE PERRYSBURG QUAD.



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**BALL HILL WIND ENERGY  
MITIGATION SITE**  
10050 SOUTH DAYTON SILVER CREEK RD  
HANOVER, NEW YORK

**LOCUS PLAN**

PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 	
PROJ MGR: PJM	REVIEWED BY: PJM	CHECKED BY: TLT	<b>FIG</b>  <b>1</b>
DESIGNED BY: TLT	DRAWN BY: MJD	SCALE: 1" = 2,000 FEET	
DATE: 10/16/2018	PROJECT NO: 21.0056858.00	REVISION NO:	

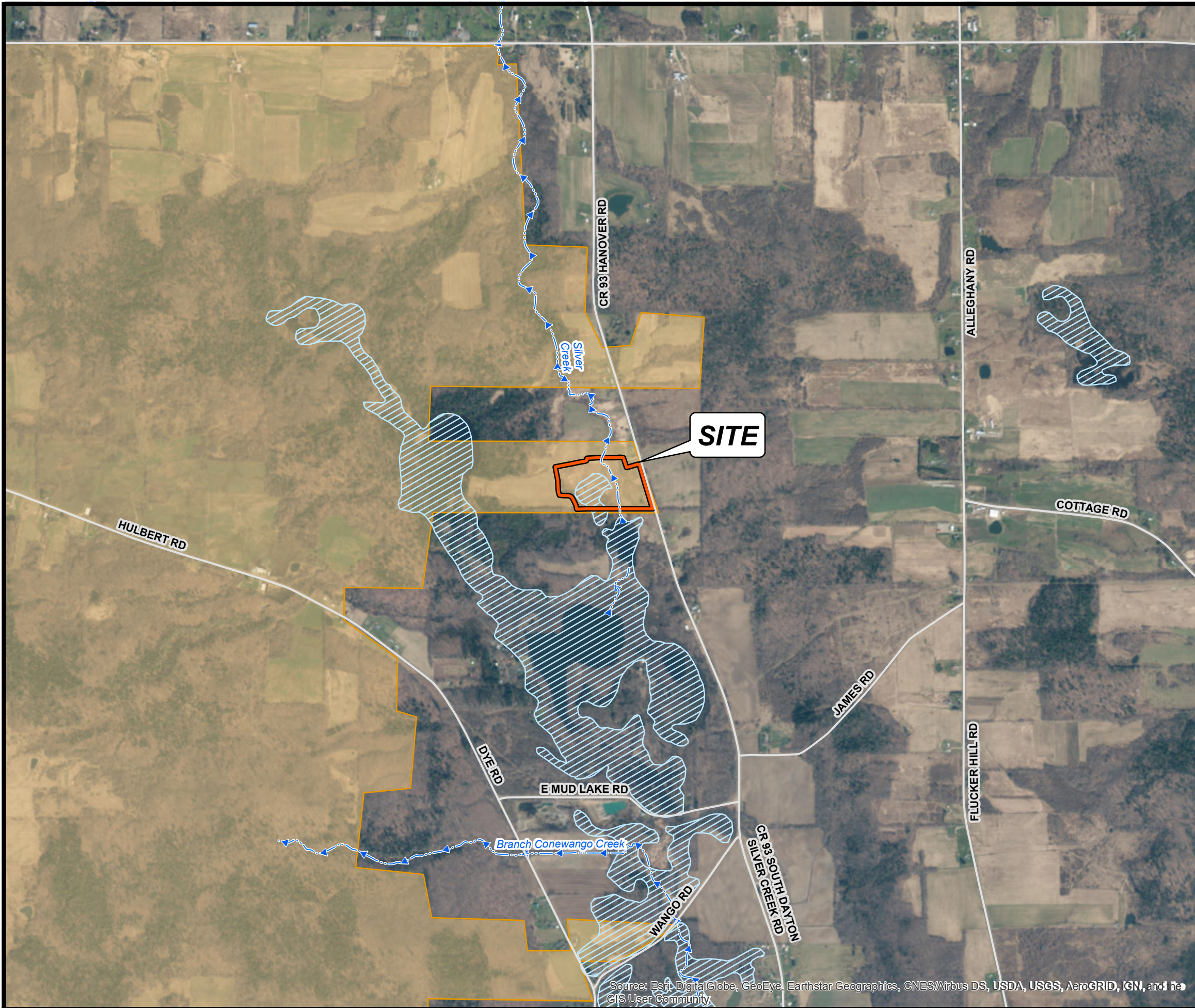








**Figure 2 – Aerial Overview Plan**



© 2018 - GZA Geo Environmental, Inc. P:\Branch\offices\21 Buffalo\RES\Ball Hill\Ball Hill GIS\MXD\Fig 2 - Aerial Overview Plan.mxd, 10/16/2018, 3:13:46 PM, matthew.deane



**LEGEND**

-  MITIGATION AREA BOUNDARY
-  BALL HILL WIND ENERGY PROJECT SITE BOUNDARY
-  NYSDEC WETLANDS
-  FLOWLINES

**SITE DETAILS**

-COUNTY: CHAUTAUQUA  
 -TOWN: HANOVER  
 -LAT/LONG: 42.440119°, -79.095652° (WGS 1984)  
 -STUDY AREA SIZE: 20.22 ACRES  
 -HUC12 CODE: 041201010101  
 -WATERBODIES: SILVER CREEK  
 -USGS QUAD MAP: PERRYSBURG  
 -USDA SOILS MAP: CHAUTAUQUA COUNTY

**NOTES**

- 1) DATA IN CLUDING "NYSDEC WETLANDS", "ROADS", AND "FLOWLINES" WAS DERIVED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.
- 2) THIS MAP CONTAINS THE ESRI ArcGIS ONLINE WORLD IMAGERY MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCGIS SERVICES AND UPDATED OFTEN. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.



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**BALL HILL WIND ENERGY  
 MITIGATION SITE**  
 10050 SOUTH DAYTON SILVER CREEK RD  
 HANOVER, NEW YORK

**AERIAL OVERVIEW PLAN**

PREPARED BY:  
 **GZA** GeoEnvironmental, Inc.  
 Engineers and Scientists  
 www.gza.com

PREPARED FOR:  


PROJ MGR: PJM	REVIEWED BY: PJM	CHECKED BY: TLT	FIG <b>2</b>
DESIGNED BY: TLT	DRAWN BY: MJD	SCALE: 1" = 2,000 FEET	
DATE: 10/16/2018	PROJECT NO: 21.0056858.00	REVISION NO:	

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





**Figure 3 – Mitigation Site Delineation**



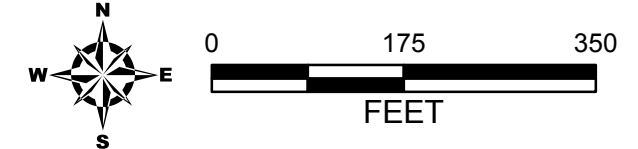
Existing Wetland Area	
PEM/SS	11.45 acres
R2UB	0.23 acres
PFO	0.21 acres
PEM	0.33 acres
<b>Total</b>	<b>12.22 acres</b>
<b>Agricultural Wetland Disturbance</b>	<b>2.05 ac</b>

- LEGEND**
- MITIGATION AREA BOUNDARY
  - FIELD MAPPED DITCH
  - FIELD MAPPED STREAM
  - FIELD MAPPED WETLAND
  - LIMITS OF DELINEATION
  - AGRICULTURAL WETLAND DISTURBANCE
  - CULVERT
  - APPROXIMATE PARCEL BOUNDARY
  - 2-FOOT CONTOURS

- US FISH AND WILDLIFE SERVICE WETLAND CLASSIFICATION**
- R = RIVERINE
  - 2 = LOWER PERENNIAL
  - P = PALUSTRINE
  - FO = FORESTED
  - SS = SCRUB-SHRUB
  - 1 = BROAD-LEAVED EVERGREEN
  - 4 = NEEDLE-LEAVED EVERGREEN
  - EM = EMERGENT
  - 1 = PERSISTENT
  - E = SATURATED OR SEASONALLY FLOODED
  - F = SEMI-PERMANENTLY FLOODED

**NOTES**

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- WETLAND FLAGS, STREAMS, AND CULVERTS SHOWN HEREON WERE FIELD SURVEYED BY GZA ON SEPTEMBER 4, 2018 USING AN IPAD EQUIPPED WITH ESRI COLLECTOR SOFTWARE AND AN EOS ARROW BLUETOOTH GNSS RECEIVER WITH AN APPROXIMATE SUB 2.5 METER ACCURACY.
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**BALL HILL WIND ENERGY  
WETLAND MITIGATION SITE**  
10050 SOUTH DAYTON SILVER CREEK RD  
HANOVER, NEW YORK

**MITIGATION SITE DELINEATION**

PREPARED BY: <b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: 	
PROJ MGR: PJM	REVIEWED BY: PJM	CHECKED BY: TLT	FIG
DESIGNED BY: TLT	DRAWN BY: MJD	SCALE: 1" = 175 FEET	<b>3</b>
DATE: 10/16/2018	PROJECT NO: 21.0056858.00	REVISION NO:	

