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GZA GeoEnvironmental of NY
300 Pearl Street
Suite 700
Buffalo, NY 14202
T: 716-685-2300
F: 716-248-1472
www.gza.com

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File No. 21.0056796.00

Mr. Seth Wilmore
EverPower Wind Holdings, Inc.
1251 Waterfront Place, 3rd Floor
Pittsburgh, Pennsylvania 15222

Re: Baron Winds Project Preliminary Geotechnical Assessment
Steuben County, New York

Dear Mr. Wilmore:

GZA GeoEnvironmental of New York (GZA) is pleased to present EverPower this letter report summarizing our recent study of the proposed Baron Winds Project (Facility) located in Steuben County, New York (Study Area). Our study consisted of the following.

1. A literature review of publicly available information and data pertaining to surface and subsurface soil, bedrock, and groundwater conditions within the limits of the Study Area.

2. A preliminary geotechnical investigation at select locations of the Study Area to obtain additional information pertaining to subsurface soil and bedrock features to assess the general constructability of the proposed Facility. The preliminary geotechnical investigation work included subcontracting with Earth Dimensions, Inc. (EDI) of Elma, New York to complete ten (10) soil borings at representative/approved locations to characterize subsurface conditions for the proposed wind turbine Facility[1].

The data obtained from this work will be used to address select requirements of New York Code Article 10, Exhibit 21 (Geology, Seismology and Soils) and sections (a)(1) through (a)(3) of Exhibit 23 (Water Resources and Aquatic Ecology). A Site Plan showing the proposed Study Area (including completed test boring locations) is

[1] *We note that since completion of our soil boring investigation, a modification of the Study Area resulted in a reduced area with 3 of the 10 completed test boring locations being outside of the updated Study Area. Additionally, most the proposed turbine identifiers were subsequently renumbered. Discussions pertaining to completed soil/test borings within this report reference the originally provided identifiers and Site Figures reference to both updated and original turbine identifiers.*

provided as **Figure 1**. The study area and soil boring locations overlain on the USGS topographic map are shown on **Figure 2.**

Based on our findings from the assessment of literature and the preliminary geotechnical investigation regarding subsurface soils, bedrock, and groundwater conditions, it is GZA's opinion that the Study Area is generally suitable for the planned Facility. However, due to variability in soil types, overburden thickness, bedrock type, and groundwater depths throughout the Study Area, a soil boring is recommended to be performed at each planned turbine location prior to construction to assess localized subsurface conditions. We anticipate the proposed turbines will be constructed on anchored shallow mat foundations bearing on either very dense coarse-grained, non-plastic (sand and gravel) granular till soil, very stiff to hard, fine-grained plastic cohesive till soil (consisting of a mixture of silt and clay) or on shale and/or siltstone bedrock, depending on location. A detailed summary of the work completed and our conclusions and recommendations follows.

The following discussion presents a general summary of the surface and subsurface characteristics in the Study Area.

1.0 DATA COLLECTION

1.1 Literature Search

GZA collected various documents from our in-house files, documents available through the New York State Department of Environmental Conservation (NYSDEC), the United States Geological Survey (USGS), the New York State Museum, the Steuben County Soil and Water Conservation District, the Buffalo and Erie County Libraries, and various documents obtained through an internet search. A reference list summarizing the information (e.g., reports, figures, maps etc.) used to compile this report is included as **Attachment A**. For brevity, individual references are not cited throughout this report. Please refer to Attachment A for the sources of information contained within this report.

As part of our review, we submitted a Freedom of Information Legislation (FOIL) letter request to the NYSDEC requesting information pertaining to surface and subsurface soil, bedrock, and groundwater conditions within the vicinity of the Study Area. Per a NYSDEC telephone response, specific information regarding the Study Area (e.g., locations of turbines, substations, collector lines, etc.) was not readily available. Therefore, NYSDEC directed our inquiry for general groundwater and bedrock information for groundwater wells located within the Study Area to their publicly available website.

2.0 STUDY AREA CONDITIONS

2.1 Physical Setting

The Study Area shown on the attached figures includes an approximate 16,659-acre area (reduced from an initial 23,948-acre area) generally bounded by Loon Lake and Interstate 390 to the north and the town centers of Cohocton and Greenville to the east, Big Creek and Howard to the south, and Fremont and Beachville to the west (**Figure 2**). The Study Area is generally located within the Towns of Cohocton, Dansville, Fremont, and Wayland. The proposed wind Facility includes up to 76 wind turbines (Refer to attached figures and Table B-1 in Appendix B for proposed turbine identifiers), access roads, a substation (east of T53) and two designated laydown areas (southeast of T87 and north of T55), and associated collection lines (assumed both above ground and below ground).

Current land use within the Study Area generally consists of a mixture of dense forested areas, agricultural land, and residential properties (**Figure 1**). The areas to the south and west of the Study Area have historically included extensive natural gas extraction wells. Limited natural gas extraction appears to have occurred within the Study Area based on the few gas wells reported in the NYSDEC data base for the general area (**Figure 4**). Several federal and state wetlands are located within the Study Area (**Attachment B**, **Figures B-1 and B-2**). Several of these mapped wetland areas are located proximate to proposed wind turbine locations. Evidence of wetlands was not observed near the proposed turbine locations during completion of the ten test borings (see discussion below). In addition, the NYSDEC maintains public fishing rights in the central portion of the Study Area along Neils Creek (**Attachment B**, **Figure B-3**).

The Study Area is located within the western Finger Lakes region of the Appalachian Plateau. The Study Area was glaciated several times during the most recent Wisconsin glacial stage (~12,000 to 80,000 years ago), which rounded and eroded the uplands and widened and deepened pre-existing creek valleys. As the glacier advanced, till scoured from the landscape was deposited over the uplands, and as the glacier melted, outwash and lacustrine deposits were deposited in the valleys. Major valleys exist to the east and west of the Study Area, along the Cohocton and Canisteo Rivers, respectively. Elevations within the Study Area range from approximately 1,470 feet above sea level in the Neils Creek valley in the east-central portion of the Study Area to over 2,000 feet above sea level in the summit areas of the uplands. The proposed locations of the turbines are in the upper elevations of the Study Area (**Figure 2**).

2.2 Overburden Soil

The Soil Survey of Steuben County (SSSC, 1978) provides general information regarding surface soils in the Study Area. The soil survey is a government sponsored[2] publication that provides surface soil information that can be

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[2] United States Department of Agriculture (USDA), Natural Resources Conservation Service (NCRS) – http://soils.usda.gov/ formally the USDA Soil Conservation Service.

applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for potential uses including farming, industry and recreation.

Figure 3 is a general surface soil map for the Study Area as presented in the SSSC. Each soil association on the map represents a landscape that has a distinctive proportional pattern of soils, and is named for the major soils within that area. The soils in one association can occur in other associations, but in different patterns. Most of the proposed turbine and substation locations are located within the Bath-Lordstown and Fremont-Mardin associations. These two soil associations are present on uplands, on slopes ranging from nearly level to moderately steep. These soils formed in glacial till, which is the primary surficial deposit in the uplands of the Study Area. It appears that proposed turbine locations T4, T8, T11, T13, T15, T17, T18, T19, and T43 located in the northeastern portion of the Study Area are within the Lordstown-Arnot association. This soil association is present on steep and very steep hillsides along the Cohocton River Valley and most of its major tributaries.

The Howard-Chenango-Middlebury association is present in the Study Area along portions of the Neils Creek valley. This soil association is present along the major valleys on glacial outwash terraces, fans, and flood plains, primarily on slopes ranging from nearly level to gently sloping. These soils formed in glacial outwash and recent alluvium, which are the primary surficial deposits in the Neils Creek valley in the central portion of the Study Area. It does not appear that any of the proposed turbine or substation locations are located within this soil association.

Characteristics and Origins of the Bath-Lordstown Association

Origin	Loamy glacial till derived mainly from sandstone and interbedded siltstone and shale.
Landscape	Hilltops in the uplands in the north-central part of Steuben County; these plateau tops are narrow and deeply dissected, especially where they are adjacent to the main valleys
Slopes	Gently sloping and sloping
Composition	Bath (35%), Lordstown (30%), soils of minor extent (35%)
Soils of Minor Extent	Arnot, Mardin, Volusia, and a narrow strip of soils on flood plains
Texture	Coarse

Characteristics and Origins of the Fremont-Mardin Association

Origin	Glacial till
Landscape	Smoothly sloping areas of the plateau in the uplands in the northwestern part of Steuben County
Slopes	Nearly level to moderately steep
Composition	Fremont (40%), Mardin (20%), soils of minor extent (40%)
Soils of Minor Extent	Bath, Chippewa, Lordstown, Volusia
Texture	Fine and coarse

Characteristics and Origins of the Lordstown-Arnot Association

Origin	Glacial till over sandstone bedrock
Landscape	Steep and very steep hillsides along the Cohocton River Valley and most of its major tributaries
Slopes	Steep and very steep
Composition	Lordstown (45%), Arnot (30%), soils of minor extent (25%)
Soils of Minor Extent	Bath and Mardin
Texture	Skeletal and coarse

Characteristics and Origins of the Howard-Chenango-Middlebury Association

Origin	Glacial outwash and recent alluvium
Landscape	Along the major valleys on glacial outwash terraces, fans, and flood plains
Slopes	Nearly level and gently sloping

Composition	Howard (40%), Chenango (25%), Middlebury (5%), soils of minor extent (30%)
Soils of Minor Extent	Red Hook, Tioga, Unadilla, Wayland
Texture	Skeletal and coarse

Several figures obtained from the United States Department of Agriculture (USDA) Natural Resources Conservation Service Web Soil Survey site presents soil units in greater detail within the Study Area. Copies of soil maps showing specific soil units proximate to the approximate locations of the proposed turbine and substation are presented in **Attachment B** (**Figures B-4 through B-13**). Major soils which comprise at least 1% of any of the individual areas mapped in Figures B-4 through B-13 include the following soil types: Bath channery silt loam, Fremont silt loam, Lordstown-Arnot association, Mardin channery silt loam, Chenango channery silt loam, Howard-Madrid complex, Bath soils, Lordstown channery silt loam, Howard gravelly loam, Howard and Alton gravelly soils, Arnot channery silt loam, and Middlebury silt loam. Minor soils which comprise at least 1% of any of the individual areas mapped in Figures B-4 through B-13 include the following soil types: Fluvaquents and Ochrepts, Volusia channery silt loam, Chippewa channery silt loam, Ochrepts and Orthents, Wayland soils complex, Braceville gravelly silt loam, Hornell-Fremont silt loams, Hornell and Fremont silt loams (undifferentiated), and Tioga silt loam.

Most of the dominant and minor soils' specific identifiers are differentiated by their apparent surface slope percentages and as such are generalized indicators of varying topographic or drainage slopes proximate to the proposed turbine and substation locations. However, each soil's attributes pertaining to soil depth, drainage, water table seasonality (high water table), and depth to bedrock are generally independent of slope, and are summarized in the attached **Tables 1 and 2** for dominant and minor soils, respectively, that comprise at least 1% of any of the individual areas mapped in Figures B-4 through B-13. The dominant soils present within the Study Area are generally moderately well drained to somewhat excessively well drained (with the exception of Fremont silt loam, which is somewhat poorly drained) and exhibit either seasonal high perched or apparent water tables in the subsoil, with the exceptions of the Lordstown channery silt loam, Lordstown-Arnot association, Howard gravelly loam, Howard and Alton gravelly soils, and Howard Madrid complex, which exhibit high water tables greater than six feet below ground surface. **Table B-1** in **Attachment B** summarizes the predominant soil type(s) and approximate surface slope range at each proposed wind turbine and substation location.

2.3 Surficial Geology

The unconsolidated surficial deposits in the uplands of the Study Area consist primarily of till derived from the underlying shale and sandstone bedrock and deposited during the most recent glaciation (**Figure 4**). Till generally consists of unstratified, unsorted pebbles, cobbles, and boulders within an interstitial matrix of fine-grained sand, silt, and clay deposited beneath glacier ice. The till overlies shale, siltstone, and sandstone bedrock of the Canisteo Shale, which form the top of the bedrock stratigraphic sequence in the Study Area and is present at the highest elevations (**Figure 5B,** Hornell Quadrangle). Most of the proposed turbine and substation locations are in these areas of till cover or exposed bedrock along the Neils Creek Valley (**Figure 4**).

The attached **Table 3** presents depths to bedrock as recorded on drilling logs for select water wells (NYSDEC database) drilled in the Study Area and in the area west of the Study Area, which appears to contain similar topographic and geologic characteristics as the Study Area. These well locations are shown on **Figures 4, 5A, and 5B.** GZA also reviewed records for water wells on the USGS database and oil and gas wells on the NYSDEC database in these areas, but as these records did not indicate depths to bedrock or groundwater information, they are not included on Table 3. Depths to bedrock (and therefore the base of the till deposits) in wells drilled on the uplands were generally reported as ranging from approximately 30 to 70 feet below ground surface (bgs) at elevations ranging from approximately 1,625 to 2,020 feet above sea level. Depths to bedrock in the wells identified as SB1863, SB1099, and SB2273 were reported as 90, >284, and 71 ft. bgs, respectively, and may be greater than the bedrock wells reported for the other wells due to the presence of a kame deposit near Loon Lake.

Various types of additional glacial deposits exist in the Study Area. Outwash sand and gravel is present in the Neils Creek valley from Loon Lake southward to Haskinville, from Haskinville eastward to Greenville, and from Haskinville southwestward to Fremont (**Figure 4**). Kame deposits are present in the Study Area at Haskinville, northeast of Fremont, and in the extreme northeastern portion of the Study Area. Kame deposits generally consist of coarse to fine gravel and/or sand deposited adjacent to glacier ice. Proposed turbine locations T13 and T18 appear to be in kame deposits. Lastly, lacustrine sand is present in the southeastern portion of the Study Area, although no turbines are proposed in this area (we note that a soil boring identified as T116 was completed in this area however after Study Area modification, no turbines are planned for this location). Lacustrine sand is generally well-sorted and well-stratified, deposited at shorelines of large bodies of water (i.e., lakes).

Most of the proposed turbine locations and the substation are not proximate to a previously completed well; therefore, respective overburden thickness at each proposed structure location would need to be confirmed via additional soil boring investigations.

2.4 Bedrock Geology

Bedrock in the Study Area consists of Devonian clastic marine sediments. Bedrock within central New York dips less than one degree to the south-southwest. The bedrock that forms the upper portion of the stratigraphic sequence within the Study Area (from oldest to youngest) consists of the West Hill Formation, the Nunda Sandstone, the Wiscoy Sandstone, and the Canitsteo Shale (**Figure 5A**). The Canisteo shale member of the Perrysburg Formation outcrops at the highest elevations within the Study Area. These bedrock units are described as follows, from oldest to youngest:

- West Hill Formation: Dark bluish-gray sandstones and siltstones separated by beds of dark gray shale. The basal part is mostly gray shale but contains some thin beds of siltstone and thin beds of black shale.
- Nunda Sandstone: Platy to massive blue to buff siltstone and fine-grained sandstone that intergrades downward into the West Hill Formation. Irregular, massive bluish-gray fine-grained sandstone beds range in thickness from less than 1 foot to about 10 feet. The sandstone beds are generally separated by each other by either only a bedding plane, thin strata of sandy shale, or thin lenses of shell fragments.
- Wiscoy Sandstone: Greenish-gray sandstone and siltstone containing beds of buff sandstone and siltstone.
- Perrysburg (or Machias) Formation: Interbedded shale, siltstone, and sandstone.

The Perrysburg Formation outcrops at the highest elevations within the Study Area, in the areas of the proposed turbines and substation. The Perrysburg Formation consists of a wedge of Upper Devonian deltaic sediments that thickens and increases in grain size and clastic content from Lake Erie southeastwards past Addison. The members of the Perrysburg Formation that are present in the Study Area, from oldest to youngest, are the Dunkirk shale member, South Wales member, Canaseraga sandstone member, and Canisteo shale member. The proposed turbines in the western portion of the Study Area appear to overlie the Canisteo shale member, and the proposed turbines in the eastern portion of the Study Area appear to overlie the Canaseraga sandstone member (**Figure 5B**). These members are described as follows:

- Dunkirk shale member: Consists of black shale and overlying olive-black and brownish-black shale. The Dunkirk shale is approximately 120 feet thick in western New York and thins to the east. It ranges in thickness from approximately 18 inches to 6 feet in the Hornell quadrangle, and can either be massive or contain silt and interbedded gray shale. The Dunkirk shale grades upward into the South Wales member.
- South Wales member: Consists of gray silty shale, gray silty mudstone, and small amounts of black, brown, and very dark gray shale; and some interbedded siltstones and fine-grained sandstones. It ranges in thickness from approximately 50 to 90 feet in the Hornell quadrangle. The South Wales member grades upward into the Canaseraga sandstone member.

- Canaseraga sandstone member: Sometimes referred to as the Dunkirk sandstone or a sandy facies of the Dunkirk shale. Consists of approximately 270 to 370 feet of thin- to massive- bedded siltstone, fine-grained sandstone, and gray to dark gray shale and silty shale. The upper part of the Canaseraga sandstone member is characterized by a 90- to 120- foot thick sequence of thin irregular-bedded siltstones and massive fine-grained sandstones. Beneath this upper sequence is 20 to 30 feet of dark gray shale or silty shale overlying a 50-foot thick sequence of thin slabby siltstones and fine-grained massive to platy sandstones. The basal part of the Canaseraga sandstone member is comprised of shale and siltstone of variable thickness and composition.

- Canisteo shale member: Consists of approximately 185 to 195 feet of soft bluish-gray shale which weathers to an olive brown. In the eastern part of the Hornell quadrangle, the soft shale lies on the hard, very fine-grained sandstone of the Canaseraga sandstone member.

It should be noted that based on the findings of our document review and from our limited subsurface boring investigations (see Section 3.0), evidence of karst geology does not appear to be present, nor is it reported within the regional geology of the Study Area.

Refer to the Section 2.3 Surficial Geology for a discussion of bedrock depths within the Study Area and proximate to the proposed structures.

2.5 Hydrogeologic Conditions

The Study Area is located almost entirely within the Chemung River Drainage Basin, except for the extreme northwestern portion, which is in the Genesee River Drainage Basin. Proposed turbines are located within each of these major drainage basins. The Chemung River Drainage Basin is divided into two sub-basins in the Study Area: the Chemung Watershed and the Tioga Watershed. A general regional watershed map is included in **Attachment B** (**Figure B-14**). The Chemung River is formed at the confluence of the Tioga/Canisteo and Cohocton Rivers in Painted Post, New York, southeast of the Study Area, and then flows southeasterly into the Susquehanna River, south of Sayre, Pennsylvania.

The Cohocton valley-fill aquifer, a primary aquifer, is located along the Cohocton River valley to the east of the Study Area and may extend into the Study Area in the outwash sand and gravel and kame deposits along the northeastern portion of the Study Area (**Figure 6**). This aquifer is also present to the north of the Study Area, south of Loon Lake, but is mapped as terminating just north of the Study Area, though an unconfined aquifer does extend into the Study Area (**Figure 6**). The Cohocton aquifer consists of between 20 and 100 feet of outwash, kame, and alluvial sand and gravel. Primary aquifers are defined by the NYSDEC as "highly productive aquifers presently utilized as sources of water supply by major municipal water supply systems." The aquifer is primarily shallow and unconfined, and therefore is highly vulnerable to contamination. The aquifer is underlain by low permeability silt and clay and variable permeability deposits to the bedrock base of the Cohocton River valley. Potential well yields in the aquifer ranges from 50 to over 10,000 gallons per minute.

The Cohocton aquifer is in hydraulic contact with the Cohocton River. Several creeks within the Study Area flow into the Cohocton River, which overlies or is within aquifer material, including Reynolds Creek, Neils Creek, and several unnamed creeks along the eastern boundary of the Study Area. The saturated thickness of the aquifer immediately northeast of Reynolds Creek is between 60 and 100 feet. Potentiometric surface mapping indicates that groundwater flows into the Cohocton aquifer through the multiple valleys associated with Reynolds Creek, which are partly within the northeastern portion of the Study Area (**Figure 6**), and major inflows of groundwater and surface water into the aquifer occur through the valley associated with an unnamed creek along Brown Hill Road and the valleys associated with Neils and Castle Creek. Therefore, surface water runoff and/or groundwater from proposed turbine locations located in the uplands proximate to the above-referenced valleys along the eastern portion of the Study Area likely eventually enter the Cohocton primary aquifer. In addition, these tributary valleys located within the eastern portion of the Study Area are expected to contain more productive aquifer material than the uplands.

The surficial aquifer in the Hornell area, a primary aquifer, is located along the Canisteo River and Canacadea Creek valleys to the southwest of the Study Area and consists of between 20 and 40 feet of glaciofluvial sand and gravel. The aquifer is underlain by fine sand and silt to the bedrock base of the valleys. The aquifer is primarily shallow and unconfined, and therefore highly vulnerable to contamination. Depth to water generally ranges between 3 and 15 ft. bgs. Potentiometric surface mapping suggests that a major inflow of groundwater and surface water into the aquifer occurs where Carrington Creek enters Fremont. The Carrington Creek is partly fed by an unnamed creek southwest of Haskinville within the Study Area. There is the potential that surface water runoff and/or groundwater from proposed turbine locations northwest and southwest of Haskinville may eventually enter the Hornell primary aquifer.

Shale and siltstone bedrock aquifers that are located in the uplands within the Chemung River Drainage Basin yield water sufficient for domestic and small farm use. Mean yields in wells constructed in the Chemung River Basin were reported as ranging from approximately 10 to 25 gallons per minute in wells drawing from bedrock aquifers, 15 gallons per minute in wells drawing from till aquifers, and 15 to 300 gallons per minute in wells drawing from stratified drift aquifers (refer to table in **Attachment B**). **Table 3** presents yields recorded for select water wells completed primarily on the uplands of the Study Area and in a physiographically similar area west of the Study Area. Yields for the wells completed in till (as mapped in Figure 4) range from 1 to 25 gallons per minute. Yields for the wells completed in other types of glacial deposits (as mapped in Figure 4) range from 15 to 36 gallons per minute. Recorded well depths generally located within the Study Area and above-referenced west adjacent area range from 25 to 490 feet bgs.

Median depth to groundwater in the Chemung River Basin was reported as approximately 20 feet in bedrock wells located in valleys, 50 feet on hillsides, and 80 feet on hilltops. Water levels in wells completed in bedrock in the uplands can vary several tens of feet from month to month and from year to year. Groundwater depths within wells listed on **Table 3** were reported as generally ranging from 11 to 284 feet bgs depending on location.

Due to the topographic variability within the Study Area, there are likely several groundwater sub-basins present, each with individual groundwater recharge and discharge areas (Freeze and Witherspoon 1967). Groundwater recharge areas are typically present at local topographic highs, and groundwater discharge zones are typically present at local topographic lows within a groundwater sub-basin; however, groundwater flow direction and velocity are influenced by subsurface permeability architecture and/or fractures. Variability in subsurface permeability architecture can be created by thickness and type of overburden, zones of secondary porosity within bedrock (i.e., fractures), and topography of the bedrock surface, among others. A more complete understanding of the groundwater conditions proximate to the proposed structures within the Study Area would require a more detailed and localized hydrogeologic study.

Typical residence and community groundwater wells within the Study Area are generally assumed to utilize groundwater wells that are set deeper than proposed wind turbine foundations and associated underground electrical transmission lines within fractured bedrock or granular till soil. Additionally, turbine setbacks from residential structures (and any potentially associated wells) is more than 1,000 feet. Therefore, based on the data reviewed and the planned setback distances, it is unlikely construction of the proposed turbines would have an impact on shallow aquifer or residential water well groundwater quality or quantity. Based on the subsurface geologic conditions encountered in the project area and on no specific setback criteria noted by the New York State Department of Health (Table 1 - Required Minimum Separation Distances to Protect Water Wells From Contamination), it is our opinion that off-set distances of project components (e.g., access roads, collection lines, etc.) should be based on best management practices when used in accordance with Site specific requirements of the SWPPP. As a check on the potential impacts of nearby construction activities, pre- and post-construction baseline testing of water wells located within 100-feet of project components could be conducted to determine any surficial impacts to groundwater drinking wells. With respect to project turbines, we recommend that pre- and post-construction baseline testing of water wells located within about 1,000 of project turbines be conducted to determine any surficial impacts to groundwater drinking wells.

2.6 Chemical and Engineering Properties of Soil

The Soil Survey of Steuben County presents a summary of test results for soil samples collected from soils within the County. Select estimated engineering properties (e.g., sieve size, liquid limits, plasticity, etc.), chemical properties, and classifications for major soils identified within the Study Area are presented in the attached **Table 4**. Minor soils which are present over areas of at least 1% within the areas depicted on the generated USDA figures included in **Attachment B** are also included in this table.

3.0 PRELIMINARY SOIL AND ROCK INVESTIGATION

GZA completed a preliminary subsurface investigation (including subsurface soil and bedrock sampling and limited geotechnical laboratory testing) at ten (10) test boring locations (seven of which are at proposed turbine locations) within the Study Area. This work included a total of nine days of subsurface explorations in addition to select laboratory testing. As previously noted, at the time of our soil boring investigation a different turbine layout and identification system were assumed. Since completion of the subsurface investigation, several initially proposed turbine locations have been removed and the Study Area has been reduced. Three of the completed test boring locations (identified as T41, T80 and T116) have since been removed from the proposed locations of turbines. The remaining seven borings remain within the Study Area. GZA maintains that the information obtained from these three locations located outside of the updated Study Area remains relevant this project and findings from these locations is discussed in this report. Discussions pertaining to completed test borings in this report reference the originally provided identification. The updated identification for the completed test borings is shown in the table below for reference.

The number of borings completed at the Study Area was based on several factors including general representativeness of the Study Area and its anticipated subsurface conditions, access approval from specific land owners, drill rig and associated support vehicle accessibility (gravel roads vs. dense wooded areas) and proximity to surface water required for bedrock coring. Additionally, the original Study Area was broken down into grouped areas of proposed turbine locations in which one soil boring was completed within each group.

At the start of the soil boring investigation program, 116 proposed turbines were originally proposed within the Study Area and therefore the 10 boring locations represented about 9% of the total proposed locations number. As the number of proposed turbines were reduced to 76 (with seven of the 10 completed test borings being completed at proposed turbine locations), the percentage of completed borings was maintained at about 9% of representative turbine locations. The number of soil borings typically completed as part of preliminary geotechnical drilling programs for similar wind turbine projects (completed to obtain general Study Area subsurface conditions) is approximately ±10%. Overall, the variability of bedrock and soil types encountered during completion of the test boring program was minimal with a majority of the turbine locations in areas of similar subsurface conditions. Additionally, even though three soil borings were completed outside of the revised Study Area, the data obtained from these locations is considered representative of the conditions expected within the revised Study Area limits and thus provides relevant data. Based on these findings, it is our opinion that the seven-test boring completed within the Study Area (coupled with the data obtained from the three borings outside the Study Area) is sufficient for this preliminary geotechnical investigation.

GZA subcontracted with Earth Dimensions Inc. (EDI) of Elma, New York, to complete the subsurface explorations. Mr. John Beninati (GZA Geologist) was present at the Facility during drilling operations to observe and document the test boring activities, and collect soil samples at each boring location and rock core samples when encountered at depths less than 30 feet bgs. The test borings were made using an all-terrain vehicle drill rig (i.e., track rig) equipped with a Diedrich 50 drill rig. Overburden soil was continuously sampled to depths of 12 feet bgs and at 5- foot intervals thereafter at each test boring location using a 2-inch outer diameter, split-spoon sampler. Auger refusal (which can suggest top of bedrock) was encountered at seven locations at depths ranging from 11 feet bgs and 23.5 feet bgs (identified as test borings T3, T23, T41, T58, T88, T109 and T112) although one location (T116) had auger refusal at a depth of 34 ft bgs. The remaining two test borings (T80 and T46) were completed to depths between 38 and 40 ft bgs without experiencing auger refusal. Evidence of severely weathered bedrock was observed at several of these locations. Bedrock core samples, 10-feet in length, were collected at the seven locations referenced above. The locations of the completed test borings (and their respective updated and original identifiers) are shown on the attached Figures.

The field location of each test boring was approximated using the provided coordinates, google earth application, nearby land features and the hand-held compass (I-Phone) coordinates (reportedly accurate to within 15 +/- feet). The ground surface elevations at the test borings locations were unable to be obtained.

3.1 Subsurface Soil

EDI drilled the ten (10) test borings (identified as T3, T23, T41, T46, T58, T80, T88, T109, T116 and T112) on November 1, 2016 through November 11, 2016. Hollow stem auger techniques[3] were used to advance each boring through the overburden. Split-spoon soil samples were collected in accordance with ASTM D-1586 at ground surface, and continuously to 12 feet bgs and at 5-foot intervals thereafter to about 40 feet bgs or to auger refusal, whichever was encountered first. The following table summarizes the test boring drilling done at each of the ten locations.

Original Test Boring Designation	**Updated Test Boring Designation**	**Overburden Thickness (Ft)**	**Total Depth of Boring (Ft)**	**Number of Soil Samples Collected**
T3	T5	14	24	7
T23	T43	18	28	6
T41	T41*	22	34	8
T46	T44	20	30	8
T58	T63	19	32	8
T80	T80*	34	34	11
T88	T76	40	40	12
T109	T78	38	38	12

[3] Hollow stem augers used were 3-1/4 inch inside diameter and approximate 7-inch outside diameter.

Original Test Boring Designation	Updated Test Boring Designation	Overburden Thickness (Ft)	Total Depth of Boring (Ft)	Number of Soil Samples Collected
T116	T116*	11	22	6
T112	T83	17.5	30	8

*Locations outside of updated Study Area

Test boring logs are included as **Attachment C**.

Overburden soil sampling was done at the ten test boring locations using the Standard Penetration Test (SPT), which consists of driving a 2-inch outside diameter (1-3/8 inch inside diameter) standard split spoon sampler 24 inches with a 140-pound hammer dropping from a height of 30 inches. The standard penetration value, referred to as the uncorrected "N" value, is the number of blows required to drive the soil sampler 12-inches, from the sixth to the eighteenth inch, of the 24 inches of penetration into the subsurface soil. Uncorrected "N" values ranged from 6 to greater than 100. The majority of uncorrected "N" values ranged between 30 and greater than 100, which as shown on the table below indicates a range between dense and very dense relative density (for granular soils) or medium to hard consistency, for fine-grained cohesive soils. Soils that exhibit a relative density/consistency of medium dense/medium, at a minimum, are suitable for shallow foundation construction.

Non-Plastic (Granular) Soils		**Plastic (Cohesive) Soils**	
Blows/Foot (N)	Relative Density	Blows/Foot (N)	Consistency
0 – 4	Very Loose	<2	Very Soft
4 – 10	Loose	2 – 4	Soft
10 – 30	Medium Dense	4 – 8	Medium
30 - 50	Dense	8 – 15	Stiff
>50	Very Dense	15 – 30	Very Stiff
		>30	Hard

3.2 Bedrock

Bedrock coring consisted of "NQ" size core in general accordance with ASTM D-2113. Water was used during rock core drilling at the seven locations where bedrock was encountered at depth less than 30 feet bgs. Drilling water was pumped down the test boring to lubricate and cool the rock core drill bit. Rock core samples at the seven locations were collected at 10-foot lengths. Moderately to severely weathered sedimentary bedrock (shale, siltstone and/or sandstone) was typically encountered within 11 to 21 feet of ground surface at test borings T3, T23, T41, T58, T88, T109, and T112. Evidence of severely weathered bedrock was observed at depths typically greater than 30 feet below ground at test boring locations T46, T80 and T116 specifically during our subsurface investigation.

In general, rock core samples identified medium to thinly-bedded formations consisting of interbedded shale, siltstone and/or sandstone. Depending on location, the bedrock samples obtained were classified as the Machias Formation shale and siltstone or Wiscoy Formation sandstone and shale (see logs in **Attachment C**). The rock quality designation (RQD)[4] was measured on the rock core samples collected to range from 0% to 96%, which indicates a very poor (less than 25%) to excellent rock quality, although we note that the majority of the recovered samples were identified as very poor to poor RQD and only a select few samples (from test boring locations T88 and T112) had RQD as good to excellent. The rock quality is often very poor at the bedrock/overburden interface and typically increases with depth. The RQD of interbedded bedrock is generally low. Photographs of the rock core samples are included in **Attachment C**.

The bedrock encountered at the completed test boring locations is identified as a soft to hard rock that is expected to be rippable using typical construction excavation equipment (if required) and/or could easily be broken up using a pneumatic hammer. However, excavations at these depths is considered to be unlikely. Based on the depth of bedrock and its general weathered and very poor rock quality conditions observed at select locations of the Site, blasting would likely not be necessary for construction of proposed wind turbine foundations and associated equipment.

3.3 Groundwater

The ten test boring locations were observed to have no standing water at completion of respective soil sampling (and prior to rock coring at respective locations) except for T46 which was measured with water at 29 ft. bgs. Additionally, the generally hard to very dense overburden till soil at select locations is expected to have a low to moderate permeability or hydraulic conductivity allowing for good drainage in addition to the locations typically being located at the higher elevations for the area.

---

[4] Rock quality designation is calculated by summing the length of the rock core pieces collected that are greater than 4-inches long and dividing that summation by the total length of the core run.

Most of the water used during rock coring activities for the seven cored locations was observed to be recycled up through the augers, indicating that most of the water pumped into the test boring was not being readily drained through existing rock fractures. An exception to this was T23 which was observed to lose drilling water at a depth of about 20 feet bgs.

LABORATORY TESTING

GZA selected representative soil samples for index laboratory testing to confirm field descriptions and to assist in estimating engineering properties. The laboratory testing program consisted of:

- Thirty (30) soil samples for moisture content (ASTM D2216);
- Six (6) soil samples for grain size analysis (ASTM D422);
- Ten (10) soil samples for Atterberg limits (ASTM D4318);

The laboratory test results are included as **Attachment C**.

Soil Test Results

Moisture Content

Soil sample test results ranged from 7.7% to 26.6% with an average moisture content of about 13%. A moisture profile from test boring locations (i.e., T-46 and T116) ranged from 9% to 27% with an average value of about 14%. These profiles were done assuming their representativeness for the proposed turbine locations at the upper elevations within the Study Area.

Gradation Testing

Soil sample gradations tests were completed on a total of ten (10) samples and the following range and average percentage by weight for fines, sand and gravel soil components are presented below.

- Percent fines (silt and clay) ranged between 13% and 98% and averaging about 56%
- Percent sand ranged between 1% and 36% and averaging about 22%
- Percent gravel ranged between 1% and 67% and averaging about 22%

Atterberg Limits

Atterberg limits testing was done on the "fines" component (silt and clay) to better assess plasticity. The analysis indicated that the fine component for the ten samples tested had ranged between non-plastic, slight and medium plasticity, depending on location.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 Seismic Considerations

For consideration under the New York State Building Code, a Site Class definition[5] is approximated for proposed turbine locations (typically upper elevations) using an assumed 100-foot general subsurface profile that consists of the following.

- From 0 – 25 feet – stiff soil profile
- From 25 – 100 feet – very dense soil and soft rock to weathered to competent bedrock

Based on this information, GZA would recommend an overall Site Class C – very dense soil and soft rock which is assumed to be the most representative for the proposed turbine locations. Using a Site Class C, the corresponding spectral response for 0.2 second (Ss) and 1.0 second (S_1) acceleration is 0.20 and 0.06 respectively. The resulting site coefficient Fa and Fv is 1.2 and 1.7 respectively. We would consider the anticipated use (wind power generation) to fall within the Seismic Use Group II category (define as buildings that constitute a substantial public hazard, such as power plants and those that house over 300 people). Therefore, a seismic use group B is considered appropriate for design.

Based on a review of seismic faults within the Study Area (Howard, et al. 1978), there does not appear to be any significant faults of concern within the Study Area that would require relocation of proposed wind turbine and associated equipment.

4.2 Soil Suitability for Construction of Shallow Foundations and Access Roads

The subsurface conditions encountered in the test borings were observed to be generally consistent with the mapped surficial and bedrock geology at those locations. Based upon the subsurface conditions encountered at the test borings, conventional shallow anchored mat turbine foundations, direct embedded or drilled pier transmission structure foundations, and shallow spread footing building foundations are considered technically feasible.

Design and construction of the proposed foundations and roadways and work pads should anticipate surficial topsoil and subsoil overlying generally poor draining, slightly plastic, and frost-susceptible overburden glacial till, further soil overlying weathered bedrock. The weathered bedrock may be characterized as soil similar to the glacial till for engineering purposes. The underlying sedimentary, and slightly metamorphosed, rock was observed to be generally fractured and low strength for anchor design purposes, within the depth of the rock cores.

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[5] Building Code of New York State, August 2015.

Depending on the soil types, we anticipate that existing natural soils would likely be suitable for Site reuse. The reuse applications (e.g., general fill, structural fill, etc.) will depend on specific soil type gradations and drainage behavior/requirements. Specific uses of excavation soils would be at the discretion of a Geotechnical Engineer.

Preliminary index parameters are presented in the tables herein, for both cohesive and granular till, weathered bedrock, and bedrock that was encountered in the test borings. The upper 1 to 2.5 feet of topsoil and subsoil is anticipated to be stripped as part of foundation construction and roadway subgrade preparation, and is neglected in the tables. The glacial till was encountered to be slightly plastic to non-plastic. Therefore, for preliminary design purposes, the glacial till/weathered bedrock should be evaluated as both a cohesive soil and as a granular soil, as needed to evaluate the undrained (short-term) and drained (long-term) conditions, respectively.

RECOMMENDED PRELIMINARY INDEX PARAMETERS - GRANULAR SOIL

Parameter	Units	Granular Till or Severely to Moderately Weathered Bedrock
USCS	Symbol	SM, ML
Presumed corrected SPT (N'60)	bpf	25
Presumed Relative Density	unitless	Medium Dense to Dense
Unit Weight, dry, γ_d	pcf	125
Unit Weight, Moist, Unsaturated, γ_m	pcf	130
Unit Weight, Saturated, γ_t	pcf	140
Unit Weight, Effective Buoyant, Saturated, γ_e	pcf	78
Internal friction angle, ϕ'	deg	36

NOTES:
1. pcf = pounds per cubic foot; deg = degrees; psf = pounds per square foot; tcf = tons per cubic feet; psi = pounds per square inch; ft = feet; N/A = Not Applicable or Not Recommended

2. Values provided above assume that subgrades are prepared as recommended and assumed in the Preliminary Geotechnical Report and not allowed to become disturbed during construction.

RECOMMENDED PRELIMINARY INDEX PARAMETERS - COHESIVE SOIL

Parameter	Units	Cohesive Till or Weathered Bedrock
USCS	symbol	CL-ML
Presumed corrected SPT (N'60)	bpf	25
Undrained Shear Strength, s_u	ksf	2.5
Consistency	unitless	Very Stiff to Hard
Liquid Limit, LL	%	25
Plastic Limit, PL	%	16
Plastic Index, PI	%	9
Unit Weight, dry, γ_d	psf	125
Unit Weight, Moist, Unsaturated, γ_m	psf	130
Unit Weight, Saturated, γ_t	psf	140
Unit Weight, Effective Buoyant, Saturated, γ_e	psf	78

Notes:

1. pcf = pounds per cubic foot; deg = degrees; psf = pounds per square foot; tcf = tons per cubic feet; psi = pounds per square inch; ft = feet; N/A = Not Applicable or Not Recommended

2. Values provided above assume that subgrades are prepared as recommended and assumed in the Preliminary Geotechnical Report and not allowed to become disturbed during construction.

RECOMMENDED PRELIMINARY INDEX PARAMETERS - ROCK

Rock Type		**R1**
Parameter for Shallow Foundations	Units	Slightly Weathered to Fresh Siltstone, Sandstone, and Shale
Constant, M_i	Unitless	5 to 15
Rock Quality Designation, RQD	%	10 to 20
Geologic Strength Index, GSI	unitless	12 to 20
Unit Wt. Total, g_t	Pcf	150 to 160
Unconf. Comp. Strength, q_u (Intact Rock)	Psi	1,000 to 2,000

Notes:

pcf = pounds per cubic foot; psf = pounds per square foot; psi = pounds per square inch; ksf = kips (1,000 pounds) per square foot; N/A = Not Applicable or Not Recommended

The values presented in the tables herein are based on a limited number of test borings and laboratory testing and are provided to aid the designer in conceptual foundation design for planning purposes. Additional test borings, laboratory soil and rock testing, and geotechnical analysis, at individual representative turbine and structure locations, are required to confirm/modify the preliminary soil and rock index parameters presented herein.

According to the Steuben County Soil Survey, the natural soils which comprise the majority of the Study Area (e.g., Fremont, Mardin, Volusia, Bath, etc.) have a fine-grained (silt and clay) constituent ranging from 10% to 95%, depending on type and location. The natural soils which comprise valleys within and proximate to the Study Area (i.e., Howard, Chenango and Middleton) have a fine-grained constituent generally ranging from 15% to 65%. Minor soils may consist of a lesser or greater percentage of fine-grained particles. Soil types that contain greater than 50% by weight of fine-grained material are considered moisture sensitive and compressible.

> *<u>Moisture sensitivity</u>* – When exposed to moisture, largely from precipitation, the soil fabric deteriorates and soils become more difficult to place and compact, and less stable.
>
> *<u>Compressible</u>* – These fine-grained soils can consolidate under an additional applied load. Consolidation should be considered and expected if overlying embankments or structures/roads/bridge foundations are constructed bearing on these soils.

Structures and utilities placed within surficial soils should be designed against corrosion. The soils located within the Study Area are generally considered to be acidic (pH values ranging from 3.6 to 8.4), and are moderately to highly corrosive to bare steel and/or concrete, as listed below. Additionally, frost action is generally considered to be moderate to high risk for the soils with seasonally high water or perched water table due to low permeability soils. Foundations in these areas should be constructed at suitable depths below the frost line, assumed 3 to 4 feet below ground surface and up to 4.5 feet bgs on hilltops. The soil units within the Study Area which have moderate and high potential for frost action are listed below.

The Soil Survey of Steuben County, New York defines potential frost action as …"the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when the moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have high water table in winter are the most (or highly) susceptible to frost action. Well drained, very gravelly, or very sandy soils are least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other (shallow) rigid structures".

Corrosion and Frost Potential of Study Area Soil

Soil	Corrosivity to Uncoated Steel		Corrosivity to Concrete		Frost Risk	
	Moderate Risk	High Risk	Moderate Risk	High Risk	Moderate Risk	High Risk
Bath Channery Silt Loam	X					X
Lordstown Channery Silt Loam			X	X		
Lordstown-Arnot Association, Lordstown part			X	X		
Lordstown-Arnot Association, Arnot part				X	X	
Chenango Channery Silt Loam			X			
Fremont Silt Loam		X		X		X
Mardin Channery Silt Loam	X		X		X	
Middlebury Silt Loam	X		X			X
Howard and Alton Gravelly			X	X		
Howard-Madrid Complex, Madrid part			X			
Arnot Channery Silt Loam				X	X	
Volusia Channery Silt Loam		X	X			X
Chippewa Channery Silt Loam		X	X			X
Wayland Silt Loam		X				X
Tioga Silt Loam			X		X	
Braceville Gravelly Silt Loam	X		X		X	
Hornell-Fremont Silt Loams and Hornell and Fremont Silt		X		X	X	
Hornell-Fremont Silt Loams and Hornell and Fremont Silt		X		X		X

We note that typical turbine foundations and associated buried collection lines are constructed on a compacted layer of well drained structural fill over compacted subbase soil of suitable bearing capacity. Due to the sizing requirements of the turbine foundations and collection line requirements, they are typically placed at depths below the frost zone (generally considered to range in depth from 3.5 to 4 feet below ground surface). In addition, the use of structural backfill soil that is less susceptible to frost action around these features will minimize the potential for concrete damage (e.g., spalling) from to frost action as they will not be in direct contact with the native soils that are of concern.

As discussed above, the turbine foundations will be constructed on top of well-drained, compacted structural fill (e.g., crusher-run stone) and therefore will not be in direct contact with native soils that are reported as highly corrosive and/or high frost risk potential.

Additionally, as part of the more comprehensive geotechnical investigation to be completed at each final turbine location, soil samples will be collected and tested for typical corrosivity parameters (e.g., sulfates, chlorides) for verification. The test results would be used by the foundation designers for consideration of concrete and steel design requirements.

5.0 CONSTRUCTION PROCEDURES AND RECOMMENDATIONS

General preliminary guidelines are outlined below that address the geotechnical-related construction aspects for this project.

- Excavation techniques for the construction of the proposed wind turbine Facility are expected to be completed using conventional construction equipment including bulldozers, track hoes and possible pan excavators. Due to the apparent depth of bedrock and its low RQD, blasting may not be a requirement for construction of the turbine foundations.
- Based on the document review and the preliminary soil boring investigation, foundations for the proposed turbines are assumed to be constructed on anchored shallow mat foundations. However, prior to construction, it is recommended that additional soil borings will be completed at each proposed location to better evaluate and design specific foundation requirements and bearing grades.
- Prior to construction, organic layers and topsoil should be stripped from the Site in access road, crane pad, slab-on-grade and foundation areas. GZA recommends completing fill placement within and adjacent to the proposed construction zone prior to the construction of foundations. Any loose or unstable soils that are encountered during preparation of the subgrade should be removed and replaced with compacted approved granular fill.
- Following the site stripping of grass, vegetation and underlying topsoil, as well as unsuitable fill soils, the exposed undisturbed soils should be proof-rolled with a drum roller (typical static drum weight of 10,000-pounds capable of at least 20,000-pounds of dynamic force). Weak or soft spots identified during “proof-rolling” should be excavated and replaced with compacted approved granular fill.
- Approved granular fill is anticipated to be a suitable soil having no more than 10-percent by weight material passing the No. 200 sieve and should be generally free of particles greater than 6 inches. It should also be free of topsoil, asphalt, concrete rubble, wood, debris, clay and other deleterious

materials. Suitable material classified as GW, GP, GM, SW, SP and SM soils using the Unified Soil Classification System (ASTM D-2487) could be acceptable.