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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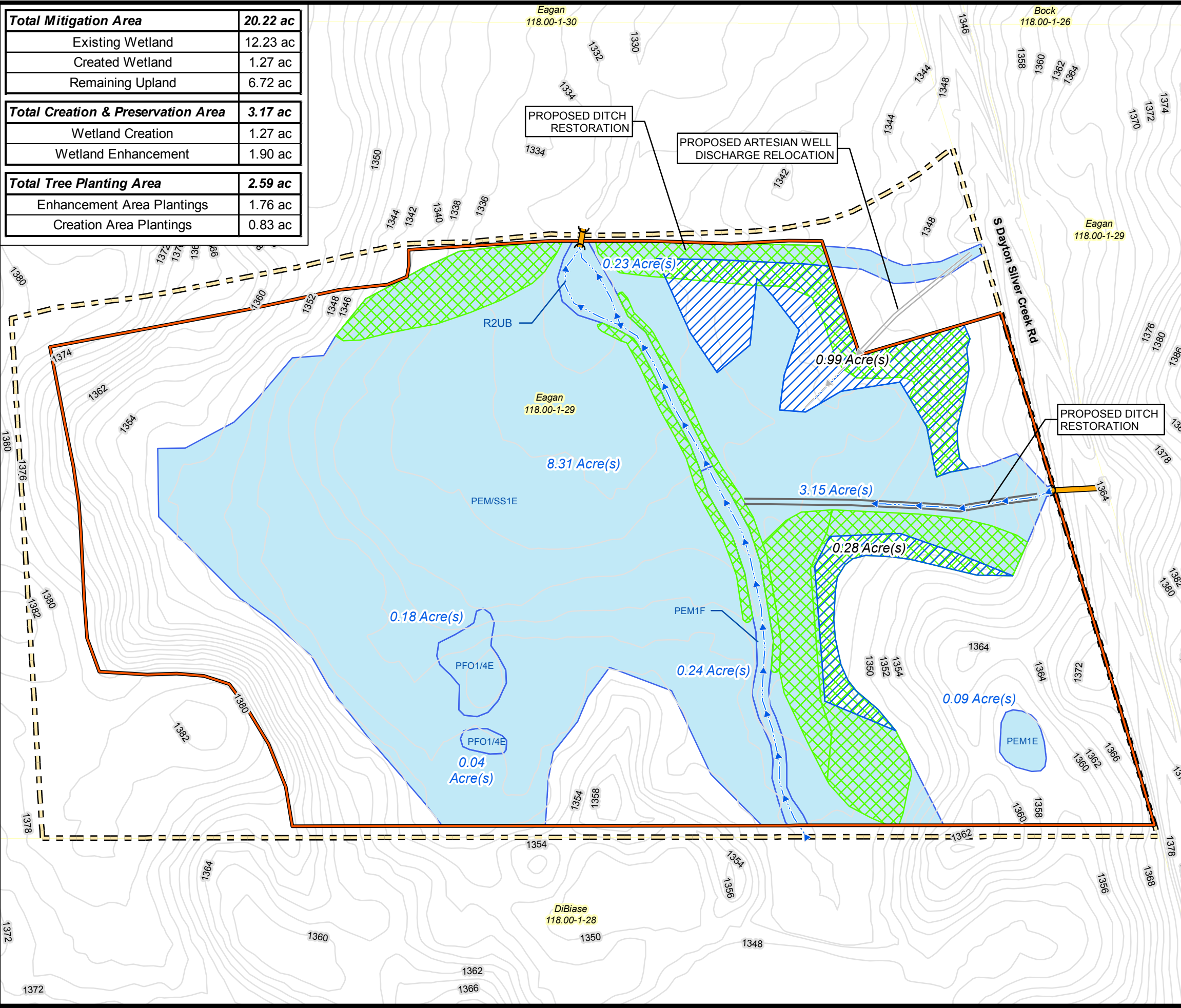




**Figure 4 – Wetland Mitigation Plan Concept**



<b>Total Mitigation Area</b>	<b>20.22 ac</b>
Existing Wetland	12.23 ac
Created Wetland	1.27 ac
Remaining Upland	6.72 ac
<b>Total Creation &amp; Preservation Area</b>	<b>3.17 ac</b>
Wetland Creation	1.27 ac
Wetland Enhancement	1.90 ac
<b>Total Tree Planting Area</b>	<b>2.59 ac</b>
Enhancement Area Plantings	1.76 ac
Creation Area Plantings	0.83 ac

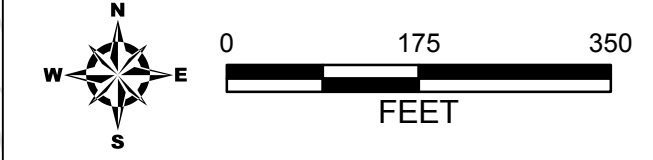


**LEGEND**

- MITIGATION AREA BOUNDARY
- FIELD MAPPED DITCH
- FIELD MAPPED STREAM
- FIELD MAPPED WETLAND
- LIMITS OF DELINEATION
- PROPOSED SHRUB/TREE PLANTINGS
- PROPOSED WETLAND CREATION AREA
- CULVERT
- APPROXIMATE PARCEL BOUNDARY
- 2-FOOT CONTOURS

**US FISH AND WILDLIFE SERVICE WETLAND CLASSIFICATION**  
R = RIVERINE  
2 = LOWER PERENNIAL  
P = PALUSTRINE  
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F = SEMI-PERMANENTLY FLOODED

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**BALL HILL WIND ENERGY  
MITIGATION SITE  
10050 SOUTH DAYTON SILVER CREEK RD  
HANOVER, NEW YORK**

**WETLAND MITIGATION PLAN**

<b>PREPARED BY:</b> <b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		<b>PREPARED FOR:</b> 	
<b>PROJ MGR:</b> PJM <b>DESIGNED BY:</b> TLT <b>DATE:</b> 10/18/2018	<b>REVIEWED BY:</b> PJM <b>DRAWN BY:</b> MJD <b>PROJECT NO.:</b> 21.0056858.00	<b>CHECKED BY:</b> TLT <b>SCALE:</b> 1" = 175 FEET <b>REVISION NO.:</b>	<b>FIG</b> <b>4</b>

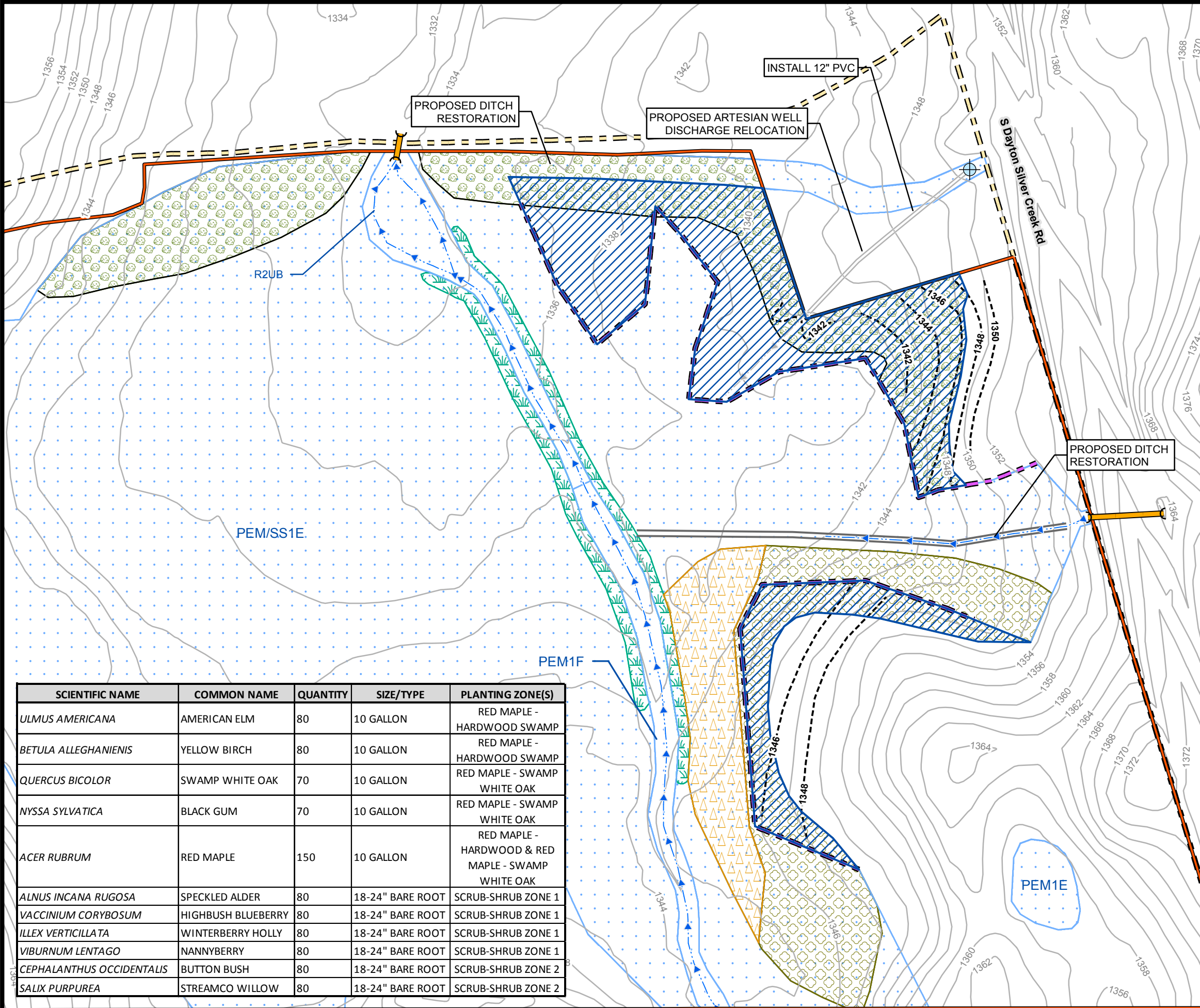
© 2018 - GZA GeoEnvironmental, Inc. P:\Branch\offices\21 Buffalo\RES\Ball Hill\Bad Hill GIS\MXD\Fig 2 - Draft Mitigation Plan.mxd, 10/18/2018, 1:18:45 PM, matthew.deane



**Figure 5 – Mitigation Detail Plan**



© 2018 - GZA GeoEnvironmental, Inc. P:\Branch\offices\21 Buffalo\RES\Ball Hill\Bad Hill GIS\MXD\Fig 3 - Mitigation Detail Plan 101518.mxd, 10/16/2018, 4:09:36 PM, matthew.deane



**LEGEND**

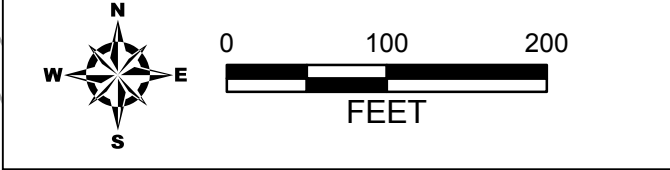
- EXISTING ARTESIAN WELL
- SEDIMENT/EROSION CONTROLS
- MITIGATION AREA BOUNDARY
- FIELD MAPPED DITCH
- FIELD MAPPED STREAM
- FIELD MAPPED WETLAND
- LIMITS OF DELINEATION
- PROPOSED WETLAND CREATION AREA
- CULVERT
- PROPOSED 2-FOOT CONTOURS
- EXISTING 2-FOOT CONTOURS