- Based on the information provided by the Steuben County Soil Survey, it is anticipated that construction excavations may encounter zones of perched groundwater should construction occur during times when a seasonally high water table may be present (spring and fall). In addition, construction during rainy periods may see an increase in perched groundwater due to the Study Area soils reported low hydraulic conductivity.
- Construction dewatering may be required for surface water control and for excavations that encounter perched groundwater conditions. Surface water should be diverted away from open excavations and prevented from accumulating on exposed subgrades. Silt and clay natural soil subgrades will be susceptible to strength degradation in the presence of excess moisture. If perched groundwater is encountered during construction, dewatering should be implemented prior to excavation below the groundwater surface. The groundwater levels should be maintained below the proposed excavation bottom. It is anticipated that diversion berms, proper site grading, cut-off trenches and sump and pump methods of dewatering may be used to control surface water and near surface groundwater conditions.
- It is unlikely that foundation construction activities associated with the turbines, support structures and overhead/underground transmission lines will encounter or impact subsurface groundwater, which depending on location, is assumed to be at deeper depths. Additionally, based on the at least 1,000-foot setback of turbines from residential structures, it is unlikely that turbine foundation construction activities will have an impact on quality or quantity of shallow aquifers and/or residential groundwater wells.
- Construction of access roads and/or collection lines are assumed to have minimal surficial impacts. Assuming best management practices and minimum set backs are followed during the construction of these features, impacts to quality or quantity of shallow aquifers and/or residential groundwater wells is considered unlikely.
- Based on the subsurface test boring locations investigated, foundation construction most likely will not encounter bedrock that requires removal. As such, blasting of near-surface exposed rock (if any) and rock removal may be unlikely for the proposed Baron Winds. If encountered and requiring removal at select locations, the bedrock is assumed to be rippable with an excavator and/or able to be broken by pneumatic hammer. As a reuse alternative, rock or boulders (if encountered) may be broken into a well graded mixture of the size recommended by the geotechnical engineer and used as follows:
  - Used for deeper fills (over 2' below finish grade) as specified in the geotechnical report (requires verification by a geotechnical engineer prior to final design).
  - Crushed for topping gravel (requires verification by a geotechnical engineer prior to final design).
  - Crushed for use as surface gravel for access road pavement (requires verification by a geotechnical engineer prior to final design).
  - Processed and used as rip rap.

Should you have any questions or comments regarding our findings, please feel free to contact the undersigned. We appreciate the opportunity to be involved with Everpower on this project and look forward to working with you through its completion.

Sincerely,

GZA GEOENVIRONMENTAL OF NEW YORK

Daniel J. Troy, P.E.
Senior Project Manager

Bart A. Klettke, P.E.
Principal

Gary R. McAllister
Consultant Reviewer

Attachments:

Figure 1 – Study Area
Figure 2 – Topographic Map of Study Area and Soil Boring Location Plan
Figure 3 – Soil Associations In Study Area
Figure 4 – Surficial Deposits in Study Area
Figure 5 (A and B) – Bedrock and Select Wells in Study Area
Figure 6 – Unconsolidated Aquifers in Study Area

Table 1 – Dominant Soils Proximate to Proposed Baron Winds Project Turbine and Substation Locations
Table 2 – Minor Soils Proximate to Proposed Baron Winds Project Turbine and Substation Locations
Table 3 – Groundwater Well Data Proximate to Proposed Baron Winds Project Study Area
Table 4 – Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area

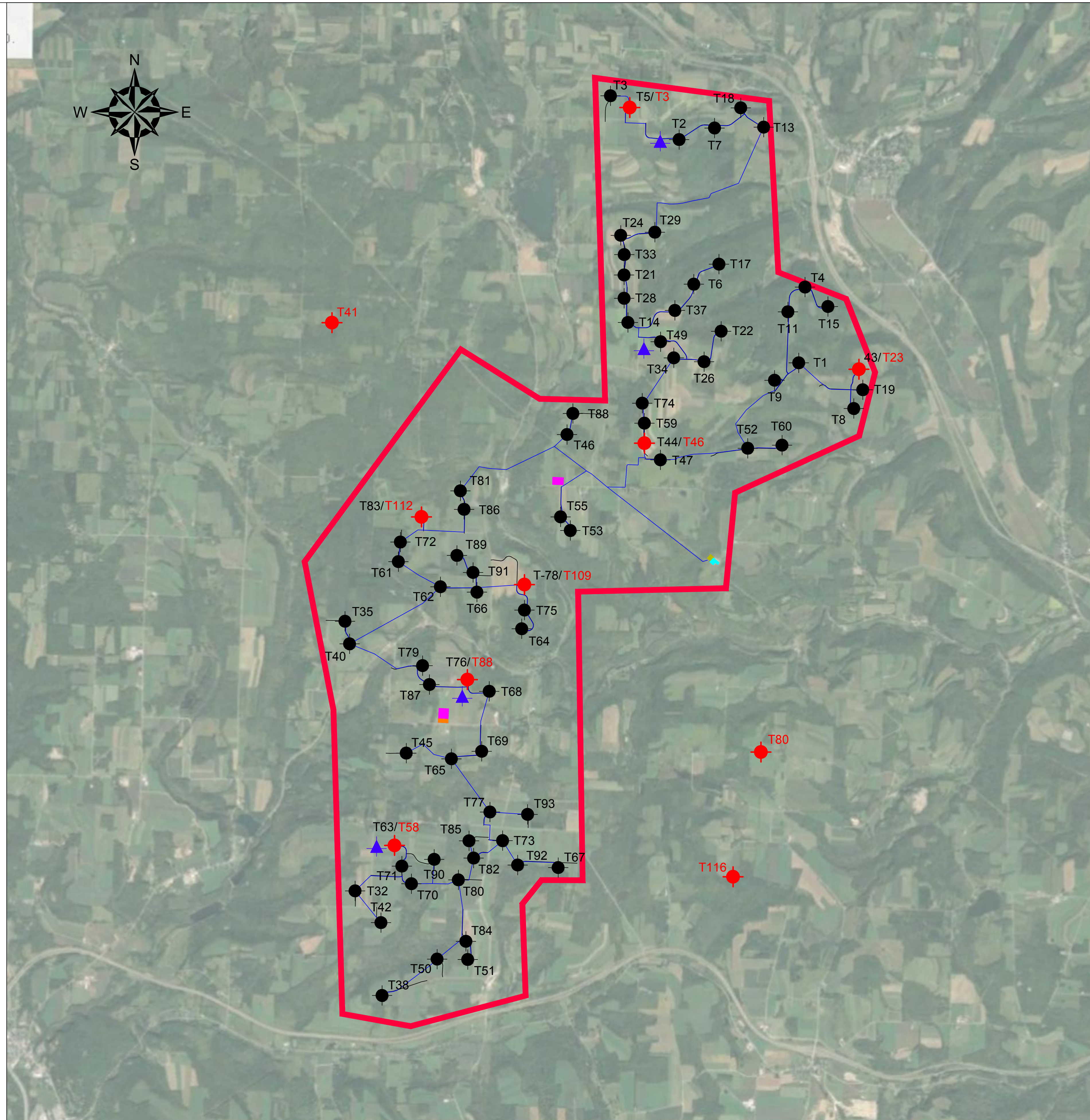
Attachment A – References

Attachment B – Additional Land Use Information

Figure B-1 – Federal Wetlands in Study Area
Figure B-2 – State Wetlands in Study Area
Figure B-3 – State Land Use in Study Area
Figure B-4 – Soil Map, Proposed Turbines T62, T66, T61, T86, T81, T89, T72, T83, and T91
Figure B-5 – Soil Map, Proposed Turbines T64, T55, T53, T75, T78, and Substation

Attachments (cont'd):

FIGURES



GENERAL NOTES

1. BASE MAP ADAPTED FROM WORLD IMAGERY MAP USING ArcGIS AUTOCAD PLUGIN.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
- T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)
- INDICATES UPDATED STUDY AREA LIMITS
- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- LAYDOWN YARD LIMITS
- SUBSTATION LIMITS
- COLLECTOR SUBSTATION
- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
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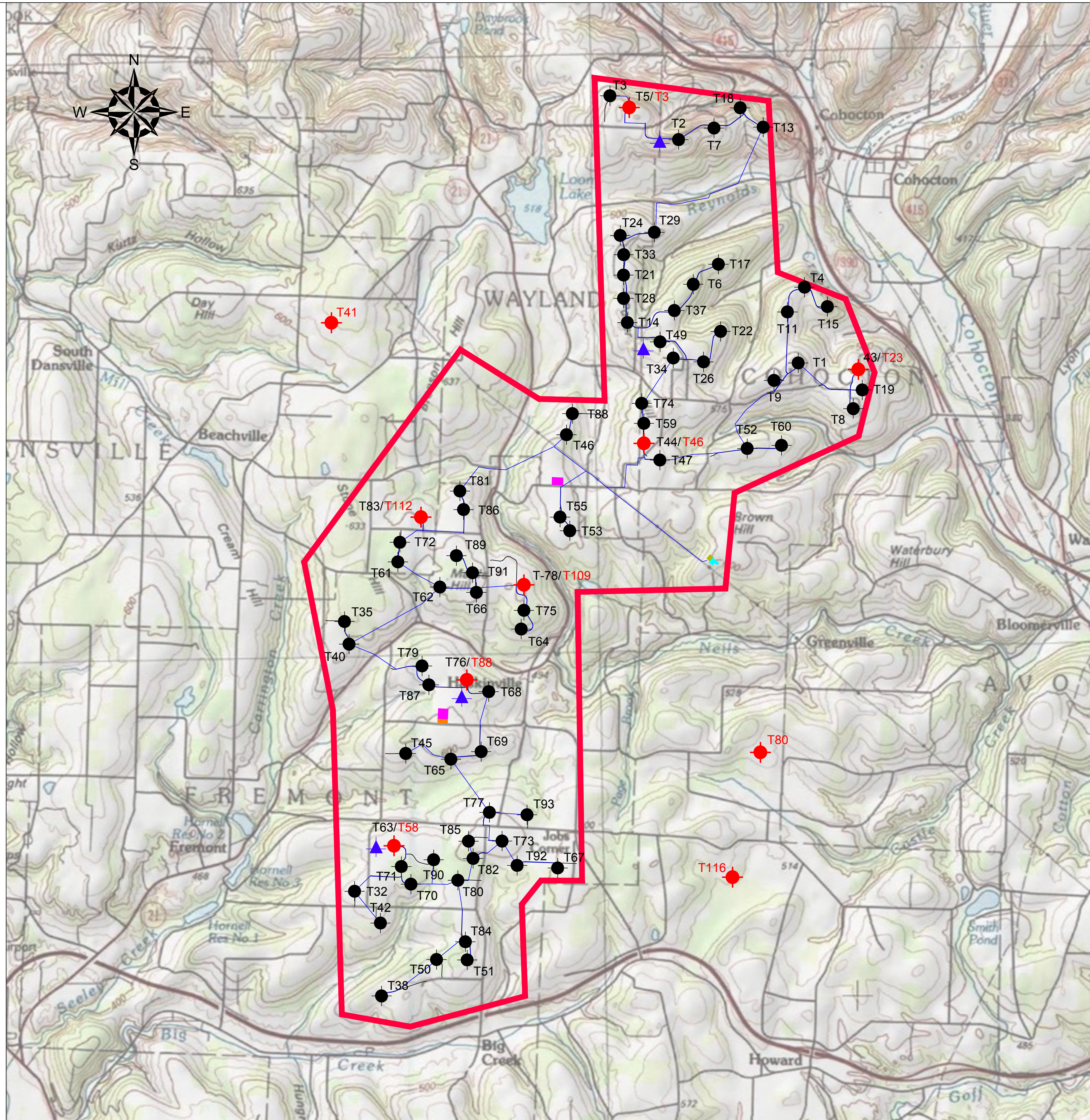
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	



GENERAL NOTES

1. BASE MAP ADAPTED FROM USA TOPO MAPS USING ArcGIS AUTOCAD PLUGIN.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
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- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

TOPOGRAPHIC MAP OF STUDY AREA AND SOIL BORING LOCATION PLAN

PREPARED BY: GZA GeoEnvironmental of NY, Engineers and Scientists, www.gza.com

PREPARED FOR: EVER POWER, 1251 WATERFRONT PLACE, 3RD FLOOR, PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
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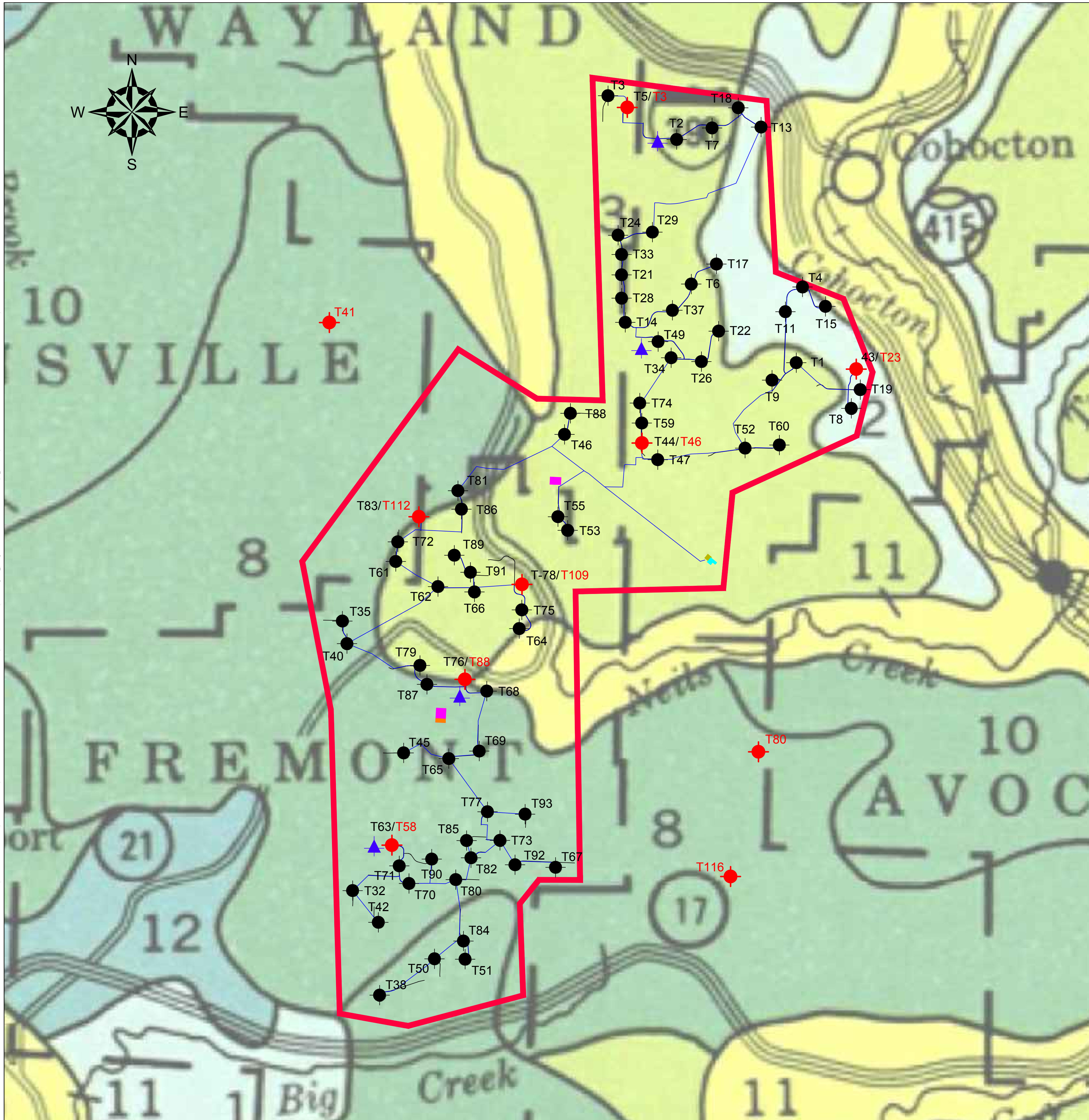
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	



GENERAL NOTES

1. BASE MAP ADAPTED FROM USDA SOIL CONSERVATION SERVICE GENERAL SOIL MAP OF STEUBEN COUNTY, NEW YORK.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)

T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL

T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)

INDICATES UPDATED STUDY AREA LIMITS

ACCESS ROAD LOCATION

COLLECTION LINE LOCATION

COLLECTOR SUBSTATION

LAYDOWN YARD LIMITS

O.M. STATION

SUBSTATION LIMITS

PERMANENT METEOROLOGICAL STATION

2 — Lordstown–Arnot association: Steep and very steep, dominantly well drained, moderately deep and shoallow soils overlying hard sandstone bedrock; on uplands

3 — Bath–Lordstown association: Gently sloping and sloping, well drained, deep soils that have a fragipan and moderately deep soils overlying hard sandstone bedrock; on uplands

8 — Fremont–Mardin association: Nearly level to moderately steep, somewhat poorly drained, deep soils and moderately well drained, deep soils that have a fragipan; on uplands

11 — Howard–Chenango–Middlebury association: Nearly level and gently sloping, well drained and somewhat excessively drained, deep soils that formed in outwash in valleys and nearly level, moderately well drained and somewhat poorly drained, deep soils that formed in recent alluvium on floodplains

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

SOIL ASSOCIATIONS IN STUDY AREA

PREPARED BY: GZA GeoEnvironmental of NY, Engineers and Scientists, www.gza.com

PREPARED FOR: EVER POWER, 1251 WATERFRONT PLACE, 3RD FLOOR, PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	3
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

EXPLANATION

ls — ls – Lacustrine sand
Sand deposits associated with large bodies of water, generally a near–shore deposit or near a sand source, well–sorted, stratified, generally quartz sand, thickness variable (2–20 meters).

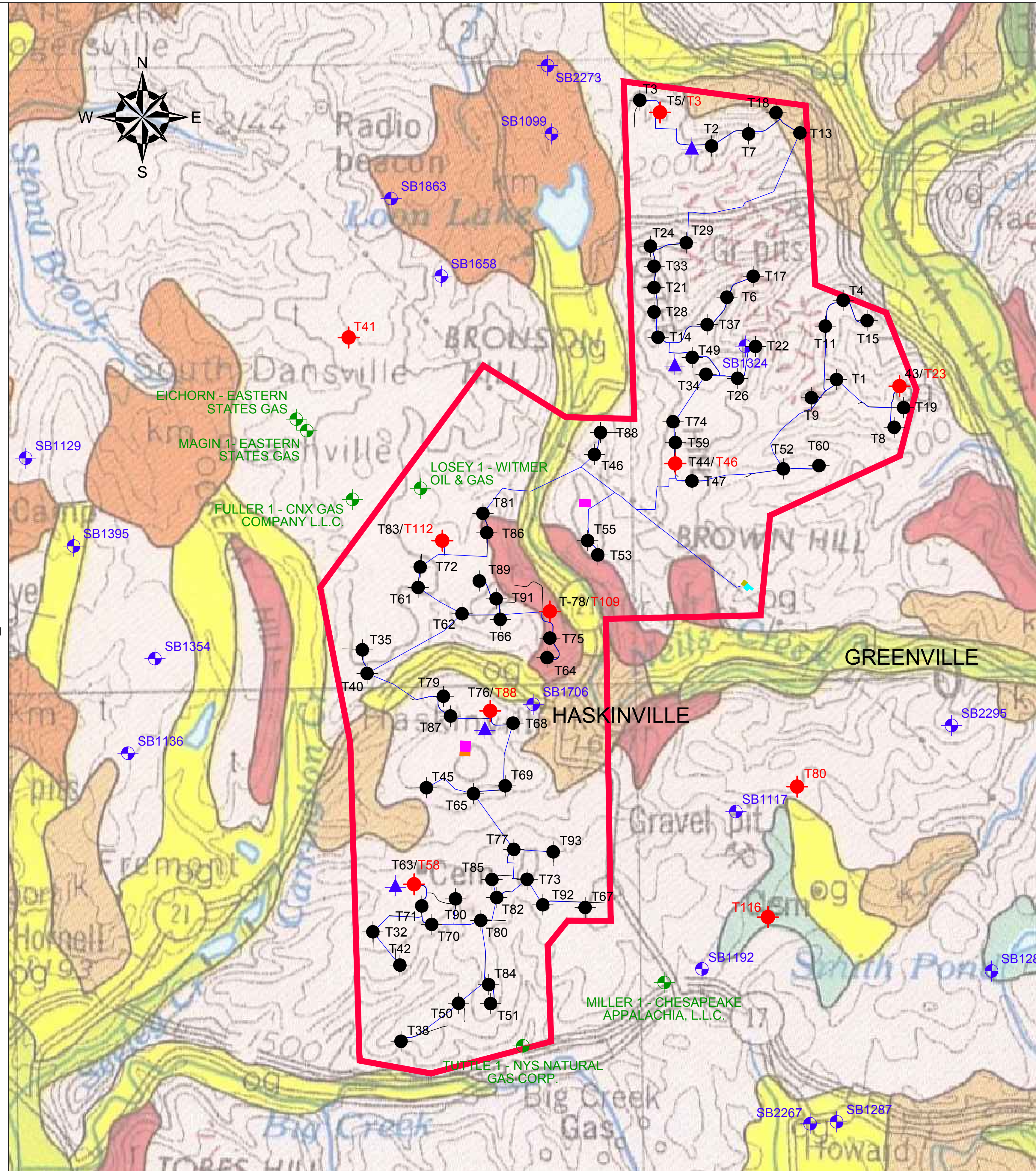
og — og – Outwash sand and gravel
Coarse to fine gravel with sand, proglacial fluvial deposition, well–rounded and stratified, generally finer texture away from ice border, thickness variable (2–20 meters).

k — k – Kame deposits
Includes kames, eskers, kame terraces, kame deltas, coarse to fine gravel and/or sand, deposition adjacent to ice, lateral variability in sorting, coarseness and thickness, locally firmly cemented with calcareous cement, thickness variable (10–30 meters).

km — km – Kame moraine
Variable texture (size and sorting) from boulders to sand, deposition at an ice margin during deglaciation, locally cemented with calcareous cement, thickness variable (10–30 meters).

t — t – Till
Variable texture (e.g. clay, silt–clay, boulder clay), usually poorly sorted diamict, deposition beneath glacier ice, generally calcareous in northern part of map, relatively impermeable (loamy matrix), variable clast content – ranging from abundant well–rounded diverse lithologies in valley tills to relatively angular, more limited lithologies in upland tills, potential land instability on steep slopes, thickness variable (1–50 meters).

r — r – Bedrock
Exposed or within 1 meter of surface, the following types of rock may be exposed: Paleozoic limestone, sandstone, shale.



GENERAL NOTES

1. BASE MAP ADAPTED FROM 1970 GEOLOGIC MAP OF NEW YORK.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
- T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)
- INDICATES UPDATED STUDY AREA LIMITS
- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- LAYDOWN YARD LIMITS
- SUBSTATION LIMITS
- COLLECTOR SUBSTATION
- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER
- SB1324 — INDICATES WATER WELL LOCATION (NYSDEC DATABASE)
- OIL & GAS — INDICATES OIL AND GAS WELL LOCATION (NYSDEC DATABASE)

0 3000 6000 12000
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

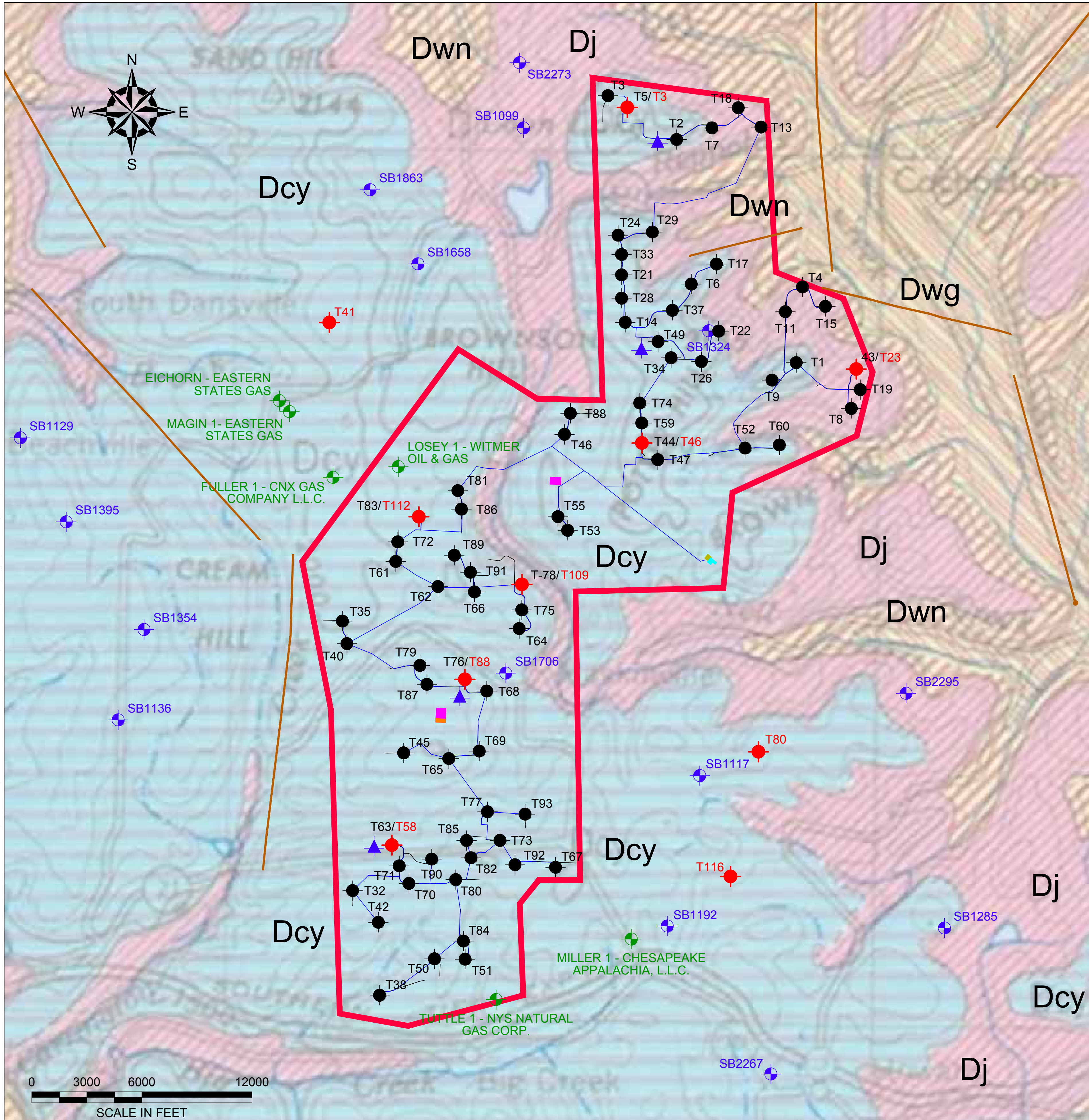
BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

SURFICIAL DEPOSITS IN STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	4
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	



GENERAL NOTES

1. BASE MAP ADAPTED FROM 1970 GEOLOGIC MAP OF NEW YORK.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

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- INDICATES UPDATED STUDY AREA LIMITS
- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- COLLECTOR SUBSTATION
- LAYDOWN YARD LIMITS
- O.M. STATION
- SUBSTATION LIMITS
- PERMANENT MET. STATION
- INDICATES FAULT LINE
- SB1324 — INDICATES WATER WELL LOCATION (NYSDEC DATABASE)
- LOSEY 1 - WITMER OIL & GAS — INDICATES OIL AND GAS WELL LOCATION (NYSDEC DATABASE)
- Dcy — Machias Formation – shale, siltstone; Rushford Sandstone; Caneadea, Canisteo, and Hume Shales; Canaserage Sandstone; South Wales and Dunkirk Shales; In Pennsylvania: Towanda Formation – shale, sandstone.
- Dj — Wiscoy Formation – sandstone, shale; Hanover and Pipe Creek Shales.
- Dwn — Nunda Formation – sandstone, shale.
- Dwg — West Hill and Gardeau Formation – shale, siltstone; Roricks Glen Shale; upper Beers Hill Shale; Grimes Siltstone.

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

BEDROCK AND SELECT WELLS IN STUDY AREA

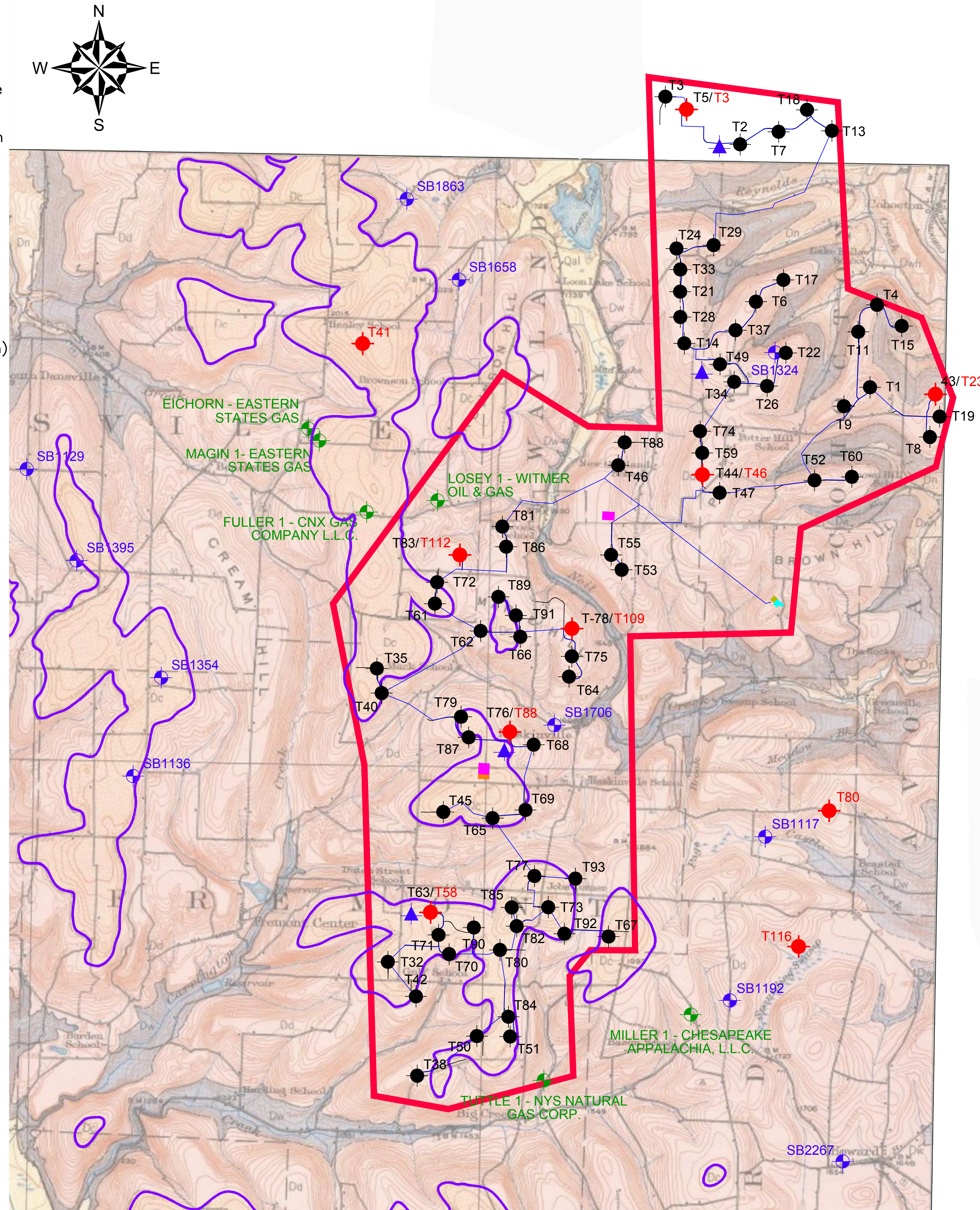
PREPARED BY: GZA GeoEnvironmental of NY, Engineers and Scientists, www.gza.com

PREPARED FOR: EVER POWER, 1251 WATERFRONT PLACE, 3RD FLOOR, PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	5A
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

EXPLANATION

- **Qal** — ALLUVIUM – Gravel, sand silt, and clay of Pleistocene and Recent age
- **Dc** — CANISTEO SHALE MEMBER AND HIGHER BEDS – Gray shale overlain by brown sandstone that contains interbedded brown and gray shale (Perrysburg formation)
- **Dd** — CANASERAGA SANDSTONE MEMBER; SOUTH WALES MEMBER; DUNKIRK SHALE MEMBER – Thin to massive irregular–bedded buff sandstones and some interbedded shale; gray shale and thin siltstones and sandstones; black shale, silty in some places, may contain gray shale streaks (Perrysburg formation)
- **Dw** — WISCOY SANDSTONE; HANOVER SHALE; PIPE CREEK SHALE MEMBER – Greenish–gray sandstone and siltstone containing beds of buff sandstone and siltstone; dark–gray shale, containing some buff siltstones; black shale at the base of the Hanover shale
- **Dn** — NUNDA SANDSTONE – Platy to massive blue to buff siltstone and fine–grained sandstone that intergrades downward into West Hill formation
- **Dwh** — WEST HILL FORMATION – Dark bluish–gray sandstones and siltstones separated by beds of dark–gray shale. The basal part is mostly gray shale but contains some thin beds of siltstone and thin beds of black shale



GENERAL NOTES

1. BASE MAP ADAPTED FROM 1954 GEOLOGIC MAP OF THE HORNELL GUADRANGLE, NEW YORK.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
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- SUBSTATION LIMITS
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- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER
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0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

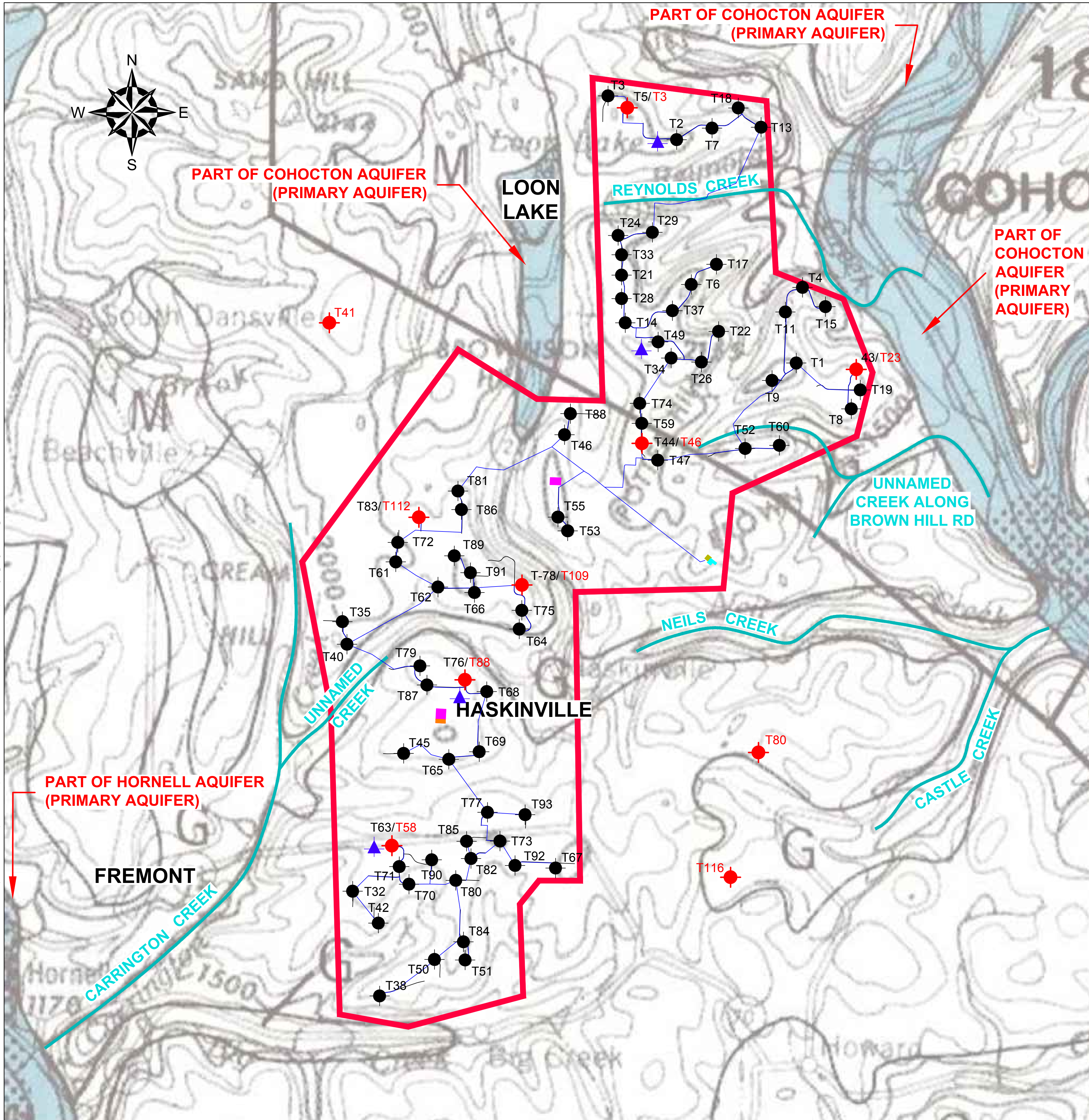
BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

BEDROCK AND SELECT WELLS IN STUDY AREA

PREPARED BY: GZA GeoEnvironmental of NY, Engineers and Scientists, www.gza.com

PREPARED FOR: EVER POWER, 1251 WATERFRONT PLACE, 3RD FLOOR, PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	5B
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	



GENERAL NOTES

1. BASE MAP ADAPTED FROM UNCONSOLIDATED AQUIFERS IN UPSTATE NEW YORK GEOLOGICAL SURVEY MAP.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)

T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL

T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)

INDICATES UPDATED STUDY AREA LIMITS

ACCESS ROAD LOCATION

COLLECTION LINE LOCATION

COLLECTOR SUBSTATION

LAYDOWN YARD LIMITS

O.M. STATION

SUBSTATION LIMITS

PERMANENT METEOROLOGICAL STATION

APPROXIMATE LOCATION OF CREEK (FULL LENGTH OF CREEK NOT SHOWN)

EXPLANATION

UNCONFINED AQUIFER – More than 100 gallons per minute

CONFINED AQUIFER – 5 to more than 500 gallons per minute

AQUIFERS OF UNKNOWN POTENTIAL

G — Kame, Kame terrace, outwash, or alluvium

M — Moraine

0 3000 6000 12000
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

UNCONSOLIDATED AQUIFERS IN STUDY AREA

PREPARED BY: GZA GeoEnvironmental of NY, Engineers and Scientists, www.gza.com

PREPARED FOR: EVER POWER, 1251 WATERFRONT PLACE, 3RD FLOOR, PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	6
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

TABLES

TABLE 1
Dominant Soils Proximate to Proposed Baron Winds Project Turbine and Substation Locations
Steuben County, New York

Soil Type	Bath channery silt loam (Ba)	Lordstown channery silt loam (Lo)	Lordstown-Arnot association, steep (LRE)	Chenango channery silt loam, fan (Ch)
Occurrence	**BaB:** Convex side slopes on higher plateau areas of uplands; receives little or no runoff from adjacent soils (3-12% slopes) **BaC:** Long areas on ridges or sides of ridges that are in higher areas of the plateau where runoff does not accumulate (12-20% slopes) **BaD:** Side slopes of hills and ridges in higher areas of the plateau where runoff does not accumulate (20-30% slopes) **BBE:** Side slopes of drainage dissections in the plateau (steep, mainly 30-45% slopes)	**LoB:** Slightly convex tops of hills and ridges (3-12% slopes) **LoC:** Long, narrow strips along the upper valley walls just below the crests of the hills (12-20% slopes)	Valley walls; water runs off rapidly, and little water is received from other areas (20-40% slopes)	Fan-shaped, alluvial areas where streams from the uplands poured out onto nearly level valley floors (gently sloping)
Depth	Deep	Moderately deep	Moderately deep	Deep
Drainage	Well drained	Well drained	Well drained	Well drained to somewhat excessively drained
High Water Table	Perched at 2.0 feet	Greater than 6.0 feet	Greater than 6.0 feet	Apparent at 3.0 to 6.0 feet from April through May
Depth to Bedrock	Greater than 5 feet	20 to 40 inches	20 to 40 inches	Greater than 5 feet
Notable Features	Bath soils contain many hard, angular, channery, and flaggy fragments and sandstone	-	Ledges and bedrock outcrops are common	-

Soil Type	Lordstown-Arnot association, very steep (LRF)	Fremont silt loam (Fr)	Mardin channery silt loam (Md)	Middlebury silt loam (Mp)
Occurrence	Forested slopes of valley sides (>40% slopes, nearly vertical in places)	**FrB:** Broad, slightly convex plateau areas where runoff is somewhat slow and persists for significant periods (2-8% slopes)	**MdB:** High areas where little or no runoff accumulates (2-8% slopes) **MdC:** Sides of large hills (8-15% slopes) **MdD:** Hillsides and narrow dissected valleys (15-25% slopes)	Slight depressions on flood plains (nearly level)
Depth	Moderately deep	Deep	Deep	Deep
Drainage	Well drained	Somewhat poorly drained	Moderately well drained	Moderately well drained
High Water Table	Greater than 6.0 feet	Perched at 0.5-1.5 feet from December through May	Perched at 1.5 to 2.0 feet from March through May	Apparent at 0.5 to 2.0 feet from February through April
Depth to Bedrock	20 to 40 inches	40 to 60 inches	Greater than 5 feet	Greater than 5 feet
Notable Features	Ledges and bedrock outcrops are common	-	-	-

Soil Type	Howard gravelly loam (Ho)	Howard and Alton gravelly soils (Ht)	Howard-Madrid complex (Hr)	Arnot channery silt loam (ARC)
Occurrence	**HoA:** Glacial outwash terraces along larger streams (0-3% slopes) **HoB:** Glacial outwash terraces and plains in areas of complex slopes and kettle and kame topography (undulating, 3-12% slopes) **HoC:** Valley sides and hillsdies on uplands (rolling, 12-20% slopes)	**HtD:** Terrace faces and hilly valley sides; runoff is very rapid (20-30% slopes) **HtE:** Very steep terrace faces and valley sides (30-45% slopes)	**HrB:** Lesser slopes in valleys (undulating, 3-12% slopes) **HrC:** Lower part of valley walls in rolling areas (rolling, 12-20% slopes) **HrD:** Steep slopes of the lower valley walls (20-30% slopes)	Sides of long narrow ridges in uplands (2-20% slopes)
Depth	Deep	Deep	Deep	Shallow
Drainage	Well drained to somewhat excessively drained	Well drained to somewhat excessively drained	Well drained to somewhat excessively drained	Well drained and moderately well drained
High Water Table	Greater than 6.0 feet	Greater than 6.0 feet	Greater than 6.0 feet	Perched at 1.0 to 1.5 feet from April through May
Depth to Bedrock	Greater than 5 feet	Greater than 5 feet	Greater than 5 feet	10 to 20 inches
Notable Features	Good source of gravel	-	-	-

TABLE 2
Minor Soils Proximate to Proposed Baron Winds Project Turbine and Substation Locations
Steuben County, New York

Soil Type	Volusia channery silt loam (Vo)	Fluvaquents and Ochrepts (FL)	Ochrepts and Orthents (OC)
Occurrence	**VoB:** Undulating hilltops or uniformly gently sloping hillsides; receives runoff from higher lying Mardin soils (3-8% slopes) **VoC:** Long sloping areas where water accumulates from higher lying areas (8-15% slopes) **VoD:** Areas along waterways on hillsides and foot slopes below areas of steeper, better drained soils (15-25% slopes)	Narrow strips along streams and rivers (0-8% slopes)	Very steep areas that have been deeply dissected by streams (very steep)
Depth	Deep	-	-
Drainage	Somewhat poorly drained	Well drained to very poorly drained	Tendency to slip or slump downslope
High Water Table	Perched at 0.5 to 1.5 feet from December through May	Apparent at 0 to 6.0 feet	Greater than 6.0 feet
Depth to Bedrock	Greater than 5 feet	Greater than 5 feet	0 to 5 feet
Notable Features	-	Consist of mixed alluvial material that ranges from clay to large boulders	Can have large amounts of rock outcrop
Soil Type	**Chippewa channery silt loam (Ck)**	**Wayland silt loam (Wn)**	**Tioga silt loam (Tg)**
Occurrence	Saucer-shaped depressions and drainageways (0-3% slopes)	Low areas of flood plains along major rivers and streams (0-3% slopes)	Flood plains (nearly level)
Depth	Deep	Deep	Deep
Drainage	Poorly drained	Very poorly drained	Well drained
High Water Table	Perched at 0 to 0.5 feet from November through May	Apparent at 0 to 0.5 feet from November through June	Apparent at 3.0 to 6.0 feet
Depth to Bedrock	Greater than 5 feet	Greater than 5 feet	Greater than 5 feet
Notable Features	-	-	-
Soil Type	**Braceville gravelly silt loam (Br)**	**Hornell-Fremont silt loams (Hf)**	**Hornell and Fremont silt loams (HgD)**
Occurrence	**BrA:** Concave areas on gravelly terraces (0-3% slopes)	**HfB:** Ridgetop areas of uplands where runoff is somewhat slow (1-6% slopes) **HfC:** Side slopes of ridges on uplands (6-12% slopes)	Long side slopes below the crests of hills and on foot slopes below steep valley sides (12-20% slopes)
Depth	Deep	Moderately deep	Moderately deep
Drainage	Moderately well drained	Somewhat poorly drained	Somewhat poorly drained
High Water Table	Perched at 0.5 to 3.0 feet from November through March	Perched at 0.5 to 2.0 feet from December through May	Not provided
Depth to Bedrock	Greater than 5 feet	20 to 60 inches	Not provided
Notable Features	-	-	-

TABLE 3

Groundwater Well Data Proximate to Proposed Baron Winds Project Study Area

Steuben County, New York

Well	Elevation (feet above sea level)	Depth to Bedrock (feet)	Depth to Groundwater (feet)	Water Well Depth (feet)	Yield (gallons per minute)
SB1706	1672	53	47	100	20
SB1117**	1757	>33	11	33	25
SB1324	2022	34	*	490	1
SB1192**	1809	112	190	205	*
SB1658**	1879	34	25	73	20
SB1863**	1806	90	40	108	20
SB1099**	1748	>284	284	284	1
SB2273**	1779	71	260	300	8
SB2267**	1666	>48	25	48	15
SB1287**	1661	>25	15	25	20
SB1285**	1643	30	14	39	25
SB2295**	1548	*	*	211	10
SB1129**	1624	69	135	155	*
SB1395**	1857	45	18	65	36
SB1354**	1975	30	18	70	20
SB1136**	1920	*	55	65	6

* Not available in records reviewed

** Well is outside of the Study Area

See Figures 4, 5A, and 5B for well locations.