**PLANTING ZONES**

- RED MAPLE - HARDWOOD SWAMP
- RED MAPLE - SWAMP WHITE OAK
- SCRUB - SHRUB 1
- SCRUB-SHRUB 2

**US FISH AND WILDLIFE SERVICE WETLAND CLASSIFICATION**  
 R = RIVERINE  
 2 = LOWER PERENNIAL  
 P = PALUSTRINE  
 FO = FORESTED  
 SS = SCRUB-SHRUB  
 1 = BROAD-LEAVED EVERGREEN  
 4 = NEEDLE-LEAVED EVERGREEN  
 EM = EMERGENT  
 1 = PERSISTENT  
 E = SATURATED OR SEASONALLY FLOODED  
 F = SEMI-PERMANENTLY FLOODED

**NOTES**  
 1) JURISDICTIONAL WETLANDS WERE DELINEATED BY GZA GEOENVIRONMENTAL, INC. (GZA) ON SEPTEMBER 4, 2018 IN ACCORDANCE WITH THE 1987 U.S. ARMY CORPS OF ENGINEERS' (ACOE) "WETLANDS DELINEATION MANUAL," TECHNICAL REPORT Y-87-1 AND THE "REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL, NORTHCENTRAL AND NORTHEAST REGION," JANUARY 2012.  
 2) WETLAND FLAGS, STREAMS, AND CULVERTS SHOWN HEREON WERE FIELD SURVEYED BY GZA ON SEPTEMBER 4, 2018 USING AN IPAD EQUIPPED WITH ESRI COLLECTOR SOFTWARE AND AN EOS ARROW BLUETOOTH GNSS RECEIVER WITH AN APPROXIMATE SUB 2.5 METER ACCURACY.  
 3) DATA IN CLUING "APPROXIMATE PARCEL BOUNDARY" WAS DERIVED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.  
 4) THIS MAP CONTAINS THE ESRI ArcGIS ONLINE WORLD IMAGERY MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCSIMS SERVICES AND UPDATED OFTEN. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.



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**MITIGATION DETAIL PLAN**

SCIENTIFIC NAME	COMMON NAME	QUANTITY	SIZE/TYPE	PLANTING ZONE(S)
<i>ULMUS AMERICANA</i>	AMERICAN ELM	80	10 GALLON	RED MAPLE - HARDWOOD SWAMP
<i>BETULA ALLEGHANIENSIS</i>	YELLOW BIRCH	80	10 GALLON	RED MAPLE - HARDWOOD SWAMP
<i>QUERCUS BICOLOR</i>	SWAMP WHITE OAK	70	10 GALLON	RED MAPLE - SWAMP WHITE OAK
<i>NYSSA SYLVATICA</i>	BLACK GUM	70	10 GALLON	RED MAPLE - SWAMP WHITE OAK
<i>ACER RUBRUM</i>	RED MAPLE	150	10 GALLON	RED MAPLE - HARDWOOD & RED MAPLE - SWAMP WHITE OAK
<i>ALNUS INCANA RUGOSA</i>	SPECKLED ALDER	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 1
<i>VACCINIUM CORYBOSUM</i>	HIGHBUSH BLUEBERRY	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 1
<i>ILLEX VERTICILLATA</i>	WINTERBERRY HOLLY	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 1
<i>VIBURNUM LENTAGO</i>	NANNYBERRY	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 1
<i>CEPHALANTHUS OCCIDENTALIS</i>	BUTTON BUSH	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 2
<i>SALIX PURPUREA</i>	STREAMCO WILLOW	80	18-24" BARE ROOT	SCRUB-SHRUB ZONE 2

PREPARED BY: **GZA GeoEnvironmental, Inc.**  
 Engineers and Scientists  
 www.gza.com

PREPARED FOR: **RES**

PROJ MGR: PJM	REVIEWED BY: PJM	CHECKED BY: TLT	FIG <b>5</b>
DESIGNED BY: TLT	DRAWN BY: MJD	SCALE: 1" = 120 FEET	
DATE: 10/16/2018	PROJECT NO: 21.0056858.00	REVISION NO:	



**Figure 6 – Erosion Control Notes**



# Best Management Practices (BMP's) for Straw wattles

## Definition and purpose:

Straw wattles are burlap rolls filled with straw that trap sediment and interrupt water flow by reducing slope lengths.

## Applications:

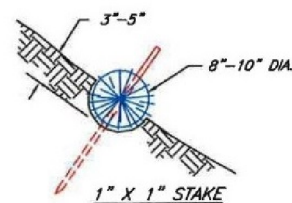
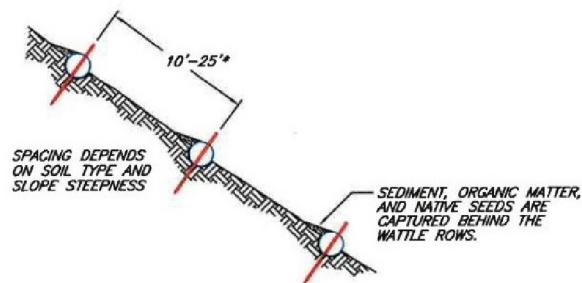
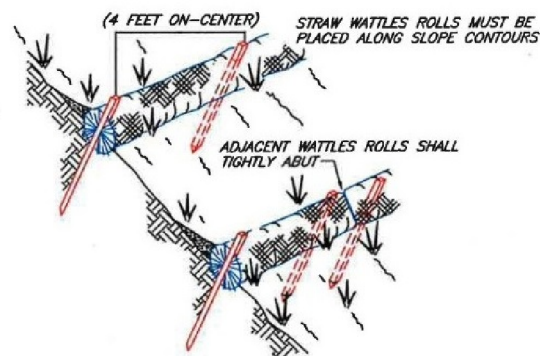
- \* Along erodible or unstabilized slopes
- \* Spread overland waterflow
- \* Trap sediment
- \* Around storm drain inlets to slow water and settle out sediment
- \* Overlap ends approximately 6 inches

## Installation:

Straw wattles are installed parallel to slope contours and perpendicular to sheet flow.

Spacing\* - Dependent on slope length, soil steepness and soil type (general range 10 - 25').

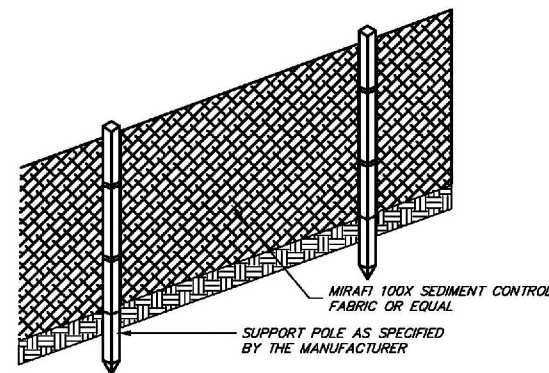
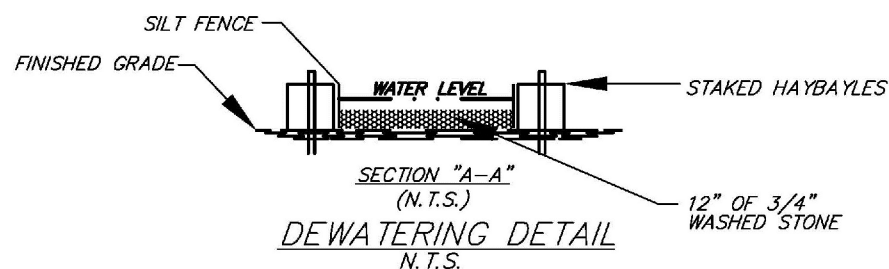
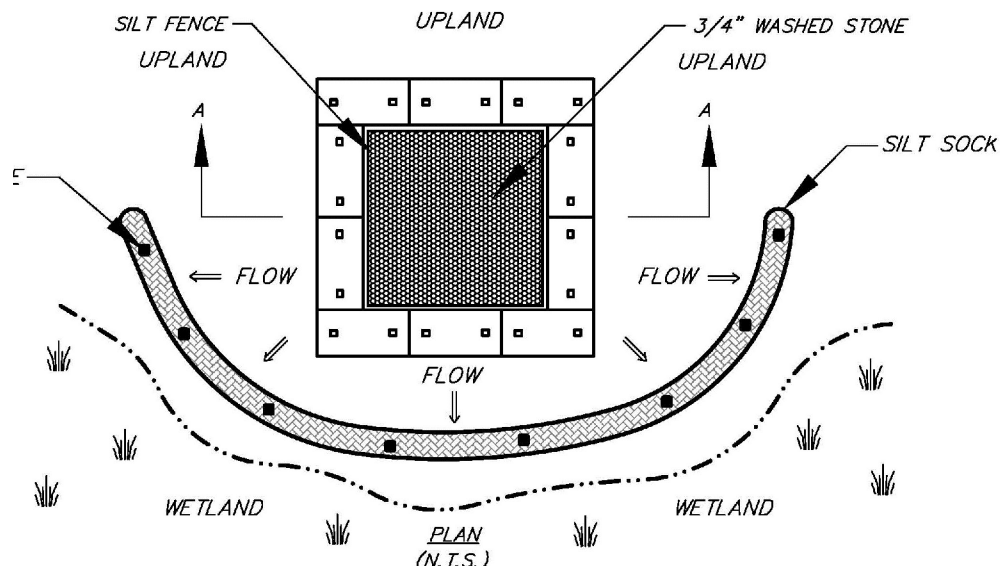
Trenching - 2"-5" inch trench  
Stacking - at each end and four foot on center (i.e. 25 foot wattle uses 6 stacks)



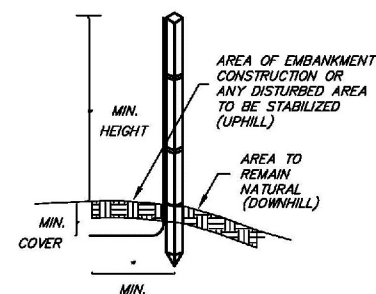
NOT TO SCALE

## NOTES (SILT FENCE)

1. THE HEIGHT OF THE BARRIER SHALL NOT EXCEED 36 INCHES.
2. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED. SEE MANUFACTURER'S RECOMMENDATIONS.
3. POSTS SHALL BE PLACED AT A MAXIMUM OF 10 FEET APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES). WHEN EXTRA STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL BE AS MANUFACTURER RECOMMENDS.
4. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 6 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE OF THE BARRIER IN ACCORDANCE WITH RECOMMENDATIONS
5. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE, AND WILL EXTEND A MINIMUM OF 8 INCHES INTO THE TRENCH. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FILTER FABRIC.
7. FABRIC BARRIERS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST ONCE DAILY DURING PROLONGED RAINFALL AND ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
9. SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
10. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
11. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