TABLE 4

Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area

Steuben County, New York

Bath Channery Silt Loam (Ba)

	0 to 23 inches	23 to 31 inches	31 to 41 inches
USDA Texture	Channery silt loam	Channery loam, channery silt loam	Channery loam, channery silt, loam, channery sandy loam
Percentage Fragments > 3 inches	5-10%	5-10%	10-15%
Percentage Passing Sieve No. 200	25-65%	25-55%	10-45%
Liquid Limit (%)	30-35%	20-24%	20-24%
Plasticity Index	6-10	2-4	4-6
Permeability (in/hr)	0.6-2.0	0.6-2.0	0.06-0.2
Available Water Capacity (in./in)	0.10-0.20	0.08-0.18	0.00-0.06
Soil Reaction (pH)	4.5-6.0	4.5-6.0	4.5-6.5
Flooding Frequency	None		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.17	0.28	0.28
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Moderate	Moderate	Moderate
Risk of Corrosion - Concrete	Moderate	Moderate	Moderate

	41 to 60 inches
USDA Texture	Channery loam, channery silt loam, channery sandy loam
Percentage Fragments > 3 inches	10-15%
Percentage Passing Sieve No. 200	10-45%
Liquid Limit (%)	19-24%
Plasticity Index	4-6
Permeability (in/hr)	0.06-0.2
Available Water Capacity (in./in)	-
Soil Reaction (pH)	5.1-7.8
Flooding Frequency	None
Potential Frost Action	High
Shrink/Swell Potential	Low
Soil Erodibility Factor K	0.28
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	Moderate
Risk of Corrosion - Concrete	Moderate

Lordstown Channery Silt Loam (Lo)

	0 to 9 inches	9 to 27 inches	27 to 36 inches
Texture	Channery silt loam	Very channery silt loam, channery very fine sandy loam	Very flaggy silt loam, channery fine sandy loam
Fragments > 3 inches	5-10%	5-10%	5-25%
Percentage Passing Sieve No. 200	40-65%	25-65%	15-60%
Liquid Limit	<30%	<30%	<30%
Plasticity Index	NP-4	NP-4	NP-4
Permeability (in/hr)	0.6-2.0	0.6-2.0	0.6-2.0
Available Water Capacity (in./in)	0.11-0.17	0.10-0.16	0.05-0.14
Soil Reaction (pH)	4.5-5.5	4.5-5.5	5.1-6.0
Flooding Frequency	None		
Potential Frost Action	Low		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.20	0.28	0.28
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Low	Low	Low
Risk of Corrosion - Concrete	High	High	Moderate

	36 inches
Texture	Unweathered bedrock
Fragments > 3 inches	Not estimated
Percentage Passing Sieve No. 200	Not estimated
Liquid Limit	Not estimated
Plasticity Index	Not estimated
Permeability (in/hr)	Not estimated
Available Water Capacity (in./in)	Not estimated
Soil Reaction (pH)	Not estimated
Flooding Frequency	None
Potential Frost Action	Low
Shrink/Swell Potential	Not estimated
Soil Erodibility Factor K	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	Not estimated
Risk of Corrosion - Concrete	Not estimated

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Lordstown-Arnot Association, Steep and Very Steep (LRE, LRF), Lordstown part.

	0 to 9 inches	9 to 27 inches	27 to 36 inches	36 inches
Texture	Channery silt loam	Very channery silt loam, channery very fine sandy loam	Very flaggy silt loam, channery fine sandy loam	Unweathered bedrock
Fragments > 3 inches	5-10%	5-10%	5-25%	Not estimated
Percentage Passing Sieve No. 200	40-65%	25-65%	15-60%	Not estimated
Liquid Limit	<30%	<30%	<30%	Not estimated
Plasticity Index	NP-4	NP-4	NP-4	Not estimated
Permeability (in/hr)	0.6-2.0	0.6-2.0	0.6-2.0	Not estimated
Available Water Capacity (in./in)	0.11-0.17	0.10-0.16	0.05-0.14	Not estimated
Soil Reaction (pH)	4.5-5.5	4.5-5.5	5.1-6.0	Not estimated
Flooding Frequency	None			None
Potential Frost Action	Low			Low
Shrink/Swell Potential	Low	Low	Low	Not estimated
Soil Erodibility Factor K	0.20	0.28	0.28	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	3			3
Risk of Corrosion - Uncoated Steel	Low	Low	Low	Not estimated
Risk of Corrosion - Concrete	High	High	Moderate	Not estimated

Lordstown-Arnot Association, Steep and Very Steep (LRE, LRF), Arnot part.

	0 to 7 inches	7 to 17 inches	17 inches
Texture	Channery silt loam	Very channery silt loam, very channery loam	Unweathered bedrock
Fragments > 3 inches	5-10%	10-25%	Not estimated
Percentage Passing Sieve No. 200	30-60%	30-55%	Not estimated
Liquid Limit	10-30%	10-30%	Not estimated
Plasticity Index	2-4	2-4	Not estimated
Permeability (in/hr)	0.6-2.0	0.6-2.0	Not estimated
Available Water Capacity (in./in)	0.10-0.15	0.08-0.12	Not estimated
Soil Reaction (pH)	4.5-6.0	4.5-6.0	Not estimated
Flooding Frequency	None		
Potential Frost Action	Moderate		
Shrink/Swell Potential	Low	Low	Not estimated
Soil Erodibility Factor K	0.20	0.17	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	2		
Risk of Corrosion - Uncoated Steel	Low	Low	Not estimated
Risk of Corrosion - Concrete	High	High	Not estimated

Chenango Channery Silt Loam, Fan (Ch)

	0 to 8	8 to 34	34 to 60
Texture	Channery silt loam	Channery silt loam, channery loam, very channery fine sandy loam	Very channery sandy loam, very gravelly loamy sand
Fragments > 3 inches	5-15%	5-20%	10-20%
Percentage Passing Sieve No. 200	15-65%	15-65%	10-45%
Liquid Limit	<35%	<35%	<35%
Plasticity Index	NP-10	NP-10	NP-10
Permeability (in/hr)	2.0-6.0	2.0-6.0	6.0-20
Available Water Capacity (in./in)	0.08-0.15	0.05-0.14	0.04-0.11
Soil Reaction (pH)	4.5-5.5	4.5-6.0	5.1-6.5
Flooding Frequency	Rare		
Potential Frost Action	Low		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.17	0.17	0.17
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Low	Low	Low
Risk of Corrosion - Concrete	Moderate	Moderate	Moderate

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Fremont Silt Loam (Fr)

	0 to 10 inches	10 to 32 inches	32 to 60 inches
Texture	Silt loam	Silt loam, silty clay loam, shaly silty clay loam	Channery silt loam, shaly silty clay loam
Fragments > 3 inches	0-10%	0-10%	0-10%
Percentage Passing Sieve No. 200	70-95%	50-85%	45-65%
Liquid Limit	35-45%	25-40%	25-40%
Plasticity Index	10-20	10-20	5-15
Permeability (in/hr)	0.6-2.0	0.2-2.0	<0.2
Available Water Capacity (in./in)	0.17-0.21	0.12-0.19	0.11-0.16
Soil Reaction (pH)	4.5-6.0	4.5-6.0	5.6-7.3
Flooding Frequency	None		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.32	0.28	0.43
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	High	High	High

Mardin Channery Silt Loam (Md)

	0 to 19 inches	19 to 60 inches
Texture	Channery silt loam	Channery loam, channery silt loam, very channery loam
Fragments > 3 inches	5-10%	10-25%
Percentage Passing Sieve No. 200	50-60%	30-65%
Liquid Limit	25-35%	20-30%
Plasticity Index	5-10	5-10
Permeability (in/hr)	0.6-2.0	0.06-0.2
Available Water Capacity (in./in)	0.11-0.17	0.01-0.03
Soil Reaction (pH)	4.5-6.0	4.5-7.3
Flooding Frequency	None	
Potential Frost Action	Moderate	
Shrink/Swell Potential	Low	Low
Soil Erodibility Factor K	0.20	0.28
Soil-Loss Tolerance Factor T (entire profile)	3	
Risk of Corrosion - Uncoated Steel	Moderate	Moderate
Risk of Corrosion - Concrete	Moderate	Moderate

Middlebury Silt Loam (Mp)

	0 to 12 inches	12 to 41 inches	41 to 61 inches
Texture	Silt loam	Silt loam, loam, gravelly fine sandy loam	Very gravelly loamy sand
Fragments > 3 inches	0%	0%	10-25%
Percentage Passing Sieve No. 200	45-85%	30-85%	2-15%
Liquid Limit	<20%	<20%	-
Plasticity Index	NP-4	NP-4	NP
Permeability (in/hr)	0.6-2.0	0.6-2.0	>6.0
Available Water Capacity (in./in)	0.14-0.21	0.10-0.20	0.02-0.04
Soil Reaction (pH)	5.1-6.0	5.6-6.5	5.6-6.5
Flooding Frequency	Common		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	Not estimated	Not estimated	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	Not estimated		
Risk of Corrosion - Uncoated Steel	Moderate	Moderate	Moderate
Risk of Corrosion - Concrete	Moderate	Low	Low

Howard Gravelly Loam (Ho)

	0 to 9 inches	9 to 24 inches	24 to 45 inches	45 to 72 inches
Texture	Gravelly loam	Gravelly loam, very gravelly loam	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam	Stratified sand and gravel
Fragments > 3 inches	0-5%	0-5%	5-10%	5-15%
Percentage Passing Sieve No. 200	15-65%	15-45%	10-40%	0-5%
Liquid Limit	25-35%	15-25%	25-40%	-
Plasticity Index	5-10	5-10	5-20	NP
Permeability (in/hr)	0.6-6.0	0.6-6.0	0.6-6.0	>20
Available Water Capacity (in./in)	0.07-0.15	0.06-0.12	0.05-0.08	0.01-0.02
Soil Reaction (pH)	5.6-7.3	5.6-7.3	5.6-7.3	7.4-8.4
Flooding Frequency	None			None
Potential Frost Action	Low			Low
Shrink/Swell Potential	Low	Low	Low	Low
Soil Erodibility Factor K	0.17	0.17	0.17	0.17
Soil-Loss Tolerance Factor T (entire profile)	3			3
Risk of Corrosion - Uncoated Steel	Low	Low	Low	Low
Risk of Corrosion - Concrete	Low	Low	Low	Low

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Howard and Alton Gravelly Soils (Ht), Howard part

	0 to 9 inches	9 to 24 inches	24 to 45 inches
Texture	Gravelly loam	Gravelly loam, very gravelly loam	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam
Fragments > 3 inches	0-5%	0-5%	5-10%
Percentage Passing Sieve No. 200	15-65%	15-45%	10-40%
Liquid Limit	25-35%	15-25%	25-40%
Plasticity Index	5-10	5-10	5-20
Permeability (in/hr)	0.6-6.0	0.6-6.0	0.6-6.0
Available Water Capacity (in./in)	0.07-0.15	0.06-0.12	0.05-0.08
Soil Reaction (pH)	5.6-7.3	5.6-7.3	5.6-7.3
Flooding Frequency	None		
Potential Frost Action	Low		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.17	0.17	0.17
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Low	Low	Low
Risk of Corrosion - Concrete	Low	Low	Low

	45 to 72 inches
Texture	Stratified sand and gravel
Fragments > 3 inches	5-15%
Percentage Passing Sieve No. 200	0-5%
Liquid Limit	-
Plasticity Index	NP
Permeability (in/hr)	>20
Available Water Capacity (in./in)	0.01-0.02
Soil Reaction (pH)	7.4-8.4
Flooding Frequency	None
Potential Frost Action	Low
Shrink/Swell Potential	Low
Soil Erodibility Factor K	0.17
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	Low
Risk of Corrosion - Concrete	Low

Howard and Alton Gravelly Soils (Ht), Alton part

	0 to 6 inches	6 to 36 inches	36 to 60 inches
Texture	Gravelly fine sandy loam	Very gravelly loam, very gravelly sandy loam	Very gravelly sandy loam, very gravelly sand
Fragments > 3 inches	0-5%	5-25%	10-25%
Percentage Passing Sieve No. 200	10-60%	20-40%	2-15%
Liquid Limit	<10%	<10%	-
Plasticity Index	NP-3	NP-3	NP
Permeability (in/hr)	2.0-6.0	2.0-6.0	>6.0
Available Water Capacity (in./in)	0.04-0.14	0.04-0.09	0.02-0.04
Soil Reaction (pH)	4.5-5.5	5.6-7.8	6.6-7.8
Flooding Frequency	None		
Potential Frost Action	Low		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.17	0.17	0.17
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Low	Low	Low
Risk of Corrosion - Concrete	High	Moderate	Low

Howard-Madrid Complex (Hr), Howard part

	0 to 9 inches	9 to 24 inches	24 to 45 inches
Texture	Gravelly loam	Gravelly loam, very gravelly loam	Very gravelly loam, very gravelly sandy clay loam, very gravelly sandy loam
Fragments > 3 inches	0-5%	0-5%	5-10%
Percentage Passing Sieve No. 200	15-65%	15-45%	10-40%
Liquid Limit	25-35%	15-25%	25-40%
Plasticity Index	5-10	5-10	5-20
Permeability (in/hr)	0.6-6.0	0.6-6.0	0.6-6.0
Available Water Capacity (in./in)	0.07-0.15	0.06-0.12	0.05-0.08
Soil Reaction (pH)	5.6-7.3	5.6-7.3	5.6-7.3
Flooding Frequency	None		
Potential Frost Action	Low		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.17	0.17	0.17
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	Low	Low	Low
Risk of Corrosion - Concrete	Low	Low	Low

	45 to 72 inches
Texture	Stratified sand and gravel
Fragments > 3 inches	5-15%
Percentage Passing Sieve No. 200	0-5%
Liquid Limit	-
Plasticity Index	NP
Permeability (in/hr)	>20
Available Water Capacity (in./in)	0.01-0.02
Soil Reaction (pH)	7.4-8.4
Flooding Frequency	None
Potential Frost Action	Low
Shrink/Swell Potential	Low
Soil Erodibility Factor K	0.17
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	Low
Risk of Corrosion - Concrete	Low

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Howard-Madrid Complex (Hr), Madrid part

	0 to 22 inches	22 to 64 inches
Texture	Fine sandy loam	Gravelly fine sandy loam, silt loam
Fragments > 3 inches	0%	0-5%
Percentage Passing Sieve No. 200	30-90%	20-85%
Liquid Limit	30-40%	20-30%
Plasticity Index	5-10	5-10
Permeability (in/hr)	0.6-2.0	0.2-0.6
Available Water Capacity (in./in)	0.11-0.19	0.08-0.14
Soil Reaction (pH)	5.1-6.5	6.1-7.3
Flooding Frequency	None	
Potential Frost Action	Low	
Shrink/Swell Potential	Low	Low
Soil Erodibility Factor K	0.32	0.43
Soil-Loss Tolerance Factor T (entire profile)	3	
Risk of Corrosion - Uncoated Steel	Low	Low
Risk of Corrosion - Concrete	Moderate	Low

Arnot Channery Silt Loam (ARC)

	0 to 7 inches	7 to 17 inches	17 inches
Texture	Channery silt loam	Very channery silt loam, very channery loam	Unweathered bedrock
Fragments > 3 inches	5-10%	10-25%	Not estimated
Percentage Passing Sieve No. 200	30-60%	30-55%	Not estimated
Liquid Limit	10-30%	10-30%	Not estimated
Plasticity Index	2-4	2-4	Not estimated
Permeability (in/hr)	0.6-2.0	0.6-2.0	Not estimated
Available Water Capacity (in./in)	0.10-0.15	0.08-0.12	Not estimated
Soil Reaction (pH)	4.5-6.0	4.5-6.0	Not estimated
Flooding Frequency	None		
Potential Frost Action	Moderate		
Shrink/Swell Potential	Low	Low	Not estimated
Soil Erodibility Factor K	0.20	0.17	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	2		
Risk of Corrosion - Uncoated Steel	Low	Low	Not estimated
Risk of Corrosion - Concrete	High	High	Not estimated

Volusia Channery Silt Loam (Vo)

	0 to 7 inches	7 to 15 inches	15 to 46 inches
Texture	Channery silt loam	Channery silt loam, channery loam, silty clay loam	Channery silt loam, channery loam, silty clay loam
Fragments > 3 inches	5-10%	5-10%	5-10%
Percentage Passing Sieve No. 200	40-70%	35-80%	40-80%
Liquid Limit	30-40%	15-25%	20-30%
Plasticity Index	5-10	5-10	5-10
Permeability (in/hr)	0.6-2.0	0.6-2.0	<0.2
Available Water Capacity (in./in)	0.11-0.17	0.09-0.16	0.01-0.02
Soil Reaction (pH)	4.5-5.5	4.5-6.0	5.1-7.8
Flooding Frequency	None		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.24	0.43	0.28
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	Moderate	Moderate	Low

	46 to 62 inches
Texture	Channery loam, very channery loam, channery silt loam
Fragments > 3 inches	5-25%
Percentage Passing Sieve No. 200	25-70%
Liquid Limit	20-30%
Plasticity Index	5-10
Permeability (in/hr)	<0.2
Available Water Capacity (in./in)	0.01-0.02
Soil Reaction (pH)	5.1-7.8
Flooding Frequency	None
Potential Frost Action	High
Shrink/Swell Potential	Low
Soil Erodibility Factor K	0.28
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	High
Risk of Corrosion - Concrete	Low

Fluvaquents and Ochrepts (FL)

	0 to 60 inches
Texture	Variable
Fragments > 3 inches	Variable
Percentage Passing Sieve No. 200	Variable
Liquid Limit	Variable
Plasticity Index	Variable
Permeability (in/hr)	Not estimated
Available Water Capacity (in./in)	Not estimated
Soil Reaction (pH)	Not estimated
Flooding Frequency	Frequent
Potential Frost Action	Not a concern
Shrink/Swell Potential	Not estimated
Soil Erodibility Factor K	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	Not estimated
Risk of Corrosion - Uncoated Steel	Not estimated
Risk of Corrosion - Concrete	Not estimated

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Ochrepts and Orthents (OC)

	0 to 60 inches
Texture	Variable
Fragments > 3 inches	Variable
Percentage Passing Sieve No. 200	Variable
Liquid Limit	Variable
Plasticity Index	Variable
Permeability (in/hr)	Not estimated
Available Water Capacity (in./in)	Not estimated
Soil Reaction (pH)	Not estimated
Flooding Frequency	None
Potential Frost Action	Not a concern
Shrink/Swell Potential	Not estimated
Soil Erodibility Factor K	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	Not estimated
Risk of Corrosion - Uncoated Steel	Not estimated
Risk of Corrosion - Concrete	Not estimated

Chippewa Channery Silt Loam (Ck)

	0 to 13 inches	13 to 40 inches	40 to 64 inches
Texture	Channery silt loam	Channery silt loam	Channery silt loam
Fragments > 3 inches	0-10%	10-25%	10-25%
Percentage Passing Sieve No. 200	35-100%	40-65%	40-65%
Liquid Limit	35-50%	15-25%	25-35%
Plasticity Index	5-15	4-10	5-10
Permeability (in/hr)	0.6-2.0	<0.06	<0.06
Available Water Capacity (in./in)	0.11-0.18	0.01-0.02	0.01-0.02
Soil Reaction (pH)	4.5-5.5	5.1-6.5	5.6-7.3
Flooding Frequency	None		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.24	0.28	0.28
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	Moderate	Moderate	Low

Wayland Silt Loam (Wn)

	0 to 8 inches	8 to 47 inches	47 to 60 inches
Texture	Silt loam	Silt loam, silty clay loam	Stratified silt and very fine sand
Fragments > 3 inches	0%	0%	0%
Percentage Passing Sieve No. 200	70-95%	70-95%	40-90%
Liquid Limit	40-50%	20-40%	15-40%
Plasticity Index	5-15	5-15	NP-10
Permeability (in/hr)	0.2-2.0	0.06-0.2	0.06-0.2
Available Water Capacity (in./in)	0.17-0.22	0.16-0.20	0.11-0.19
Soil Reaction (pH)	6.6-7.8	6.6-7.8	7.4-8.4
Flooding Frequency	Frequent		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	Not estimated	Not estimated	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	Not estimated		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	Low	Low	Low

Tioga Silt Loam (Tg)

	0 to 10 inches	10 to 60 inches
Texture	Silt loam	Silt loam, fine sandy loam, loam
Fragments > 3 inches	0%	0%
Percentage Passing Sieve No. 200	40-85%	40-85%
Liquid Limit	<15%	<15%
Plasticity Index	NP-4	NP-2
Permeability (in/hr)	0.6-2.0	0.6-2.0
Available Water Capacity (in./in)	0.15-0.21	0.14-0.20
Soil Reaction (pH)	5.1-6.0	5.1-7.3
Flooding Frequency	Common	
Potential Frost Action	Moderate	
Shrink/Swell Potential	Low	Low
Soil Erodibility Factor K	Not estimated	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	Not estimated	
Risk of Corrosion - Uncoated Steel	Low	Low
Risk of Corrosion - Concrete	Moderate	Low

TABLE 4
Engineering and Chemical Properties and Classifications of Select Soils within the Proposed Baron Winds Project Study Area
Steuben County, New York

Braceville Gravelly Silt Loam (Br)

	0 to 8 inches	8 to 24 inches	24 to 36 inches
Texture	Gravelly silt loam	Gravelly loam, silt loam, gravelly sandy loam	Gravelly loam, gravelly silt loam
Fragments > 3 inches	0-10%	0-10%	0-10%
Percentage Passing Sieve No. 200	40-55%	20-55%	30-65%
Liquid Limit	-	-	15-40%
Plasticity Index	-	-	NP-10
Permeability (in/hr)	0.2-2.0	0.2-2.0	0.06-0.6
Available Water Capacity (in./in)	0.08-0.12	0.08-0.12	0.06-0.10
Soil Reaction (pH)	4.5-6.0	4.5-6.0	4.5-6.0
Flooding Frequency	Rare		
Potential Frost Action	Moderate		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.20	0.20	0.28
Soil-Loss Tolerance Factor T (entire profile)	3-2		
Risk of Corrosion - Uncoated Steel	Moderate	Moderate	Moderate
Risk of Corrosion - Concrete	Moderate	Moderate	Moderate

	36 to 60 inches
Texture	Stratified sand and gravel
Fragments > 3 inches	0-15%
Percentage Passing Sieve No. 200	10-50%
Liquid Limit	<30%
Plasticity Index	NP-5
Permeability (in/hr)	2.0-20
Available Water Capacity (in./in)	0.03-0.06
Soil Reaction (pH)	5.1-6.5
Flooding Frequency	Rare
Potential Frost Action	Moderate
Shrink/Swell Potential	Low
Soil Erodibility Factor K	0.17
Soil-Loss Tolerance Factor T (entire profile)	3-2
Risk of Corrosion - Uncoated Steel	Moderate
Risk of Corrosion - Concrete	Moderate

Hornell-Fremont Silt Loams (Hf) and Hornell and Fremont Silt Loams (HgD), Hornell part

	0 to 7 inches	7 to 33 inches	33 to 38 inches
Texture	Silt loam	Silty clay, silty clay loam, shaly silty clay loam	Shaly silty clay, shaly silty clay loam, shaly clay
Fragments > 3 inches	0%	0-5%	0-5%
Percentage Passing Sieve No. 200	65-90%	60-85%	45-70%
Liquid Limit	35-45%	35-45%	35-45%
Plasticity Index	10-20	10-20	10-20
Permeability (in/hr)	0.6-2.0	0.2-0.6	<0.06
Available Water Capacity (in./in)	0.16-0.21	0.11-0.13	0.07-0.13
Soil Reaction (pH)	3.6-5.5	4.5-5.5	4.5-5.5
Flooding Frequency	None		
Potential Frost Action	Moderate		
Shrink/Swell Potential	Low	Moderate	Moderate
Soil Erodibility Factor K	0.43	0.28	0.17
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	High	High	High

	38 inches
Texture	Weathered bedrock
Fragments > 3 inches	Not estimated
Percentage Passing Sieve No. 200	Not estimated
Liquid Limit	Not estimated
Plasticity Index	Not estimated
Permeability (in/hr)	Not estimated
Available Water Capacity (in./in)	Not estimated
Soil Reaction (pH)	Not estimated
Flooding Frequency	None
Potential Frost Action	Moderate
Shrink/Swell Potential	Not estimated
Soil Erodibility Factor K	Not estimated
Soil-Loss Tolerance Factor T (entire profile)	3
Risk of Corrosion - Uncoated Steel	Not estimated
Risk of Corrosion - Concrete	Not estimated

Hornell-Fremont Silt Loams (Hf) and Hornell and Fremont Silt Loams (HgD), Fremont part

	0 to 10 inches	10 to 32 inches	32 to 60 inches
Texture	Silt loam	Silt loam, silty clay loam, shaly silty clay loam	Channery silt loam, shaly silty clay loam
Fragments > 3 inches	0-10%	0-10%	0-10%
Percentage Passing Sieve No. 200	70-95%	50-85%	45-70%
Liquid Limit	35-45%	25-40%	25-40%
Plasticity Index	10-20	10-20	5-15
Permeability (in/hr)	0.6-2.0	0.2-2.0	<0.2
Available Water Capacity (in./in)	0.17-0.21	0.12-0.19	0.11-0.16
Soil Reaction (pH)	4.5-6.0	4.5-6.0	5.6-7.3
Flooding Frequency	None		
Potential Frost Action	High		
Shrink/Swell Potential	Low	Low	Low
Soil Erodibility Factor K	0.32	0.28	0.43
Soil-Loss Tolerance Factor T (entire profile)	3		
Risk of Corrosion - Uncoated Steel	High	High	High
Risk of Corrosion - Concrete	High	High	High

ATTACHMENT A

REFERENCES

ATTACHMENT A

REFERENCES

1. World Imagery Map and USA Topo Maps, ArcGIS AutoCAD.

2. Soil Survey of Steuben County, New York, prepared by United States Department of Agriculture Soil Conservation Service, July 1978.