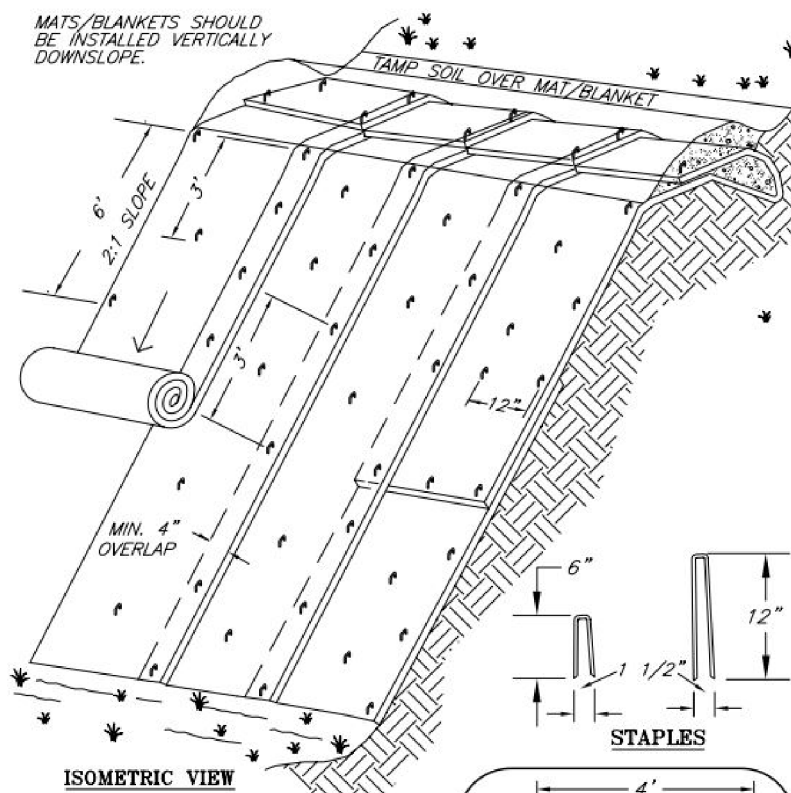


FRONT VIEW



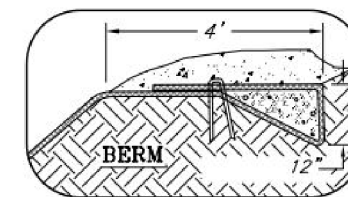
SIDE VIEW

## JUTE MATTING DETAIL



ISOMETRIC VIEW

## TYPICAL SLOPE SOIL STABILIZATION



NOT TO SCALE  
ADAPTED FROM JOHN MCCULLAH, 1994

## NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BANKETS.
3. LAY BANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
4. STAKING OR STAPLING LAYOUT PER MANUFACTURERS SPECIFICATIONS.

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## EROSION CONTROL NOTES

PREPARED BY:  
**GZA** GeoEnvironmental, Inc.  
Engineers and Scientists  
www.gza.com

PREPARED FOR:  
**res**

PROJ MGR: PJM  
DESIGNED BY: TLT  
DATE: 10/16/2018

REVIEWED BY: PJM  
DRAWN BY: MJD  
PROJECT NO.: 21.0056858.00

CHECKED BY: TLT  
SCALE:  
REVISION NO.

SHEET  
**6**



**Figure 7 – Planting Notes**

**PRE-CONSTRUCTION SEQUENCE**

1. ALL KEY PROJECT PERSONNEL INVOLVED IN THE WETLAND CREATION AND ENHANCEMENT WILL ATTEND A PRE-CONSTRUCTION MEETING. A PROJECT WETLAND SCIENTIST WILL MONITOR THE CONSTRUCTION OF THE CREATION/ENHANCEMENT AREAS AND MONITOR COMPLIANCE WITH THE APPROVED PLAN, AND ANY ADDITIONAL PROJECT CONDITIONS REQUIRED BY THE USACE AND NYDEC.
2. THE KEY PERSONNEL WILL DEVELOP A CONSTRUCTION SCHEDULE WITH ALL PARTIES INVOLVED.
3. AREAS OF RESPONSIBILITY WILL BE ASSIGNED (E.G. EXCAVATION, PLANTINGS, AND EROSION CONTROL).
4. THE FOLLOWING CONSTRUCTION SEQUENCE WILL BE REVIEWED AND MAY NEED TO BE ALTERED DEPENDING ON SITE CONDITIONS. ALL PARTIES MUST APPROVE CHANGES IN THE CONSTRUCTION SEQUENCE, AND CHANGES MAY REQUIRE REVIEW BY THE USACE AND NYSDEC.

**OVERALL GENERAL CONSTRUCTION SEQUENCE**

1. ALL WORK MUST BE COMPLETED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND APPROVED FINAL FIGURES.
2. EROSION CONTROLS WILL BE INSTALLED PRIOR TO THE COMMENCEMENT OF EXCAVATION. STRAW WATTLE OR SIMILAR PERIMETER CONTROL WILL BE INSTALLED BETWEEN THE EXISTING WETLAND AND CREATION AREAS.
3. PRIOR TO EXCAVATION, THE PLANT ZONES (FORESTED CREATION, FORESTED ENHANCEMENT, AND SCRUB-SHRUB ENHANCEMENT) WILL BE STAKED IN THE FIELD AND APPROVED BY THE PROJECT WETLAND SCIENTIST PRIOR TO INITIATION OF GRADING AND PLANT INSTALLATION.
4. THE PROJECT WETLAND SCIENTIST WILL CONDUCT A PRE-CONSTRUCTION INSPECTION, FOLLOWED BY REGULAR MONITORING INSPECTIONS THROUGHOUT EXCAVATION AND PLANT INSTALLATION. ADJUSTMENTS TO THE PLAN MAY BE REQUESTED BY THE WETLAND SCIENTIST TO ENSURE PROPER CONDITIONS FOR PLANT GROWTH.
5. CONSTRUCTION S ACTIVITIES WILL TAKE PLACE DURING LOW WATER, WHENEVER POSSIBLE.

**WETLAND CREATION/RESTORATION CONSTRUCTION**

1. THE CREATION AREA WILL BE EXCAVATED APPROXIMATELY 10 INCHES BELOW FINAL GRADE (APPROXIMATELY ELEVATION 1345 AT THE UPPERMOST EXTENT OF THE MITIGATION AREA). TOP SOIL WILL BE STOCKPILED FOR RE-USE IN THE CREATION AREA AND DITCH RESTORATION AREAS.
2. THE CREATION AREA WILL BE EXCAVATED DOWN TO APPROXIMATELY ELEVATIONS 1346 TO 1342 USING A SMALL EXCAVATOR, TO CREATE A CONNECTION TO THE ADJACENT NATURAL WETLAND.
3. EXCAVATED MINERAL AND TOP SOIL MATERIAL FROM THE CREATION AREAS WILL BE USED TO RESTORE THE NORTHERN AND SOUTHERN DITCH LINES. IF NECESSARY, SAND BAGS WILL BE USED TO TEMPORARILY ISOLATE DITCH FLOW FROM CONSTRUCTION AREAS. IF FLOW IS PRESENT, CLEAN WATER WILL BE PUMPED AROUND ACTIVE CONSTRUCTION IN THE DITCH LINES.
4. EROSION CONTROL BLANKETS/JUTE MATTING WILL BE INSTALLED IN THE PREVIOUS DITCH LINES, PRIOR TO WATER BEING REDIRECTED OVER RESTORED GRADES.
5. THE CREATION AREA WILL BE ROUGH-GRADED TO BRAKE EXISTING SURFICIAL CLAY TILES, AND TO CREATE NATURAL HUMMOCK WETLAND TOPOGRAPHY. TOP-SOIL WILL BE REPLACED TO ESTABLISHED FINAL GRADES. HUMMOCKS WILL VARY FROM ONE TO TWO FEET IN HEIGHT TO CREATE VARYING MICROTOPOGRAPHY IN THE CREATION AREAS, AND SUPPORT A DIVERSITY OF HERBACEOUS PLANT SPECIES.
6. A 12-INCH PVC PIPE WILL BE INSTALLED AT THE EXISTING ARTESIAN WELL TO DIRECT NATURAL DISCHARGE FROM THE ARTESIAN WELL INTO THE CREATION AREA. TOPOGRAPHY WILL BE ROUGH-GRADE TO CREATE NATURAL FLOW PATHS IN THE CREATION AREA. FLOW PATHS WILL BE TEMPORARILY STABILIZED WITH JUTE MATTING.
7. RED MAPLE, SWAMP WHITE OAK, AND BLACK GUM (10-GALLON SIZE) WILL BE PLANTED ON APPROXIMATE 15-FOOT CENTERS IN THE SOUTHERLY FORESTED WETLAND ZONE. THE UNDERSTORY WILL BE SEEDED WITH A NORTHEAST WETLAND SHRUB/HERB MIX. EXPOSED SOIL WILL BE LIGHTLY MULCHED WITH WEED FREE HAY FOR STABILIZATION AND TO MAINTAIN MOISTURE FOR SEED GROWTH.
8. THE NORTHERLY FORESTED WETLAND ZONE WILL BE PLANTED WITH RED MAPLE, AMERICAN ELM, AND YELLOW BIRCH (10-GALLON SIZE) ON EIGHT-FOOT CENTERS. THE UNDERSTORY WILL BE SEEDED WITH A NORTHEAST WETLAND SHRUB/HERB MIX. EXPOSED SOIL WILL BE LIGHTLY MULCHED WITH WEED FREE HAY FOR STABILIZATION AND TO MAINTAIN MOISTURE FOR SEED GROWTH.
9. TWO TO THREE-FOOT TALL SPECKLED ALDER, Highbush BLUEBERRY (VACCINIUM CORYMBOSUM), WINTERBERRY HOLLY (ILEX VERTICILLATA), AND NANNYBERRY (VIBURNUM LENTAGO) WILL BE PLANTED ON APPROXIMATE EIGHT FOOT CENTERS IN THE SCRUB-SHRUB CREATION ZONE. THE UNDERSTORY WILL BE SEEDED WITH A NORTHEAST WETLAND SHRUB/HERB MIX. EXPOSED SOIL WILL BE LIGHTLY MULCHED WITH WEED FREE HAY FOR STABILIZATION AND TO MAINTAIN MOISTURE FOR SEED GROWTH.
10. THE STREAM ENHANCEMENT PLANTING AREAS WILL BE PLANTED WITH TWO TO THREE-FOOT TALL WINTERBERRY HOLLY, BUTTONBUSH (CEPHALANTHUS OCCIDENTALIS), AND STREAMCO WILLOW (SALIX PURPUREA). THESE SPECIES TOLERATE WET CONDITIONS AND WILL SERVE TO CREATE A THICK SHRUB THICKET ADJACENT TO THE STREAM. SHRUB PLANTINGS IN THE ENHANCMENT AREAS WILL BE INSTALLED WITH HAND-HELD, GAS-POWERED AUGERS TO AVOID MACHINE ACCESS IN THE EXISTING WETLAND.
11. WHERE POSSIBLE, WOODY DEBRIS OR BOULDERS WILL BE PLACED IN THE CREATION AREAS TO CREATE VARIABLE TOPOGRAPHY AND COVER SITES.
12. TEMPORARY EROSION CONTROLS WILL BE MAINTAINED UNTIL ADJACENT CREATION AREAS ARE CONSIDERED STABILIZED WITH 75% OR GREATER HERBACEOUS VEGETATION.

**CONSTRUCTION MONITORING**

1. CONSTRUCTION OF THE WETLAND RESTORATION AND STREAM ENHANCEMENT AREAS WILL BE CLOSELY MONITORED BY THE PROJECT WETLAND SCIENTIST AS NEEDED DURING CONSTRUCTION.
2. THE CONTRACTOR WILL KEEP THE PROJECT WETLAND SCIENTIST INFORMED OF THE CONSTRUCTION SCHEDULE TO ALLOW FOR APPROPRIATE MONITORING.
3. A CONSTRUCTION MONITORING REPORT WILL BE ISSUED BY THE PROJECT WETLAND SCIENTIST UPON COMPLETION OF CONSTRUCTION.
4. EROSION AND SEDIMENT CONTROL NEEDS MAY CHANGE DURING THE COURSE OF CONSTRUCTION AND MAY REQUIRE IMMEDIATE ACTION BY THE CONTRACTOR. THE CONTRACTOR MUST RESPOND IN A TIMELY MANNER TO CHANGING SITE CONDITIONS THROUGHOUT CONSTRUCTION.

**POST-CONSTRUCTION MONITORING**



1. PLANT PLOTS AND PHOTO STATIONS MARKED WITH STAKES AND FLAGGING WILL BE ESTABLISHED DURING THE CONSTRUCTION PROCESS TO ADEQUATELY ENSURE SUCCESS OF THE WETLAND RESTORATION AND STREAM ENHANCEMENT PROJECT.
2. CAREFUL MONITORING FOR INVASIVE SPECIES, INCLUDING REED CANARY GRASS, WILL BE COMPLETED DURING PROJECT MONITORING. A REMEDIAL PLAN FOR INVASIVE SPECIES WILL BE DEVELOPED IF NEW INVASIVE PLANTS, OR HIGHER DENSITIES OF KNOWN INVASIVE PLANTS, ARE DOCUMENTED IN THE AREA FOLLOWING CONSTRUCTION.
3. THE PROJECT WETLAND SCIENTIST WILL DOCUMENT THE PROJECT FOR AT LEAST TWO YEARS FOLLOWING CONSTRUCTION, DURING THE GROWING SEASON, STARTING ONE FULL-YEAR AFTER CONSTRUCTION.
4. THE PROJECT WETLAND SCIENTIST WILL GENERATE AN ANNUAL MONITORING REPORT AND DOCUMENT ANY REMEDIAL ACTIONS THAT ARE REQUIRED (e.g. RE-GRADING, REPLANTING, STABILIZATION). AREAS SHOULD EITHER HAVE 75% SURVIVAL OF PLANTINGS, OR BE STABILIZED WITH NATIVE VEGETATION, WITH NO AREAS OF ACTIVE EROSION.
5. TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES SHALL BE MAINTAINED IN THE CONSTRUCTION AREAS UNTIL THE RESTORATION/ENHANCEMENT AREAS ARE CONSIDERED PERMANENTLY STABILIZED (EITHER WITH STONE, MATTING, OR PLANTINGS AND MULCHING).
6. ONCE ALL AREAS ARE CONSIDERED STABILIZED, ALL EROSION CONTROL NEASURES (e.g. SILT FENCE) SHALL BE REMOVED OF AND PROPERLY DISPOSED.

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**PLANTING NOTES**

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PROJ MGR: PJM	REVIEWED BY: PJM	CHECKED BY: TLT	<b>SHEET 7</b>
DESIGNED BY: TLT	DRAWN BY: MJD	SCALE:	
DATE: 10/17/2018	PROJECT NO: 21.0056858.00	REVISION NO:	



## **Appendix A - Limitations**





## **NATURAL RESOURCE SURVEY AND ASSESSMENT LIMITATIONS**

### Use of Report

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of Ball Hill Wind Energy, LLC and Renewable Energy Systems Americas, Inc. ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

### Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

### Limits to Observations

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.
5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.
6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

### Reliance on Information from Others

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

#### Compliance with Regulations and Codes

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.

#### New Information

9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

#### Additional Services

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.



## **Appendix B – Custom Soil Resource Report**

# Custom Soil Resource Report for Chautauqua County, New York

## Ball Hill



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

## Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

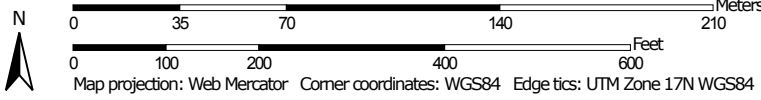


# Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:2,480 if printed on A landscape (11" x 8.5") sheet.



### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

**Special Point Features**






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York  
 Survey Area Data: Version 15, Sep 26, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 7, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
As	Ashville silt loam	12.5	59.1%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	3.0	14.4%
CsC	Collamer silt loam, 8 to 15 percent slopes	1.0	4.9%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	0.3	1.4%
VcC	Valois gravelly silt loam, rolling	4.3	20.3%
<b>Totals for Area of Interest</b>		<b>21.2</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

## Custom Soil Resource Report

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



## Chautauqua County, New York

### As—Ashville silt loam

#### Map Unit Setting

*National map unit symbol:* 9qjn  
*Mean annual precipitation:* 39 to 50 inches  
*Mean annual air temperature:* 45 to 50 degrees F  
*Frost-free period:* 105 to 190 days  
*Farmland classification:* Farmland of statewide importance

#### Map Unit Composition

*Ashville and similar soils:* 75 percent  
*Minor components:* 25 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Ashville

##### Setting

*Landform:* Depressions  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Silty local colluvium and in some places the underlying till

##### Typical profile

*H1 - 0 to 9 inches:* silt loam  
*H2 - 9 to 36 inches:* silt loam  
*H3 - 36 to 72 inches:* gravelly silt loam

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.57 in/hr)  
*Depth to water table:* About 0 to 12 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Available water storage in profile:* High (about 9.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4w  
*Hydrologic Soil Group:* C/D  
*Hydric soil rating:* Yes

#### Minor Components

##### Alden

*Percent of map unit:* 5 percent  
*Landform:* Depressions  
*Hydric soil rating:* Yes

**Busti**

*Percent of map unit: 5 percent*  
*Hydric soil rating: No*

**Canandaigua**

*Percent of map unit: 5 percent*  
*Landform: Depressions*  
*Hydric soil rating: Yes*

**Fremont**

*Percent of map unit: 5 percent*  
*Hydric soil rating: No*

**Unnamed soils**

*Percent of map unit: 5 percent*  
*Landform: Depressions*  
*Hydric soil rating: Yes*

**CkC—Chautauqua silt loam, 8 to 15 percent slopes**

**Map Unit Setting**

*National map unit symbol: 2vzpr*  
*Elevation: 590 to 1,970 feet*  
*Mean annual precipitation: 33 to 52 inches*  
*Mean annual air temperature: 43 to 52 degrees F*  
*Frost-free period: 135 to 215 days*  
*Farmland classification: Farmland of statewide importance*

**Map Unit Composition**

*Chautauqua and similar soils: 80 percent*  
*Minor components: 20 percent*  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chautauqua**

**Setting**

*Landform: Hills*  
*Landform position (two-dimensional): Shoulder, backslope*  
*Landform position (three-dimensional): Interfluve, side slope*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Parent material: Till*

**Typical profile**

*Ap - 0 to 8 inches: silt loam*  
*Bw1 - 8 to 22 inches: silt loam*  
*Bw2 - 22 to 35 inches: gravelly silt loam*  
*C - 35 to 72 inches: gravelly loam*

**Properties and qualities**

*Slope: 8 to 15 percent*

## Custom Soil Resource Report

*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Moderately well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.14 to 1.42 in/hr)  
*Depth to water table:* About 18 to 24 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Salinity, maximum in profile:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water storage in profile:* High (about 9.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* C/D  
*Hydric soil rating:* No

### Minor Components

#### Chadakoin

*Percent of map unit:* 8 percent  
*Landform:* Hills, drumlinoid ridges, till plains  
*Landform position (two-dimensional):* Shoulder, summit  
*Landform position (three-dimensional):* Interfluve, side slope, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear, convex  
*Hydric soil rating:* No

#### Langford

*Percent of map unit:* 7 percent  
*Landform:* Drumlinoid ridges, till plains, hills  
*Landform position (two-dimensional):* Shoulder, summit  
*Landform position (three-dimensional):* Crest, interfluve, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

#### Busti

*Percent of map unit:* 5 percent  
*Landform:* Hills  
*Landform position (two-dimensional):* Footslope, summit  
*Landform position (three-dimensional):* Base slope, interfluve  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

## CsC—Collamer silt loam, 8 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 9qks  
*Mean annual precipitation:* 39 to 50 inches  
*Mean annual air temperature:* 45 to 50 degrees F

## Custom Soil Resource Report

*Frost-free period:* 105 to 190 days

*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Collamer and similar soils:* 75 percent

*Minor components:* 25 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Collamer