3. Pepper, James F., Bedrock Geology of the Hornell Quadrangle, New York, Geologic Quadrangle Maps of the United States Map GQ 37, United States Geological Survey, 1954.

4. Pepper, J.F. and de Witt, Wallace, Jr., The Stratigraphy of the Perrysburg Formation of Late Devonian Age in Western and West-Central New York, Oil and Gas Investigations Chart OC-45, United States Geological Survey, 1951.

5. Miller, Todd S., Warren, Christopher C., and McPherson, Wendy S., Geohydrology of the Surficial Aquifer in the Hornell Area, in Steuben and Allegany Counties, New York, Water Resources Investigations Report 89-4053, United States Geological Survey, 1990.

6. Pagano, Timothy S., Terry, D.B., Shaw, M.L., and Ingram, A.W., Geohydrology of the Valley-Fill Aquifer in the Bath Area, Lower Cohocton River, Steuben County, New York, Water Resources Investigations Report 85-4095, United States Geological Survey, 1984.

7. Terry, David B., Pagano, Timothy S., Shaw, Martha L., and Ingram, Arlynn W., Geohydrology of the Valley-Fill Aquifer in the Cohocton Area, Upper Cohocton River, Steuben County, New York, Water Resources Investigations Report 85-4040, United States Geological Survey, 1984.

8. Bradley, W.H., Pepper, J.F., and Richardson, G.B., Geologic Structure and Occurrence of Gas in Part of Southwestern New York, Bulletin 899, United States Geological Survey, 1941.

9. Taylor, Larry E., Ground-Water Resources of the Chemung River Basin, New York and Pennsylvania, Publication No. 115, Susquehanna River Basin Commission, March 1988.

10. Miller, Todd S., Unconsolidated Aquifers in Upstate New York – Finger Lakes Sheet, Water Resources Investigations Report 87-4122, United States Geological Survey, 1988.

11. Freeze, Allan R., and Witherspoon, P.A., “Theoretical Analysis of Regional Groundwater Flow: 2. Effect of Water-Table Configuration and Subsurface Permeability Variation,” Water Resources Research Vol. 3, Issue 2, June 1967.

12. Boggs Jr., Sam, Principles of Sedimentology and Stratigraphy, 2011.

13. Caldwell, Donald H., Surficial Geologic Map of New York, Finger Lakes Sheet, 1988.

14. Rickard, Lawrence V. and Fisher, Donald W., Bedrock Geologic Map of New York, Finger Lakes Sheet, March 1970.

15. K.A. Howard, J.M. Aaron, E.E. Brabb, M.R. Brock, H.D. Gower, S.J. Hunt, D.J. Milton, W.R. Muehlberger, J.K. Nakata, G. Plafker, D.C. Prowell, R.E. Wallace, and I.J. Witkind, Preliminary Map of Young Falts in the United States as a Guide to Possible Fault , Preliminary Map of Young Faults in the United States as a Guide to Possible Fault Activity, 1978.

16. Water Well Program, New York State Department of Environmental Conservation.

17. State Lands Interactive Mapper, New York State Department of Environmental Conservation.

18. National Wetlands Inventory, United States Fish and Wildlife Service.

19. Environmental Resource Mapper, New York State Department of Environmental Conservation.

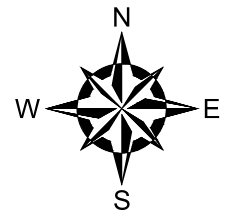
20. Building Code of New York State, August 2010.

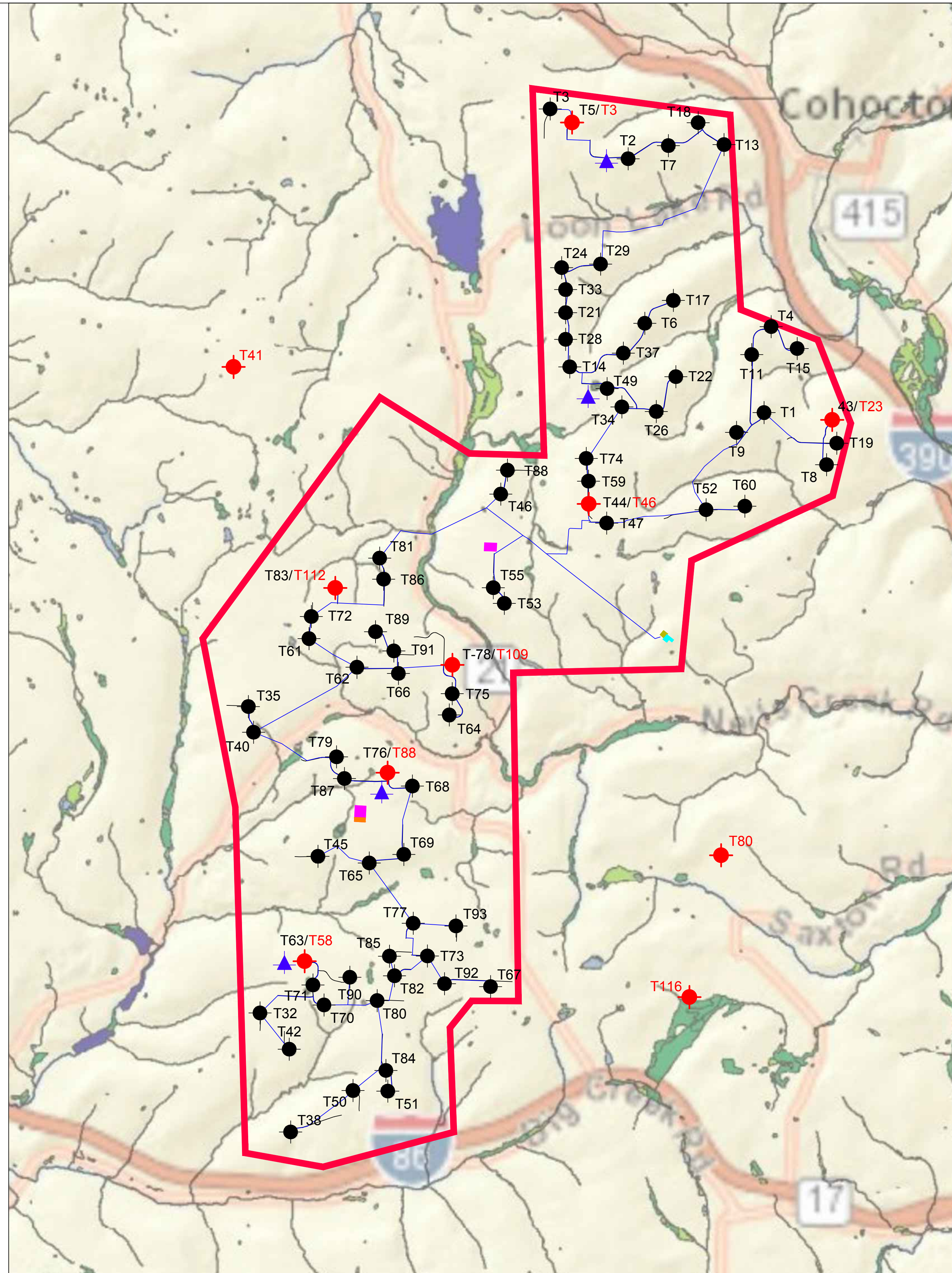
<u>Other Sources Consulted</u>

- Primary & Principal Aquifers, New York State Department of Environmental Conservation.
- National Water Information System, United States Geological Survey.
- Oil and Gas Database, New York State Department of Environmental Conservation.
- Agricultural Districts, New York State Department of Agriculture and Markets.
- Watershed Boundaries, Steuben County, New York State Department of Agriculture and Markets.
- NYS Major Drainage Basins, New York State Department of Environmental Conservation.
- Chemung Watershed – 02050105, United States Environmental Protection Agency, Surf Your Watershed.
- The National Map, United States Geological Survey.

ATTACHMENT B

ADDITIONAL LAND USE INFORMATION





GENERAL NOTES

1. BASE MAP ADAPTED FROM U.S. FISH AND WILDLIFE SERVICE WETLAND MAPPER.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
- T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)
- INDICATES UPDATED STUDY AREA LIMITS
- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- LAYDOWN YARD LIMITS
- SUBSTATION LIMITS
- COLLECTOR SUBSTATION
- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER
- LAKE
- FRESHWATER EMERGENT WETLAND
- FRESHWATER FORESTED/SHRUB WETLAND

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

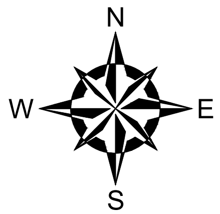
BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

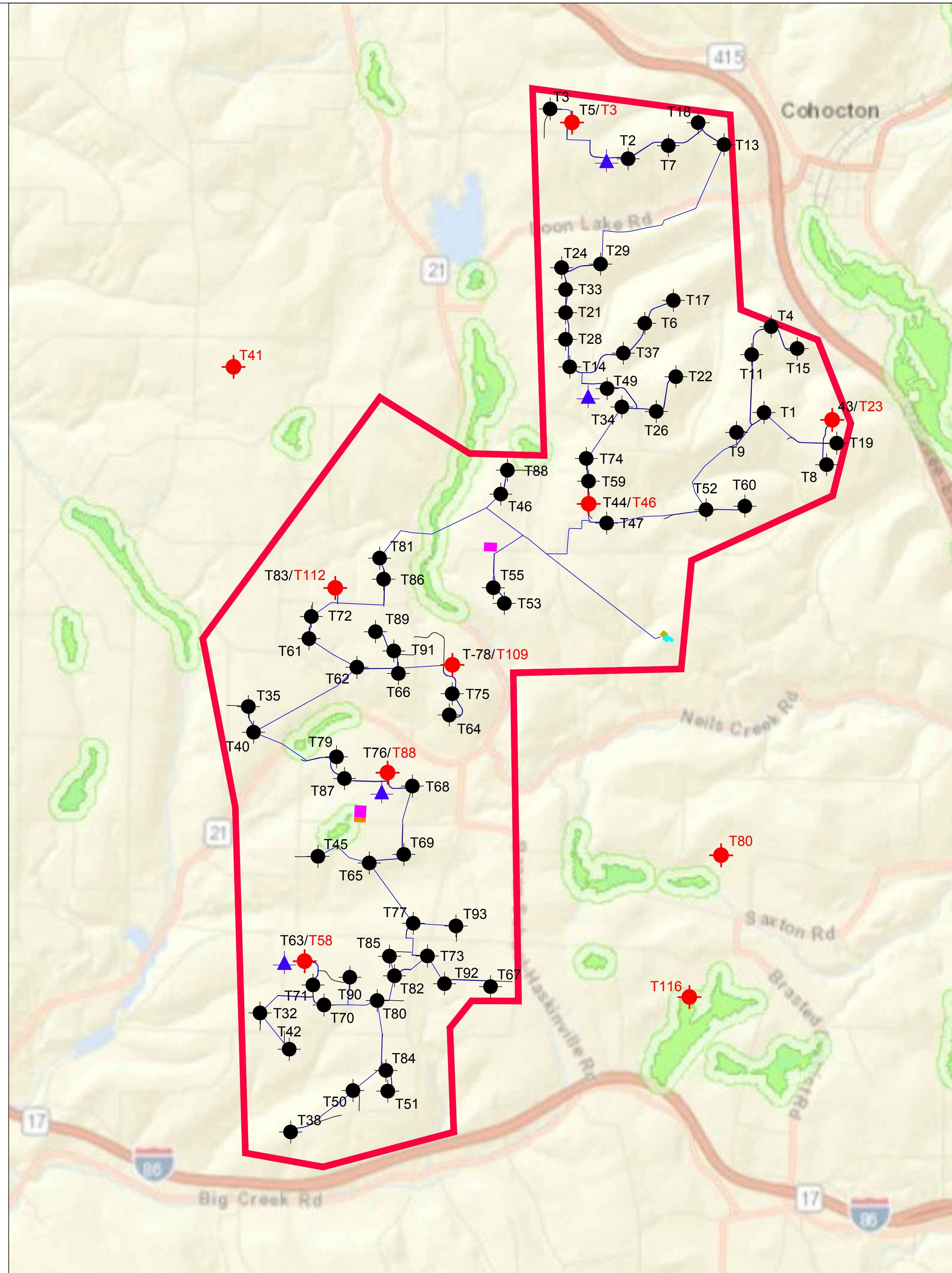
FEDERAL WETLANDS IN STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	B-1
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	





GENERAL NOTES

1. BASE MAP ADAPTED FROM NYSDEC ENVIRONMENTAL RESOURCE MAPPER.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
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- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- LAYDOWN YARD LIMITS
- SUBSTATION LIMITS
- COLLECTOR SUBSTATION
- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER
- STATE REGULATED FRESHWATER WETLANDS
- STATE REGULATED WETLAND CHECKZONE

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

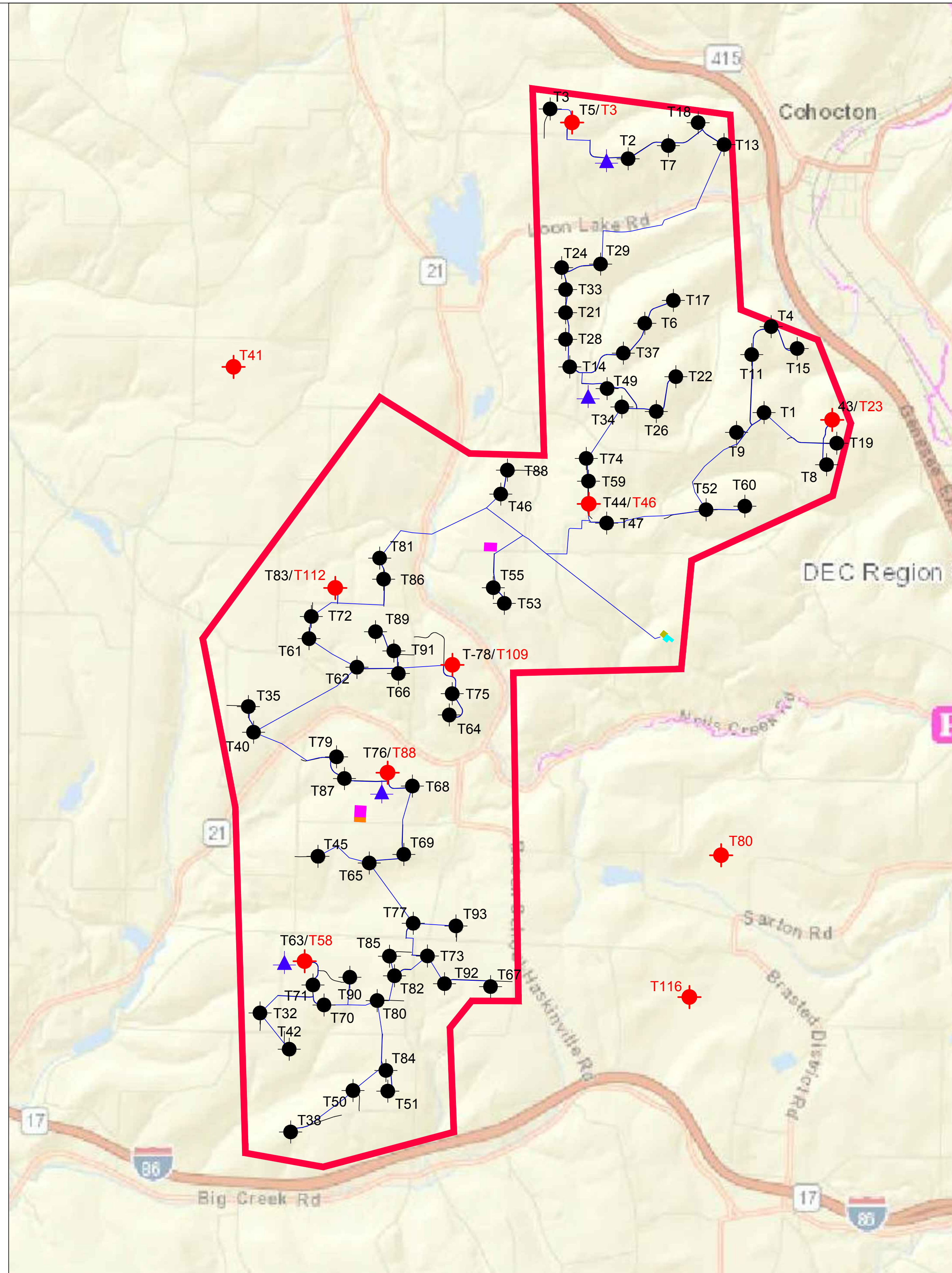
STATE WETLANDS IN STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	B-2
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

N
W E
S



GENERAL NOTES

1. BASE MAP ADAPTED FROM NYSDEC STATE LANDS MAPPER.
2. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

- T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)
- T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL
- T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)
- INDICATES UPDATED STUDY AREA LIMITS
- ACCESS ROAD LOCATION
- COLLECTION LINE LOCATION
- LAYDOWN YARD LIMITS
- SUBSTATION LIMITS
- COLLECTOR SUBSTATION
- O.M. BUILDING
- PERMANENT METEOROLOGICAL TOWER
- P — PUBLIC FISHING RIGHTS

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

STATE LAND USE IN STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	B-3
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

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.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Steuben County, New York
Survey Area Data: Version 12, Sep 24, 2015

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

Date(s) aerial images were photographed: Apr 15, 2011—May 11, 2011

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.

Figure B-4

Soil Map—Steuben County, New York

Map Scale: 1:17,500 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

N

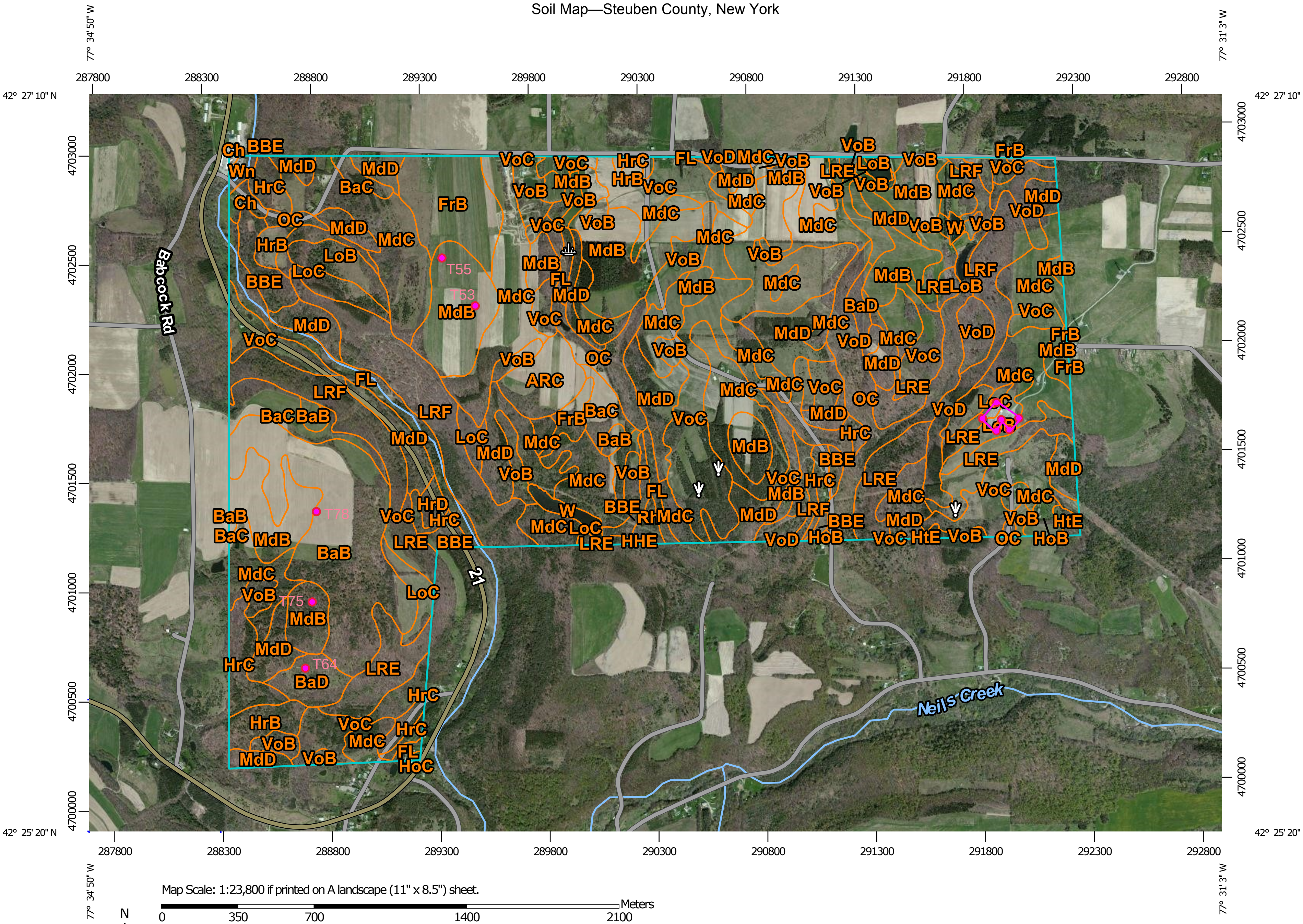
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Aa	Alden silt loam	1.6	0.1%
BaB	Bath channery silt loam, 3 to 12 percent slopes	83.8	5.9%
BaC	Bath channery silt loam, 12 to 20 percent slopes	34.1	2.4%
BaD	Bath channery silt loam, 20 to 30 percent slopes	7.2	0.5%
BBE	Bath soils, steep	18.5	1.3%
BrA	Braceville gravelly silt loam, 0 to 3 percent slopes	12.3	0.9%
Ch	Chenango channery silt loam, fan	10.2	0.7%
FL	Fluvaquents and Ochrepts	46.9	3.3%
FrB	Fremont silt loam, 2 to 8 percent slopes	409.1	28.7%
HrB	Howard-Madrid complex, undulating	69.5	4.9%
HrC	Howard-Madrid complex, rolling	65.8	4.6%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	78.3	5.5%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	0.1	0.0%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	12.1	0.8%
LRF	Lordstown-Arnot association, very steep	24.0	1.7%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	53.8	3.8%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	157.2	11.0%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	62.2	4.4%
OC	Ochrepts and Orthents	14.7	1.0%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	38.9	2.7%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	208.5	14.6%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	5.3	0.4%
W	Water	2.4	0.2%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	9.6	0.7%
Totals for Area of Interest		**1,426.2**	**100.0%**

Figure B-5

Soil Map—Steuben County, New York



Map Scale: 1:23,800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 350, 700, 1400, 2100

Feet: 0, 1000, 2000, 4000, 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

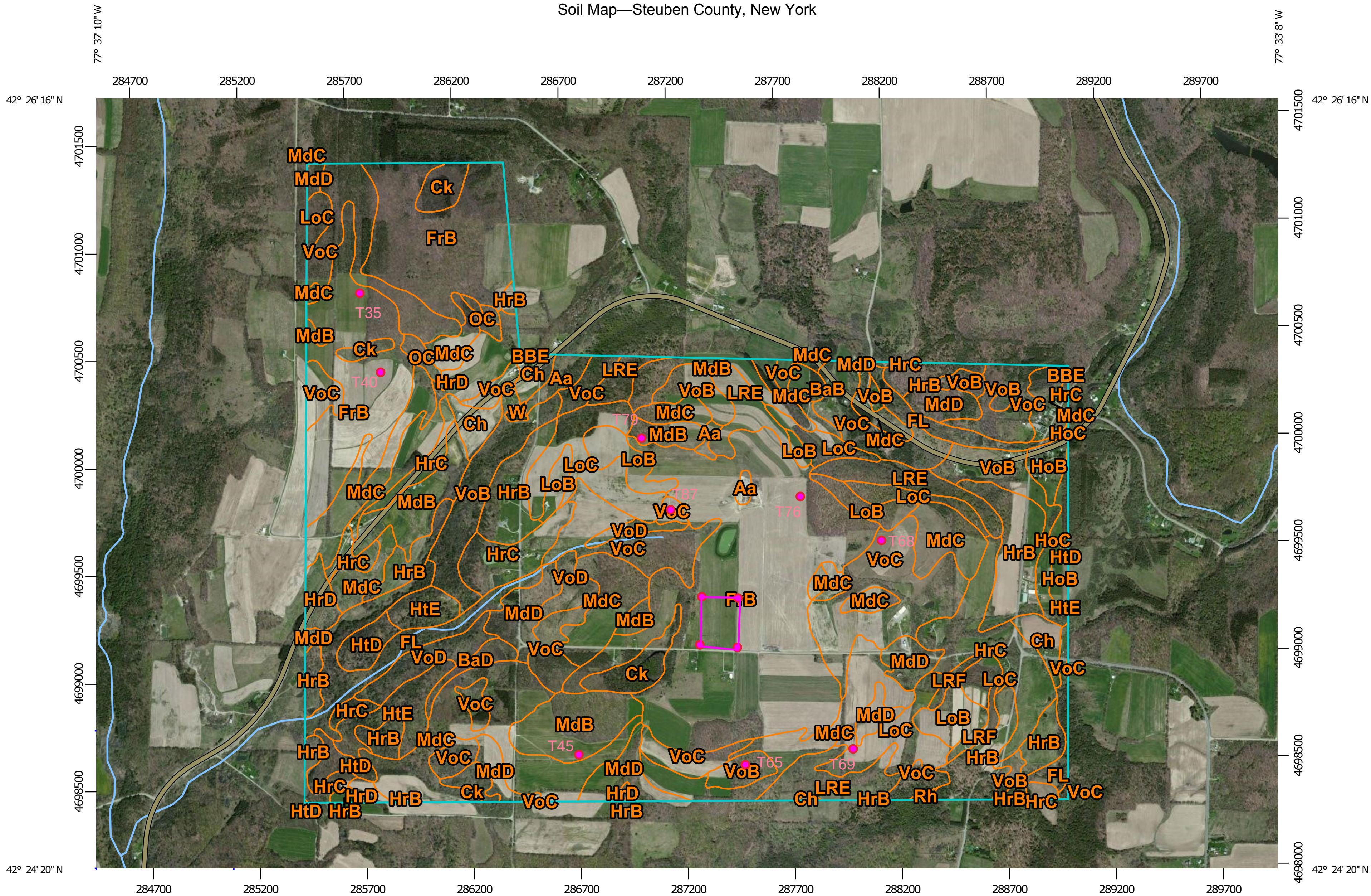
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
ARC	Arnot channery silt loam, 2 to 20 percent slopes	25.1	1.3%
BaB	Bath channery silt loam, 3 to 12 percent slopes	116.5	6.1%
BaC	Bath channery silt loam, 12 to 20 percent slopes	37.1	1.9%
BaD	Bath channery silt loam, 20 to 30 percent slopes	20.3	1.1%
BBE	Bath soils, steep	29.3	1.5%
Ch	Chenango channery silt loam, fan	4.9	0.3%
FL	Fluvaquents and Ochrepts	47.2	2.5%
FrB	Fremont silt loam, 2 to 8 percent slopes	50.8	2.6%
HHE	Hornell and Fremont silt loams, steep	1.1	0.1%
HoB	Howard gravelly loam, undulating	7.1	0.4%
HoC	Howard gravelly loam, rolling	0.4	0.0%
HrB	Howard-Madrid complex, undulating	19.2	1.0%
HrC	Howard-Madrid complex, rolling	42.5	2.2%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	4.9	0.3%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	2.8	0.1%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	30.6	1.6%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	34.9	1.8%
LRE	Lordstown-Arnot association, steep	91.3	4.8%
LRF	Lordstown-Arnot association, very steep	140.1	7.3%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	253.6	13.2%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	349.1	18.2%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	187.2	9.8%
OC	Ochrepts and Orthents	86.0	4.5%
Rh	Red Hook silt loam	4.5	0.2%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
VoB	Volusia channery silt loam, 3 to 8 percent slopes	77.4	4.0%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	204.2	10.7%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	35.3	1.8%
W	Water	10.0	0.5%
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	3.4	0.2%
Totals for Area of Interest		**1,916.8**	**100.0%**

Figure B-6

Soil Map—Steuben County, New York



Map Scale: 1:25,200 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 350, 700, 1400, 2100

Feet: 0, 1000, 2000, 4000, 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

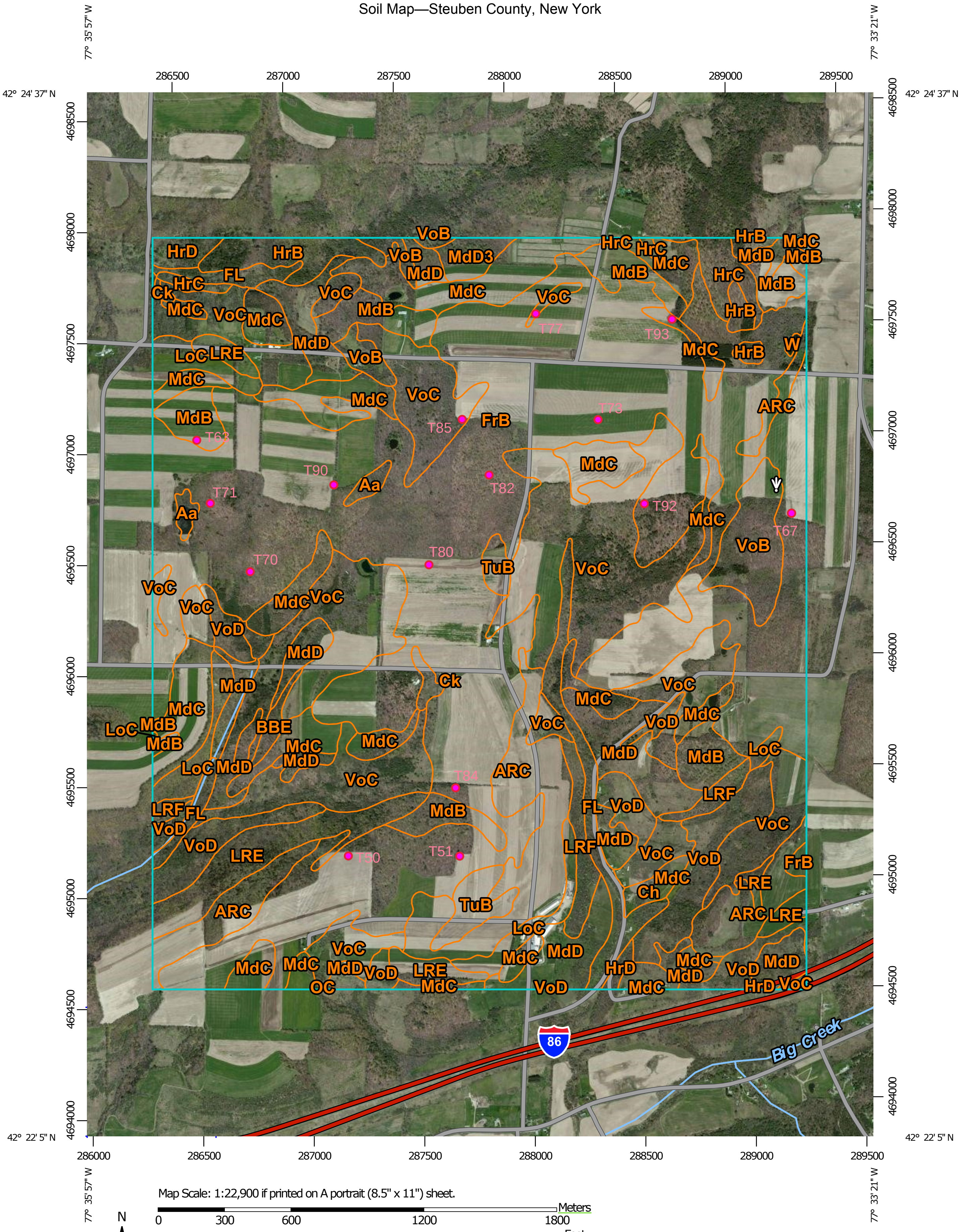
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Aa	Alden silt loam	12.3	0.6%
BaB	Bath channery silt loam, 3 to 12 percent slopes	5.5	0.3%
BaD	Bath channery silt loam, 20 to 30 percent slopes	7.4	0.4%
BBE	Bath soils, steep	0.6	0.0%
Ch	Chenango channery silt loam, fan	26.2	1.3%
Ck	Chippewa channery silt loam, 0 to 3 percent slopes	34.5	1.7%
FL	Fluvaquents and Ochrepts	67.6	3.3%
FrB	Fremont silt loam, 2 to 8 percent slopes	454.1	22.4%
HoB	Howard gravelly loam, undulating	13.9	0.7%
HoC	Howard gravelly loam, rolling	11.9	0.6%
HrB	Howard-Madrid complex, undulating	137.0	6.7%
HrC	Howard-Madrid complex, rolling	99.6	4.9%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	43.7	2.2%
HtD	Howard and Alton gravelly soils, 20 to 30 percent slopes	20.2	1.0%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	34.0	1.7%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	48.1	2.4%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	98.0	4.8%
LRE	Lordstown-Arnot association, steep	61.3	3.0%
LRF	Lordstown-Arnot association, very steep	7.8	0.4%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	106.3	5.2%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	265.5	13.1%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	75.9	3.7%
OC	Ochrepts and Orthents	7.6	0.4%
Rh	Red Hook silt loam	0.8	0.0%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
VoB	Volusia channery silt loam, 3 to 8 percent slopes	94.4	4.6%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	261.9	12.9%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	33.9	1.7%
W	Water	1.6	0.1%
Totals for Area of Interest		**2,031.7**	**100.0%**

Figure B-7

Soil Map—Steuben County, New York



Map Scale: 1:22,900 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 300, 600, 1200, 1800

Feet: 0, 1000, 2000, 4000, 6000

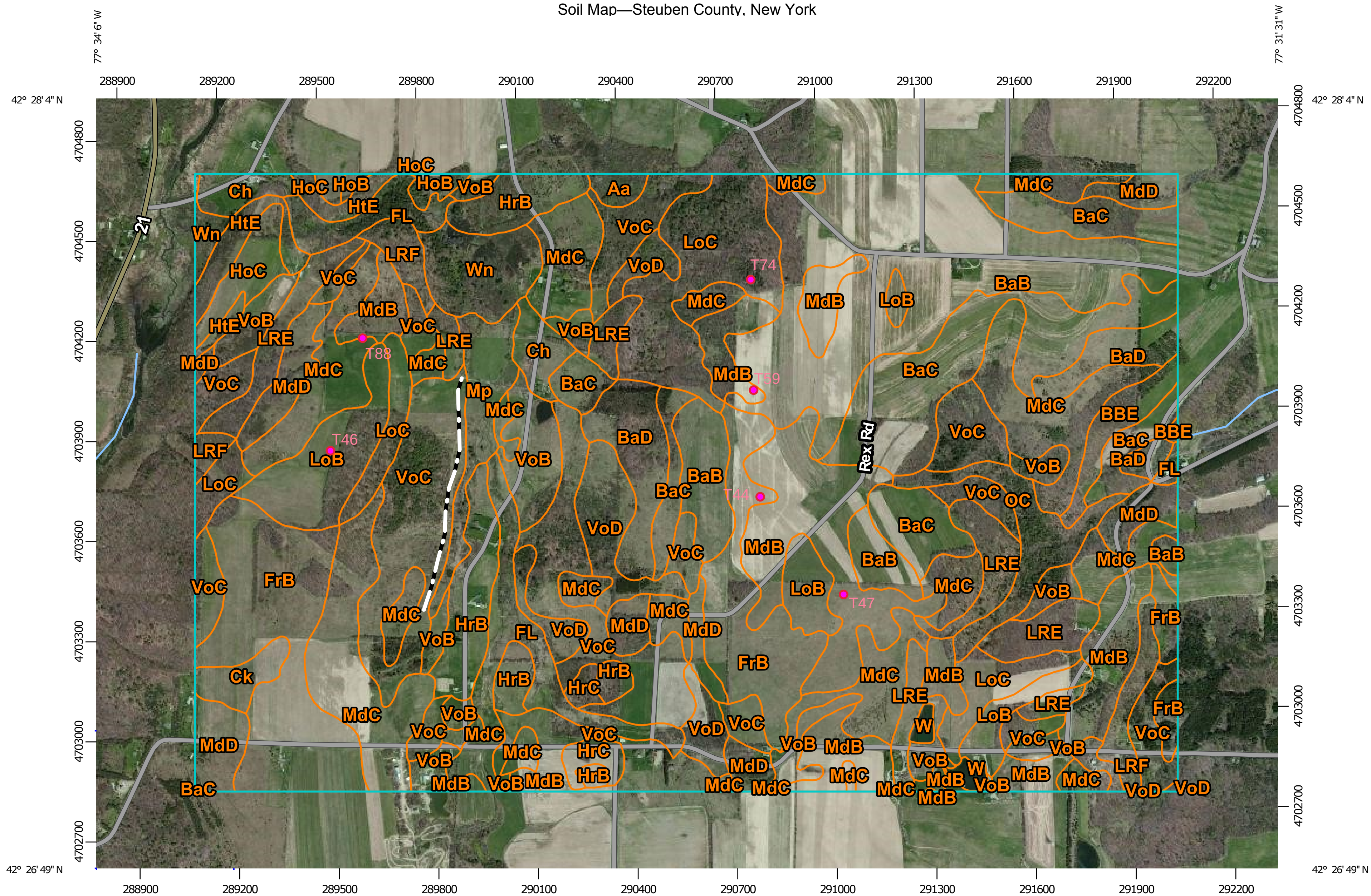
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Aa	Alden silt loam	7.8	0.3%
ARC	Arnot channery silt loam, 2 to 20 percent slopes	143.3	5.8%
BBE	Bath soils, steep	5.5	0.2%
Ch	Chenango channery silt loam, fan	5.9	0.2%
Ck	Chippewa channery silt loam, 0 to 3 percent slopes	6.0	0.2%
FL	Fluvaquents and Ochrepts	52.2	2.1%
FrB	Fremont silt loam, 2 to 8 percent slopes	945.6	38.1%
HrB	Howard-Madrid complex, undulating	35.7	1.4%
HrC	Howard-Madrid complex, rolling	21.9	0.9%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	12.4	0.5%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	46.5	1.9%
LRE	Lordstown-Arnot association, steep	71.8	2.9%
LRF	Lordstown-Arnot association, very steep	26.7	1.1%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	88.9	3.6%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	231.2	9.3%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	156.7	6.3%
MdD3	Mardin channery silt loam, 8 to 25 percent slopes, severely eroded	11.4	0.5%
OC	Ochrepts and Orthents	0.1	0.0%
TuB	Tuller channery silt loam, 0 to 6 percent slopes	22.8	0.9%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	51.3	2.1%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	431.8	17.4%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	107.4	4.3%
W	Water	0.9	0.0%
Totals for Area of Interest		**2,483.9**	**100.0%**

Figure B-8

Soil Map—Steuben County, New York



Map Scale: 1:16,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

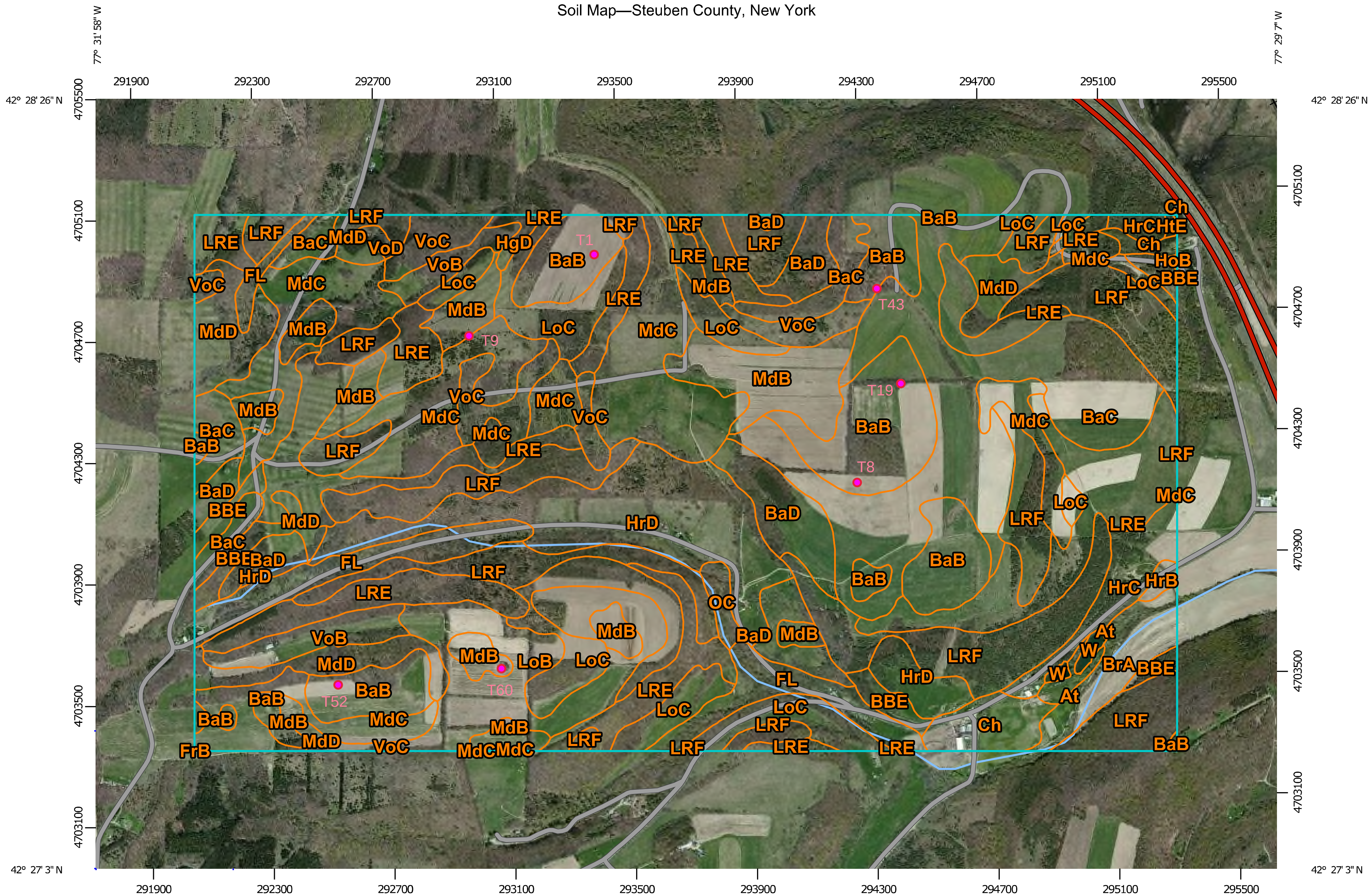
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Aa	Alden silt loam	3.4	0.3%
BaB	Bath channery silt loam, 3 to 12 percent slopes	140.2	10.3%
BaC	Bath channery silt loam, 12 to 20 percent slopes	99.6	7.3%
BaD	Bath channery silt loam, 20 to 30 percent slopes	34.3	2.5%
BBE	Bath soils, steep	10.9	0.8%
Ch	Chenango channery silt loam, fan	14.6	1.1%
Ck	Chippewa channery silt loam, 0 to 3 percent slopes	7.6	0.6%
FL	Fluvaquents and Ochrepts	40.8	3.0%
FrB	Fremont silt loam, 2 to 8 percent slopes	105.1	7.7%
HoB	Howard gravelly loam, undulating	3.8	0.3%
HoC	Howard gravelly loam, rolling	11.7	0.9%
HrB	Howard-Madrid complex, undulating	40.2	3.0%
HrC	Howard-Madrid complex, rolling	6.9	0.5%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	15.5	1.1%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	44.7	3.3%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	69.6	5.1%
LRE	Lordstown-Arnot association, steep	49.9	3.7%
LRF	Lordstown-Arnot association, very steep	18.3	1.3%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	114.2	8.4%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	164.4	12.1%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	46.0	3.4%
Mp	Middlebury silt loam	18.0	1.3%
OC	Ochrepts and Orthents	20.1	1.5%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	55.2	4.1%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
VoC	Volusia channery silt loam, 8 to 15 percent slopes	163.1	12.0%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	34.1	2.5%
W	Water	3.7	0.3%
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	23.5	1.7%
Totals for Area of Interest		**1,359.6**	**100.0%**