#### Setting

*Landform:* Lake plains

*Landform position (two-dimensional):* Summit

*Landform position (three-dimensional):* Tread

*Down-slope shape:* Concave

*Across-slope shape:* Convex

*Parent material:* Silty and clayey glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 7 inches:* silt loam

*H2 - 7 to 21 inches:* silt loam

*H3 - 21 to 45 inches:* silty clay loam

*H4 - 45 to 72 inches:* silt loam

#### Properties and qualities

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.57 in/hr)

*Depth to water table:* About 18 to 24 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 15 percent

*Available water storage in profile:* High (about 10.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* C/D

*Hydric soil rating:* No

### Minor Components

#### Canandaigua

*Percent of map unit:* 5 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

#### Dunkirk

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

#### Niagara

*Percent of map unit:* 5 percent

*Hydric soil rating:* No



**Scio**

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

**Unnamed soils**

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

**VaB—Valois gravelly silt loam, 3 to 8 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 9qnf  
*Elevation:* 600 to 1,750 feet  
*Mean annual precipitation:* 39 to 50 inches  
*Mean annual air temperature:* 45 to 50 degrees F  
*Frost-free period:* 105 to 190 days  
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Valois and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Valois**

**Setting**

*Landform:* Valley sides, lateral moraines, end moraines  
*Landform position (two-dimensional):* Summit  
*Landform position (three-dimensional):* Crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Loamy till derived mainly from sandstone, siltstone, and shale

**Typical profile**

*H1 - 0 to 6 inches:* gravelly silt loam  
*H2 - 6 to 45 inches:* gravelly loam  
*H3 - 45 to 72 inches:* very gravelly sandy loam

**Properties and qualities**

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 2 percent  
*Available water storage in profile:* Low (about 5.9 inches)

## Custom Soil Resource Report

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2e

*Hydrologic Soil Group:* B

*Hydric soil rating:* No

### Minor Components

#### Pompton

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Chautauqua

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Chenango

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Mardin

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Unnamed soils

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

## VcC—Valois gravelly silt loam, rolling

### Map Unit Setting

*National map unit symbol:* 9qnl

*Elevation:* 600 to 1,750 feet

*Mean annual precipitation:* 39 to 50 inches

*Mean annual air temperature:* 45 to 50 degrees F

*Frost-free period:* 105 to 190 days

*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Valois, rolling, and similar soils:* 80 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Valois, Rolling

#### Setting

*Landform:* End moraines, valley sides, lateral moraines

*Landform position (two-dimensional):* Shoulder

*Landform position (three-dimensional):* Crest

*Down-slope shape:* Convex

*Across-slope shape:* Convex

## Custom Soil Resource Report

*Parent material:* Loamy till derived mainly from sandstone, siltstone, and shale

### Typical profile

*H1 - 0 to 6 inches:* gravelly silt loam

*H2 - 6 to 45 inches:* gravelly loam

*H3 - 45 to 72 inches:* very gravelly sandy loam

### Properties and qualities

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 2 percent

*Available water storage in profile:* Low (about 5.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* B

*Hydric soil rating:* No

### Minor Components

#### Busti

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Chadakoin

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Chautauqua

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Mardin

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### Unnamed soils

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

# Soil Information for All Uses

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## Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

## Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

## Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.



## Custom Soil Resource Report

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

### References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

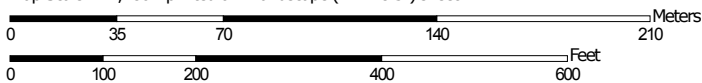
Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

# Custom Soil Resource Report Map—Hydric Rating by Map Unit




Map Scale: 1:2,480 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84







### MAP LEGEND

**Area of Interest (AOI)**







 Area of Interest (AOI)

**Soils**







**Soil Rating Polygons**

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available

**Soil Rating Lines**

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available






**Soil Rating Points**

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available


**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York  
 Survey Area Data: Version 15, Sep 26, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 7, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Hydric Rating by Map Unit**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
As	Ashville silt loam	90	12.5	59.1%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	0	3.0	14.4%
CsC	Collamer silt loam, 8 to 15 percent slopes	5	1.0	4.9%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	0	0.3	1.4%
VcC	Valois gravelly silt loam, rolling	0	4.3	20.3%
<b>Totals for Area of Interest</b>			<b>21.2</b>	<b>100.0%</b>

**Rating Options—Hydric Rating by Map Unit**

*Aggregation Method: Percent Present*

*Component Percent Cutoff: None Specified*

*Tie-break Rule: Lower*



## **Soil Properties and Qualities**

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## **Water Features**

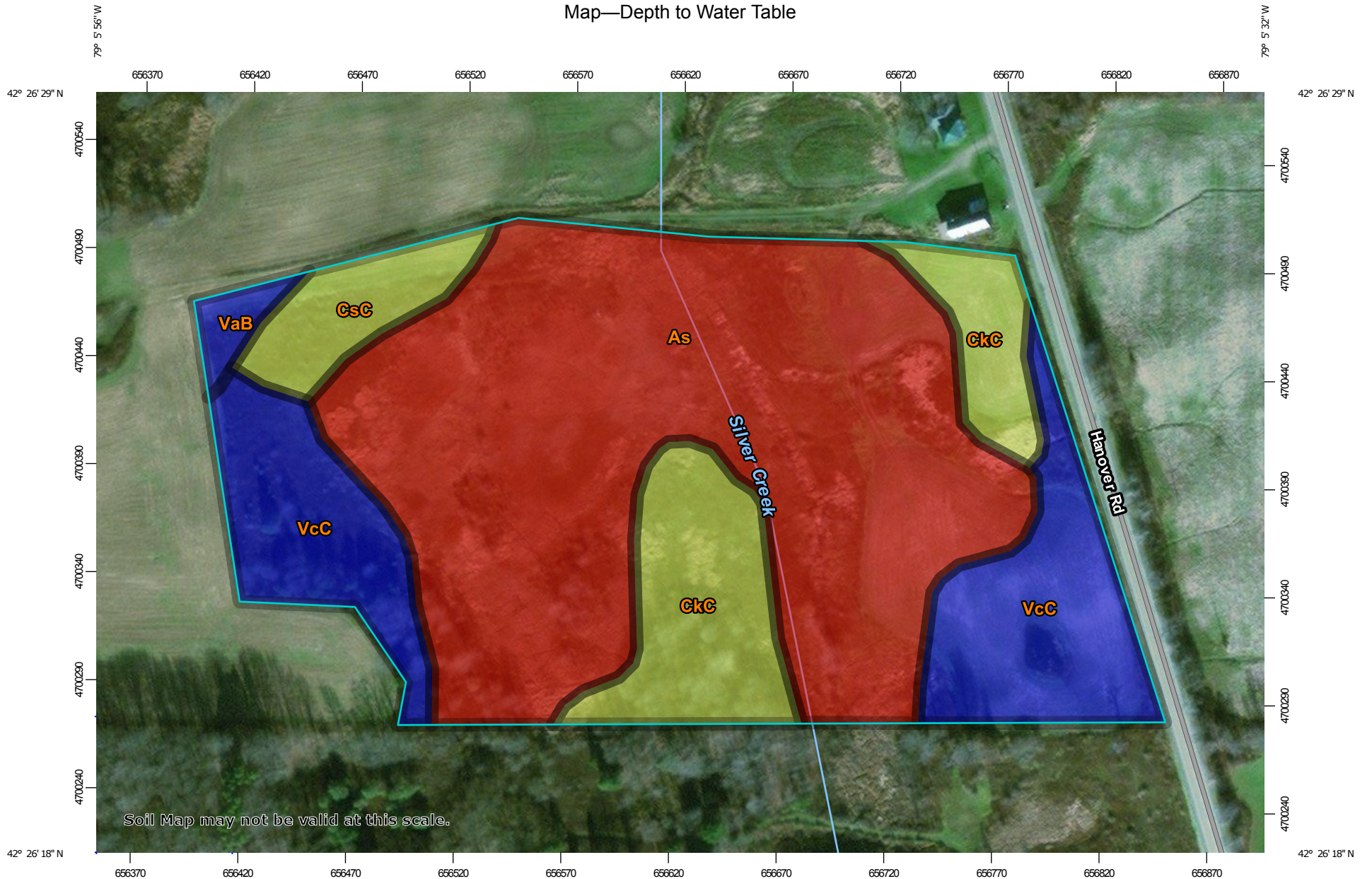
Water Features include ponding frequency, flooding frequency, and depth to water table.

### **Depth to Water Table**

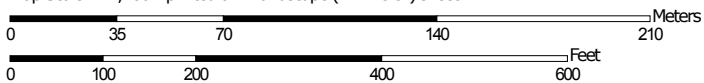
"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

# Custom Soil Resource Report Map—Depth to Water Table
































Map Scale: 1:2,480 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

### MAP LEGEND

- Area of Interest (AOI)**
  -  Area of Interest (AOI)
- Soils**
  - Soil Rating Polygons**
    -  0 - 25
    -  25 - 50
    -  50 - 100
    -  100 - 150
    -  150 - 200
    -  > 200
    -  Not rated or not available
  - Soil Rating Lines**
    -  0 - 25
    -  25 - 50
    -  50 - 100
    -  100 - 150
    -  150 - 200
    -  > 200
    -  Not rated or not available
  - Soil Rating Points**
    -  0 - 25
    -  25 - 50
    -  50 - 100
    -  100 - 150
    -  150 - 200
    -  > 200
- Water Features**
  -  Streams and Canals
- Transportation**
  -  Rails
  -  Interstate Highways
  -  US Routes
  -  Major Roads
  -  Local Roads
- Background**
  -  Aerial Photography
-  Not rated or not available

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York  
 Survey Area Data: Version 15, Sep 26, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 7, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Depth to Water Table**

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
As	Ashville silt loam	15	12.5	59.1%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	56	3.0	14.4%
CsC	Collamer silt loam, 8 to 15 percent slopes	54	1.0	4.9%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	>200	0.3	1.4%
VcC	Valois gravelly silt loam, rolling	>200	4.3	20.3%
<b>Totals for Area of Interest</b>			<b>21.2</b>	<b>100.0%</b>

### **Rating Options—Depth to Water Table**

*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Lower

*Interpret Nulls as Zero:* No

*Beginning Month:* January

*Ending Month:* December



# References

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- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)















## **Appendix C- Wetland Function-Value Evaluation Forms**

Notes:

File No: 21.0056858.00		<b>WETLAND FUNCTION – VALUE EVALUATION FORM</b>			Date: 9/4/2018		
Wetland ID: A					GZA Personnel: Tracy Tarr		
Wetland Classification: PEM/SS1E, R2UB, PEM1F, PFO1/4E							
Function/Value	Capability Y N	Criteria	Summary	Principal Yes/No			
Groundwater Recharge/Discharge	X	2, 7, 8, 9, 13, 15	Wetland contains a perennial stream (Silver Creek) which is supported by discharge	X			
Floodflow Alteration	X	1, 3, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18	Wetland serves to detain flow from Silver Creek and off-site wetlands.	X			
Fish and Shellfish Habitat	X	4, 7, 8, 9, 10, 14, 16	Wetland contains a small diffuse stream.				
Sediment/Toxicant Retention	X	1, 2, 3, 4, 10, 13, 14, 15, 16	Wetland receives road runoff and contains dense vegetation suitable for retention.	X			
Nutrient Removal	X	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	Wetland receives agriculture runoff and contains dense vegetation suitable for nutrient removal.	X			
Production Export	X	1, 2, 4, 5, 7, 8, 10, 12	Production export is occurring through streamflow and wildlife dispersal.	X			
Sediment/Shoreline Stabilization	X	2, 3, 4, 5, 7, 9, 12, 13	Dense vegetation is providing stabilization.				
Wildlife Habitat	X	4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 17, 18, 19, 20, 21	Wetland contains riverine, scrub-shrub and emergent cover types and is located in a large unfragmented block of land.	X			
Recreation	X	4, 5, 6, 7	Site is currently posted but provides hunting and non-consumptive opportunities.				
Educational/Scientific Value	X	3, 5, 11	Access is currently limited but contains Silver Creek.				
Uniqueness/Heritage	X	4, 5, 7, 11, 12, 13, 16, 17, 19, 22, 27	Wetland is part of an NYS Wetland.				
Visual Quality/Aesthetics	X	1, 2, 3, 5, 6, 8, 9	Large open vistas are present.				
<b>ES</b> Endangered Species Habitat		X	None known on-site. Black redhorse, a special concern fish species, and butterwort, a State Threatened plant species are known to occur in Hanover.				

Notes: This wetland is an isolated basin in an agricultural field. Site preservation, with buffer enhancement, has the potential to improve wildlife habitat. The wetland may function as a vernal pool.

File No: 04.0029733.00		WETLAND FUNCTION – VALUE EVALUATION FORM			Date: 9/4/2018	
Wetland ID: B					GZA Personnel: Tracy Tarr	
Wetland Classification: PEM1E						
Function/Value	Capability Y N	Criteria	Summary	Principal Yes/No		
 Groundwater Recharge/Discharge		X		Wetland hydrology appears to be supported by surface water and a seasonal high-water table.		
 Floodflow Alteration	X		3, 5, 6, 9	The wetland exists in a flat area and has flood storage potential on a small scale.		
 Fish and Shellfish Habitat		X		No permanent open or deep-water habitat is present.		
 Sediment/Toxicant Retention	X		1, 2, 4, 5	The wetland has an isolated basin with sediment/toxicant retention potential.	X	
 Nutrient Removal	X		3, 4, 7, 8, 9, 10, 11	Wetland contains dense vegetation suitable for nutrient removal.	X	
 Production Export		X	1, 4, 7, 12	Export is occurring on a small scale supported by the larger property.		
 Sediment/Shoreline Stabilization		X		There are no erosive forces or shoreline edges associated with the wetland.		
 Wildlife Habitat	X		4, 5, 7, 8, 11, 13, 19	The wetland contains emergent cover and provides nesting opportunities. The wetland may function as a vernal pool.		
 Recreation		X		The wetland is part of a posted property with limited water-based recreational opportunities.		
 Educational/Scientific Value		X		Site is currently posted.		
 Uniqueness/Heritage		X	5, 13			
 Visual Quality/Aesthetics		X	2, 6, 9	Some visual aesthetics from the road but lacks emergent and open water view.		
<b>ES</b> Endangered Species Habitat		X		None known.		





# Appendix A

## Wetland evaluation supporting documentation; Reproducible forms.

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Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.



**GROUNDWATER RECHARGE/DISCHARGE**— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

### CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other



**FLOODFLOW ALTERATION (Storage & Desynchronization)** — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

### CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.

### CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

#### STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

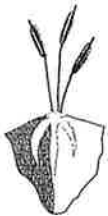
3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

#### CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

#### CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

#### STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

#### CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
  5. Wetland saturated for most of the season. Ponded water is present in the wetland.
  6. Deep organic/sediment deposits are present.
  7. Slowly drained fine grained mineral or organic soils are present.
  8. Dense vegetation is present.
  9. Emergent vegetation and/or dense woody stems are dominant.
  10. Opportunity for nutrient attenuation exists.
  11. Vegetation diversity/abundance sufficient to utilize nutrients.
- STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.
12. Waterflow through this wetland is diffuse.
  13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
  14. Water moves slowly through this wetland.
  15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



#### CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland.
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/ShORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.



#### CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other



WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.<sup>1</sup>

#### CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

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<sup>1</sup>In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.



RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



#### CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



#### CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

#### CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

ES

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.



## **Appendix D – NY Nature Explorer Results**

# New York Nature Explorer

## Town Results Report

Criteria: Town: Hanover

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Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global

### Town: Hanover

#### Animal: Fish

Black Redhorse	Minnows, Shiners, Suckers	Recently Confirmed	2003	Special Concern	S2	G5
<i>Moxostoma duquesnei</i>						

#### Plant: Flowering Plants

Butterwort	Other Flowering Plants	Recently Confirmed	1992	Threatened	S1S2	G5
<i>Pinguicula vulgaris</i>						

#### Natural Community: Freshwater Nontidal Wetlands



# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Shrub Swamp	Open Mineral Soil Wetlands	Recently Confirmed	1990			S5	G5
<i>Shrub swamp</i>							

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Note: Restricted plants and animals may also have also been documented in one or more of these Towns or Cities, but are not listed in these results. This application does not provide information at the level of Town or City on state-listed animals and on other sensitive animals and plants. A list of the restricted animals and plants documented in the corresponding county (or counties) can be obtained via the County link(s) on the original Town Search Results page. Any individual plant or animal on this county's restricted list may or may not occur in this particular Town or City.

This list only includes records of rare species and significant natural communities from the databases of the NY Natural Heritage Program. This list is not a definitive statement about the presence or absence of all plants and animals, including rare or state-listed species, or of all significant natural communities. For most areas, comprehensive field surveys have not been conducted, and this list should not be considered a substitute for on-site surveys.

# New York Nature Explorer

## County Results Report

Criteria: County: Chautauqua; State Protection Status: Endangered, Threatened, Special Concern, Rare



Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global

### County: Chautauqua

#### Animal: Mammals

Northern Long-eared Bat	Bats	Recently Confirmed	2011	Threatened	Threatened	S1	G1G2
<i>Myotis septentrionalis</i>							

#### Animal: Birds

American Bittern	Hérons, Bitterns, Egrets, Pelicans	Recently Confirmed	2000-2005	Special Concern		S4	G4
<i>Botaurus lentiginosus</i>							
Bald Eagle	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2016	Threatened		S2S3B,S2N	G5
<i>Haliaeetus leucocephalus</i>							

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Common Loon <i>Gavia immer</i>	Loons	Recently Confirmed	2005	Special Concern		S4	G5
Common Nighthawk <i>Chordeiles minor</i>	Nightbirds	Recently Confirmed	2000-2005	Special Concern		S2S3B	G5
Common Tern <i>Sterna hirundo</i>	Gulls, Terns, Plovers, Shorebirds	Recently Confirmed	2000-2005	Threatened		S3B	G5
Cooper's Hawk <i>Accipiter cooperii</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2000-2005	Special Concern		S4	G5
Horned Lark <i>Eremophila alpestris</i>	Larks	Recently Confirmed	2000-2005	Special Concern		S3S4B	G5
Least Bittern <i>Ixobrychus exilis</i>	Hérons, Bitterns, Egrets, Pelicans	Recently Confirmed	2002	Threatened		S3B,S1N	G5
Northern Goshawk <i>Accipiter gentilis</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2000-2005	Special Concern		S3S4B,S3N	G5
Northern Harrier <i>Circus cyaneus</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2001	Threatened		S3B,S3N	G5
Osprey <i>Pandion haliaetus</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2000-2005	Special Concern		S4B	G5
Pied-billed Grebe <i>Podilymbus podiceps</i>	Grebes	Recently Confirmed	2003	Threatened		S3B,S1N	G5
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i>	Woodpeckers	Recently Confirmed	2017	Special Concern		S2?B	G5
Red-shouldered Hawk <i>Buteo lineatus</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2000-2005	Special Concern		S4B	G5
Sedge Wren <i>Cistothorus platensis</i>	Wrens	Recently Confirmed	2002	Threatened		S3B	G5
Sharp-shinned Hawk <i>Accipiter striatus</i>	Hawks, Falcons, Eagles, Vultures	Recently Confirmed	2000-2005	Special Concern		S4	G5
Short-eared Owl <i>Asio flammeus</i>	Owls	Recently Confirmed	2015	Endangered		S2	G5

## Animal: Reptiles

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Blanding's Turtle <i>Emydoidea blandingii</i>	Turtles	Recently Confirmed	1990-1999	Threatened		S2S3	G4
Eastern Box Turtle <i>Terrapene carolina</i>	Turtles	Recently Confirmed	1990-1999	Special Concern		S3	G5
Queen Snake <i>Regina septemvittata</i>	Snakes	Historically Confirmed		Endangered		S1	G5
Spiny Softshell <i>Apalone spinifera</i>	Turtles	Recently Confirmed	2012	Special Concern		S2S3	G5
Wood Turtle <i>Glyptemys insculpta</i>	Turtles	Recently Confirmed	1990-1999	Special Concern		S3	G3

## Animal: Amphibians

Blue-spotted Salamander <i>Ambystoma laterale</i>	Salamanders	Recently Confirmed	1990-1999	Special Concern		S4	G5
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## Animal: Fish

Black Redhorse <i>Moxostoma duquesnei</i>	Minnows, Shiners, Suckers	Recently Confirmed	2013	Special Concern		S2	G5
Eastern Sand Darter <i>Ammocrypta pellucida</i>	Darters and Sunfishes	Recently Confirmed	2004	Threatened		S2S3	G4
Longhead Darter <i>Percina macrocephala</i>	Darters and Sunfishes	Historically Confirmed	1937	Threatened		S2	G3
Mooneye <i>Hiodon tergisus</i>	Mooneyes	Recently Confirmed	2001	Threatened		S2	G5
Mountain Brook Lamprey <i>Ichthyomyzon greeleyi</i>	Lampreys	Recently Confirmed	2003	Special Concern		S1	G4
Redfin Shiner <i>Lythrurus umbratilis</i>	Minnows, Shiners, Suckers	Recently Confirmed	2005	Special Concern		S1S2	G5
Silver Chub <i>Macrhybopsis storeriana</i>	Minnows, Shiners, Suckers	Historically Confirmed		Endangered		SH	G5
Spoonhead Sculpin <i>Cottus ricei</i>	Sculpins	Historically Confirmed		Endangered		SH	G5
Spotted Darter <i>Etheostoma maculatum</i>	Darters and Sunfishes	Recently Confirmed	2000	Threatened		S1	G2G3

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global

## Animal: Mussels and Clams

Clubshell <i>Pleurobema clava</i>	Freshwater Mussels	Recently Confirmed	2005	Endangered	Endangered	S1	G1G2
Rayed Bean <i>Villosa fabalis</i>	Freshwater Mussels	Recently Confirmed	2005	Endangered	Candidate	S1	G2
Wavyrayed Lampmussel <i>Lampsilis fasciola</i>	Freshwater Mussels	Recently Confirmed	1987	Threatened		S1	G5

## Animal: Other Animals

Grasshopper Sparrow <i>Ammodramus savannarum</i>	Other Animals	Recently Confirmed	2000-2005	Special Concern		S3B	G5
Henslow's Sparrow <i>Ammodramus henslowii</i>	Other Animals	Recently Confirmed	2013	Threatened		S3B	G4
Vesper Sparrow <i>Pooecetes gramineus</i>	Other Animals	Recently Confirmed	2000-2005	Special Concern		S3B	G5
Yellow-breasted Chat <i>Icteria virens</i>	Other Animals	Historically Confirmed		Special Concern		S2?B	G5

## Plant: Flowering Plants

American Shore Grass <i>Littorella americana</i>	Other Flowering Plants	Historically Confirmed	1937	Endangered		SH	G5
Basilbalm <i>Monarda clinopodia</i>	Other Flowering Plants	Historically Confirmed	1963	Endangered		S1	G5
Bear's Foot <i>Smallanthus uvedalia</i>	Asters, Goldenrods and Daisies	Historically Confirmed	1931	Endangered		SH	G4G5
Blue-eyed-Mary <i>Collinsia verna</i>	Other Flowering Plants	Possible but not Confirmed		Endangered		SH	G5
Blunt Mountain Mint <i>Pycnanthemum muticum</i>	Other Flowering Plants	Historically Confirmed		Threatened		S2S3	G5
Broad-lipped Twayblade <i>Neottia convallarioides</i>	Orchids	Possible but not Confirmed		Endangered		S1	G5



# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Burdick's Wild Leek <i>Allium tricoccum var. burdickii</i>	Other Flowering Plants	Historically Confirmed	1896	Endangered		SH	G4G5
Bushy Cinquefoil <i>Potentilla supina ssp. paradoxa</i>	Other Flowering Plants	Recently Confirmed	1998	Endangered		S1	G5
Butterwort <i>Pinguicula vulgaris</i>	Other Flowering Plants	Recently Confirmed	1992	Threatened		S1S2	G5
Downy Phlox <i>Phlox pilosa ssp. pilosa</i>	Other Flowering Plants	Possible but not Confirmed	1877	Endangered		SH	G5T5
Dragon's Mouth Orchid <i>Arethusa bulbosa</i>	Orchids	Possible but not Confirmed		Threatened		S2	G5
Dwarf Hawthorn <i>Crataegus uniflora</i>	Other Flowering Plants	Historically Confirmed		Endangered		SH	G5
Elk Sedge <i>Carex garberi</i>	Sedges	Historically Confirmed	1920	Endangered		S1	G5
Emory's Sedge <i>Carex emoryi</i>	Sedges	Recently Confirmed		Endangered		S2	G5
Fairywand <i>Chamaelirium luteum</i>	Other Flowering Plants	Historically Confirmed		Endangered		S1S2	G5
Few-fruited Sedge <i>Carex oligosperma</i>	Sedges	Historically Confirmed		Rare		S3	G5
Floating Pennywort <i>Hydrocotyle ranunculoides</i>	Other Flowering Plants	Recently Confirmed	1999	Endangered		S1	G5
Fragrant Flat Sedge <i>Cyperus odoratus</i>	Sedges	Recently Confirmed		Rare		S3	G5
Hill's Pondweed <i>Potamogeton hillii</i>	Other Flowering Plants	Recently Confirmed		Threatened		S2	G3
Hooker's Orchid <i>Platanthera hookeri</i>	Orchids	Historically Confirmed	1927	Endangered		S1	G4
Large Twayblade <i>Liparis liliifolia</i>	Orchids	Possible but not Confirmed		Endangered		S1	G5
Lesser Bladderwort <i>Utricularia minor</i>	Other Flowering Plants	Historically Confirmed		Rare		S3	G5

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Mountain Watercress <i>Cardamine rotundifolia</i>	Other Flowering Plants	Historically Confirmed	1930	Endangered		S1	G4
Northern Wild Comfrey <i>Andersonglossum boreale</i>	Other Flowering Plants	Historically Confirmed	1927	Endangered		S1S2	G5T4T5
Pale Indian-plantain <i>Arnoglossum atriplicifolium</i>	Asters, Goldenrods and Daisies	Possible but not Confirmed		Endangered		SH	G4G5
Pale Vetchling <i>Lathyrus ochroleucus</i>	Other Flowering Plants	Historically Confirmed		Rare		S3	G5
Pawpaw <i>Asimina triloba</i>	Other Flowering Plants	Recently Confirmed	1992	Threatened		S2	G5
Prairie Wedgegrass <i>Sphenopholis obtusata</i>	Grasses	Possible but not Confirmed	1934	Endangered		S1	G5
Purple Cress <i>Cardamine douglassii</i>	Other Flowering Plants	Historically Confirmed		Threatened		S2S3	G5
Puttyroot <i>Aplectrum hyemale</i>	Orchids	Possible but not Confirmed		Endangered		S1	G5
Red-rooted Flat Sedge <i>Cyperus erythrorhizos</i>	Sedges	Recently Confirmed		Rare		S3	G5
Rough Avens <i>Geum virginianum</i>	Other Flowering Plants	Historically Confirmed	1927	Threatened		S2	G5
Rough-leaf Dogwood <i>Cornus drummondii</i>	Other Flowering Plants	Historically Confirmed	1931	Endangered		S1	G5
Scarlet Indian-paintbrush <i>Castilleja coccinea</i>	Other Flowering Plants	Historically Confirmed	1926	Endangered		S1	G5
Schweinitz's Flat Sedge <i>Cyperus schweinitzii</i>	Sedges	Historically Confirmed		Rare		S3	G5
Slender Pondweed <i>Stuckenia filiformis</i>	Other Flowering Plants	Historically Confirmed	1936	Endangered		S1	G5
Small Yellow Sedge <i>Carex cryptolepis</i>	Sedges	Recently Confirmed		Rare		S3	G4
Small's Knotweed <i>Polygonum buxiforme</i>	Other Flowering Plants	Recently Confirmed	1992	Endangered		S1S2	G5

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global
Southern Yellow Flax <i>Linum medium var. texanum</i>	Other Flowering Plants	Recently Confirmed	1998	Threatened		S2	G5T5
Speckled Wood Lily <i>Clintonia umbellulata</i>	Other Flowering Plants	Historically Confirmed		Rare		S3	G5
Spreading Globeflower <i>Trollius laxus</i>	Other Flowering Plants	Historically Confirmed	1933	Rare		S3	G5T3
Stiff Yellow Flax <i>Linum striatum</i>	Other Flowering Plants	Recently Confirmed		Rare		S3	G5
Swamp Agrimony <i>Agrimonia parviflora</i>	Other Flowering Plants	Recently Confirmed		Rare		S3	G5
Swamp Buttercup <i>Ranunculus septentrionalis</i>	Other Flowering Plants	Historically Confirmed		Endangered		S1	GNR
Tall Ironweed <i>Vernonia gigantea</i>	Asters, Goldenrods and Daisies	Recently Confirmed	1992	Endangered		S1	G5
Toad Shade Trillium <i>Trillium sessile</i>	Other Flowering Plants	Recently Confirmed	1999	Endangered		S1	G4G5
Wafer Ash <i>Ptelea trifoliata var. trifoliata</i>	Other Flowering Plants	Recently Confirmed	2012	Endangered		S1S2	G5T5
Wheat Sedge <i>Carex atherodes</i>	Sedges	Historically Confirmed		Rare		S3	G5
Wild Sweet William <i>Phlox maculata ssp. maculata</i>	Other Flowering Plants	Recently Confirmed	1993	Endangered		S1S2	G5T4T5

## Plant: Ferns and Fern Allies

Appalachian Bristle Fern <i>Crepidomanes intricatum</i>	Ferns	Recently Confirmed	1983	Endangered		S1	G4G5
Appalachian Shoestring Fern <i>Vittaria appalachiana</i>	Ferns	Recently Confirmed	1986	Endangered		S1	G4
Blunt-lobe Grape Fern <i>Botrychium oneidense</i>	Ferns	Historically Confirmed	1937	Threatened		S2S3	G4
Lowland Fragile Fern <i>Cystopteris protrusa</i>	Ferns	Historically Confirmed	1927	Endangered		S1	G5

# New York Nature Explorer

Common Name	Subgroup	Distribution Status	Year Last Documente	Protection Status		Conservation Rank	
				State	Federal	State	Global

This list only includes records from the databases of the NY Natural Heritage Program, the second NYS Breeding Bird Atlas Project, and the NY Amphibian and Reptile Atlas Project. This list is not a definitive statement about the presence or absence of all plants and animals, including rare or state-listed species, or of all significant natural communities.



GZA GeoEnvironmental, Inc.