Figure B-9

Soil Map—Steuben County, New York



Map Scale: 1:17,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

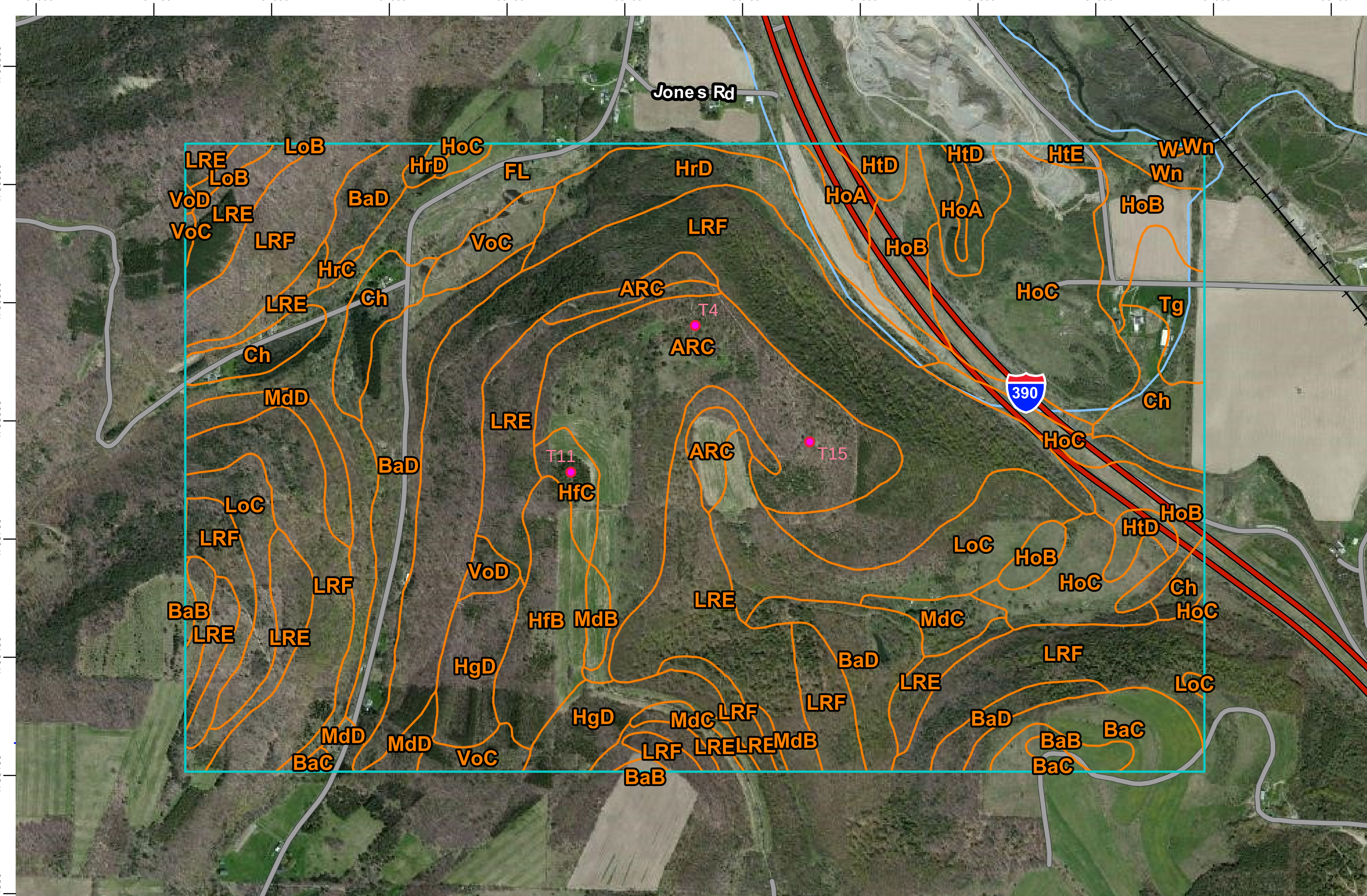
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
At	Atherton silt loam	3.6	0.3%
BaB	Bath channery silt loam, 3 to 12 percent slopes	112.9	7.9%
BaC	Bath channery silt loam, 12 to 20 percent slopes	159.8	11.2%
BaD	Bath channery silt loam, 20 to 30 percent slopes	53.1	3.7%
BBE	Bath soils, steep	20.7	1.4%
BrA	Braceville gravelly silt loam, 0 to 3 percent slopes	20.7	1.5%
Ch	Chenango channery silt loam, fan	18.3	1.3%
FL	Fluvaquents and Ochrepts	50.1	3.5%
FrB	Fremont silt loam, 2 to 8 percent slopes	0.0	0.0%
HgD	Hornell and Fremont silt loams, 12 to 20 percent slopes	3.1	0.2%
HoB	Howard gravelly loam, undulating	0.3	0.0%
HrB	Howard-Madrid complex, undulating	2.3	0.2%
HrC	Howard-Madrid complex, rolling	22.8	1.6%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	89.3	6.3%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	0.6	0.0%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	55.3	3.9%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	86.6	6.1%
LRE	Lordstown-Arnot association, steep	176.1	12.3%
LRF	Lordstown-Arnot association, very steep	183.3	12.9%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	78.5	5.5%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	162.0	11.4%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	56.4	4.0%
OC	Ochrepts and Orthents	5.0	0.4%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	23.6	1.7%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
VoC	Volusia channery silt loam, 8 to 15 percent slopes	37.6	2.6%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	1.9	0.1%
W	Water	2.4	0.2%
Totals for Area of Interest		**1,426.7**	**100.0%**

Figure B-10

Soil Map—Steuben County, New York



42° 29' 15" N | 42° 28' 2" N | 77° 31' 57" W | 77° 29' 26" W

291900 292200 292500 292800 293100 293400 293700 294000 294300 294600 294900 295200

4706900 4706600 4706300 4706000 4705700 4705400 4705100 4704800

Map Scale: 1:15,800 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

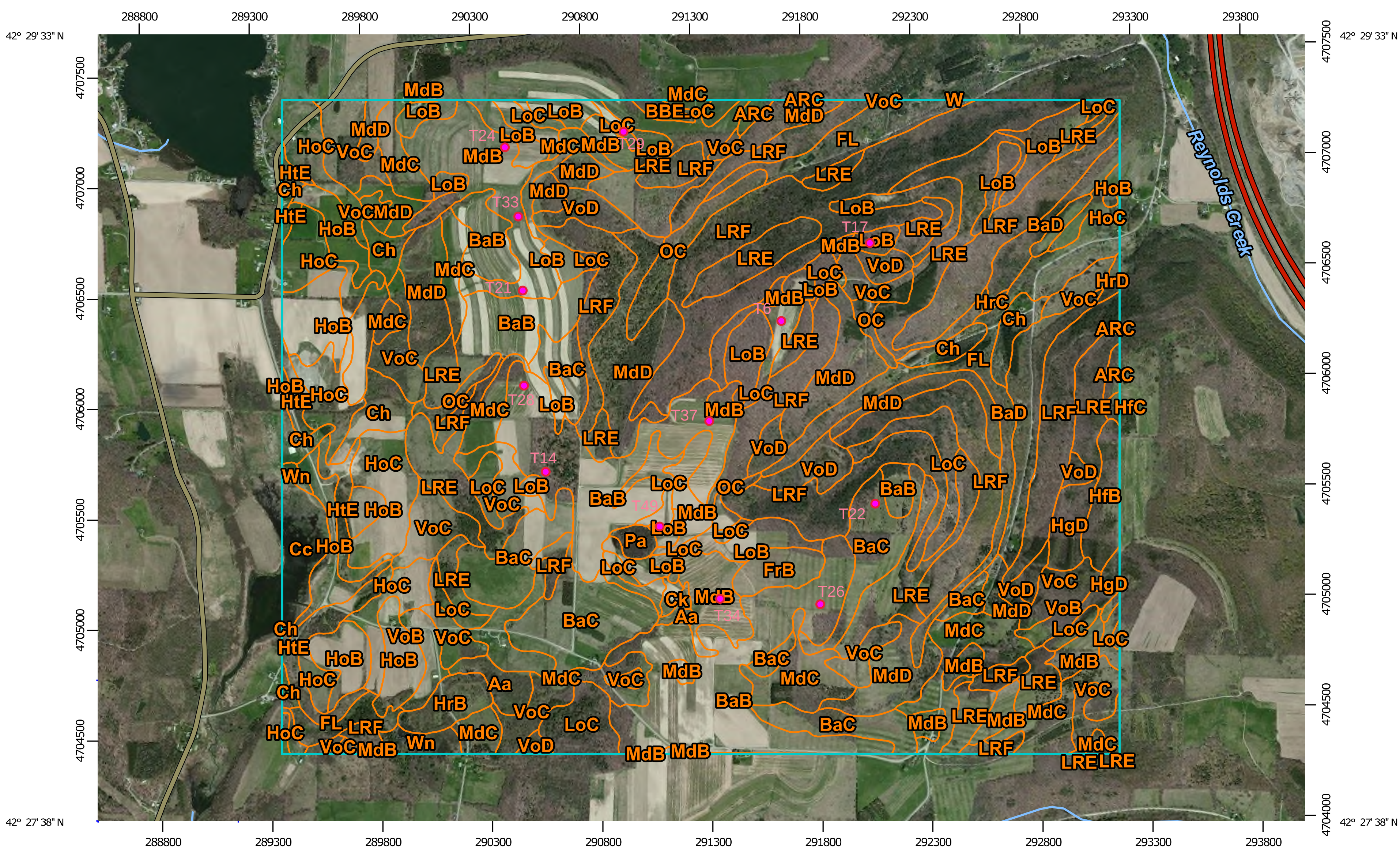
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
ARC	Arnot channery silt loam, 2 to 20 percent slopes	93.8	9.1%
BaB	Bath channery silt loam, 3 to 12 percent slopes	7.4	0.7%
BaC	Bath channery silt loam, 12 to 20 percent slopes	23.4	2.3%
BaD	Bath channery silt loam, 20 to 30 percent slopes	69.9	6.8%
Ch	Chenango channery silt loam, fan	38.3	3.7%
FL	Fluvaquents and Ochrepts	59.2	5.8%
HfB	Hornell-Fremont silt loams, 1 to 6 percent slopes	25.1	2.4%
HfC	Hornell-Fremont silt loams, 6 to 12 percent slopes	7.0	0.7%
HgD	Hornell and Fremont silt loams, 12 to 20 percent slopes	30.2	2.9%
HoA	Howard gravelly loam, 0 to 3 percent slopes	8.1	0.8%
HoB	Howard gravelly loam, undulating	45.1	4.4%
HoC	Howard gravelly loam, rolling	83.2	8.1%
HrC	Howard-Madrid complex, rolling	1.0	0.1%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	30.0	2.9%
HtD	Howard and Alton gravelly soils, 20 to 30 percent slopes	19.0	1.8%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	2.4	0.2%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	2.6	0.2%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	54.5	5.3%
LRE	Lordstown-Arnot association, steep	104.2	10.1%
LRF	Lordstown-Arnot association, very steep	255.8	24.9%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	4.7	0.5%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	10.7	1.0%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MdD	Mardin channery silt loam, 15 to 25 percent slopes	15.7	1.5%
Tg	Tioga silt loam	12.4	1.2%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	14.8	1.4%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	3.8	0.4%
W	Water	0.4	0.0%
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	4.6	0.4%
Totals for Area of Interest		**1,027.5**	**100.0%**

Figure B-11

Soil Map—Steuben County, New York



Map Scale: 1:25,100 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

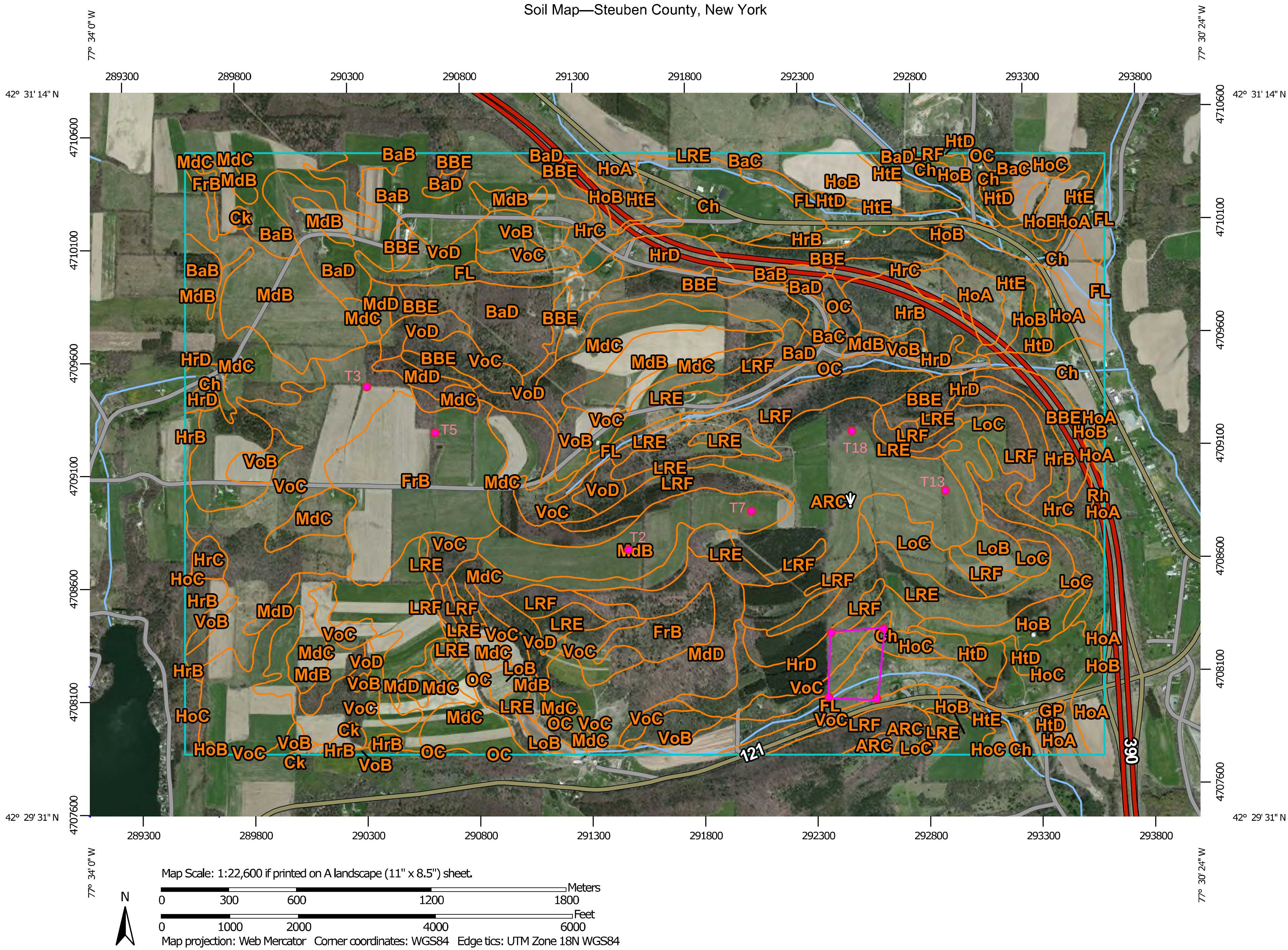
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Aa	Alden silt loam	12.8	0.5%
ARC	Arnot channery silt loam, 2 to 20 percent slopes	6.8	0.2%
BaB	Bath channery silt loam, 3 to 12 percent slopes	286.9	10.3%
BaC	Bath channery silt loam, 12 to 20 percent slopes	158.2	5.7%
BaD	Bath channery silt loam, 20 to 30 percent slopes	53.0	1.9%
BBE	Bath soils, steep	4.1	0.1%
Cc	Carlisle muck	25.4	0.9%
Ch	Chenango channery silt loam, fan	55.1	2.0%
Ck	Chippewa channery silt loam, 0 to 3 percent slopes	2.3	0.1%
FL	Fluvaquents and Ochrepts	106.5	3.8%
FrB	Fremont silt loam, 2 to 8 percent slopes	16.1	0.6%
HfB	Hornell-Fremont silt loams, 1 to 6 percent slopes	19.3	0.7%
HfC	Hornell-Fremont silt loams, 6 to 12 percent slopes	1.9	0.1%
HgD	Hornell and Fremont silt loams, 12 to 20 percent slopes	19.4	0.7%
HoB	Howard gravelly loam, undulating	115.4	4.1%
HoC	Howard gravelly loam, rolling	126.9	4.5%
HrB	Howard-Madrid complex, undulating	17.0	0.6%
HrC	Howard-Madrid complex, rolling	1.0	0.0%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	7.7	0.3%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	44.9	1.6%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	128.3	4.6%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	118.8	4.2%
LRE	Lordstown-Arnot association, steep	249.0	8.9%
LRF	Lordstown-Arnot association, very steep	429.4	15.4%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MdB	Mardin channery silt loam, 2 to 8 percent slopes	148.1	5.3%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	174.5	6.2%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	192.3	6.9%
OC	Ochrepts and Orthents	35.5	1.3%
Pa	Palms muck	5.7	0.2%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	20.1	0.7%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	150.8	5.4%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	50.6	1.8%
W	Water	0.0	0.0%
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	11.6	0.4%
Totals for Area of Interest		**2,795.4**	**100.0%**

Figure B-12

Soil Map—Steuben County, New York



USDA

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

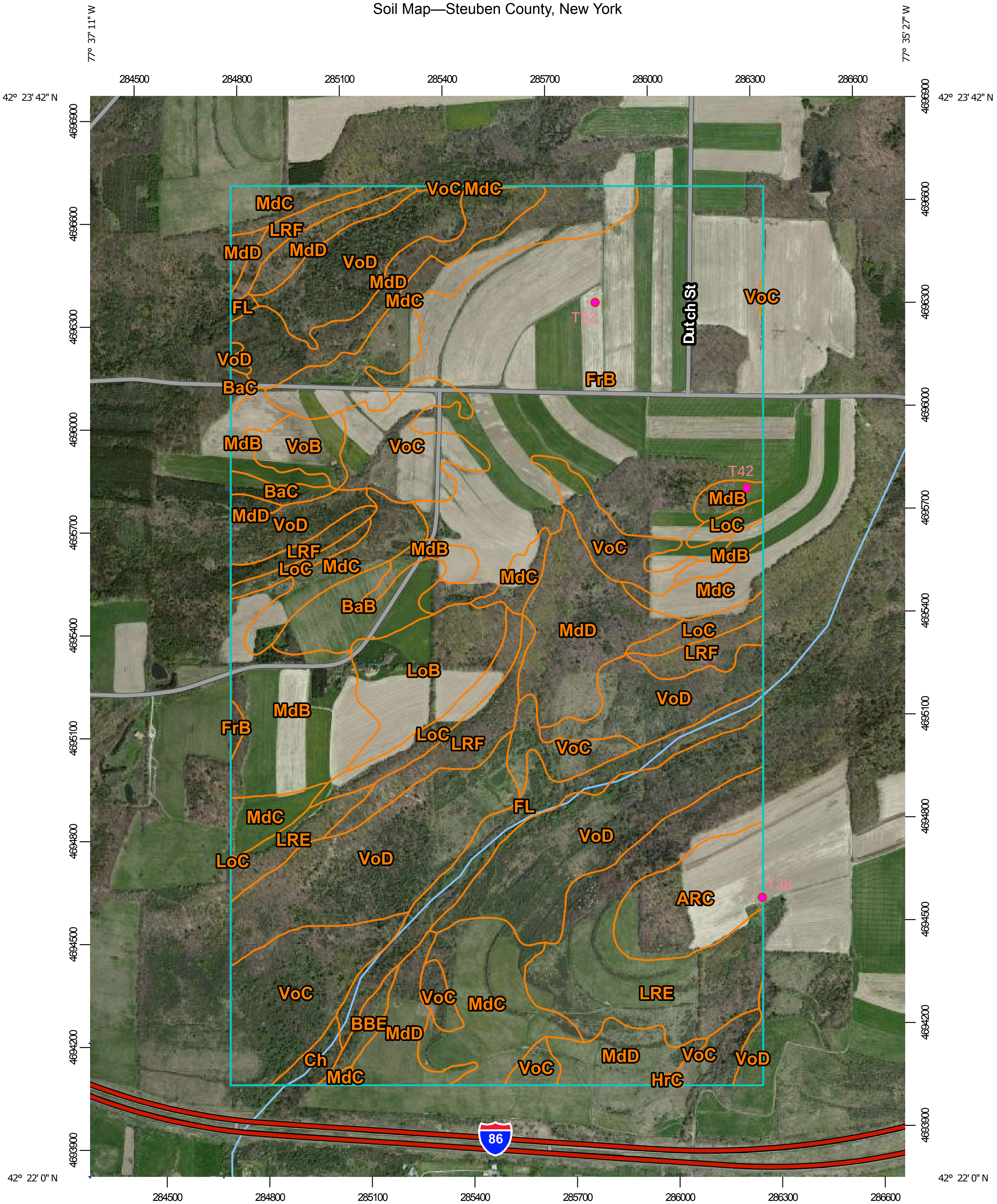
Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ARC	Arnot channery silt loam, 2 to 20 percent slopes	130.4	4.8%
BaB	Bath channery silt loam, 3 to 12 percent slopes	99.9	3.7%
BaC	Bath channery silt loam, 12 to 20 percent slopes	10.7	0.4%
BaD	Bath channery silt loam, 20 to 30 percent slopes	129.8	4.8%
BBE	Bath soils, steep	103.5	3.8%
Ch	Chenango channery silt loam, fan	115.4	4.3%
Ck	Chippewa channery silt loam, 0 to 3 percent slopes	5.4	0.2%
FL	Fluvaquents and Ochrepts	104.4	3.9%
FrB	Fremont silt loam, 2 to 8 percent slopes	129.7	4.8%
GP	Gravel pits	0.6	0.0%
HoA	Howard gravelly loam, 0 to 3 percent slopes	58.1	2.2%
HoB	Howard gravelly loam, undulating	90.1	3.3%
HoC	Howard gravelly loam, rolling	49.3	1.8%
HrB	Howard-Madrid complex, undulating	69.7	2.6%
HrC	Howard-Madrid complex, rolling	33.2	1.2%
HrD	Howard-Madrid complex, 20 to 30 percent slopes	64.1	2.4%
HtD	Howard and Alton gravelly soils, 20 to 30 percent slopes	30.8	1.1%
HtE	Howard and Alton gravelly soils, 30 to 45 percent slopes	54.6	2.0%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	18.5	0.7%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	57.5	2.1%
LRE	Lordstown-Arnot association, steep	133.3	4.9%
LRF	Lordstown-Arnot association, very steep	179.5	6.6%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	189.0	7.0%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	321.4	11.9%

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MdD	Mardin channery silt loam, 15 to 25 percent slopes	95.5	3.5%
OC	Ochrepts and Orthents	45.5	1.7%
Rh	Red Hook silt loam	4.3	0.2%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	55.1	2.0%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	270.8	10.0%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	49.8	1.8%
Wn	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	0.2	0.0%
Totals for Area of Interest		**2,700.0**	**100.0%**

Figure B-13

Soil Map—Steuben County, New York



Map Scale: 1:15,400 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 200, 400, 800, 1200

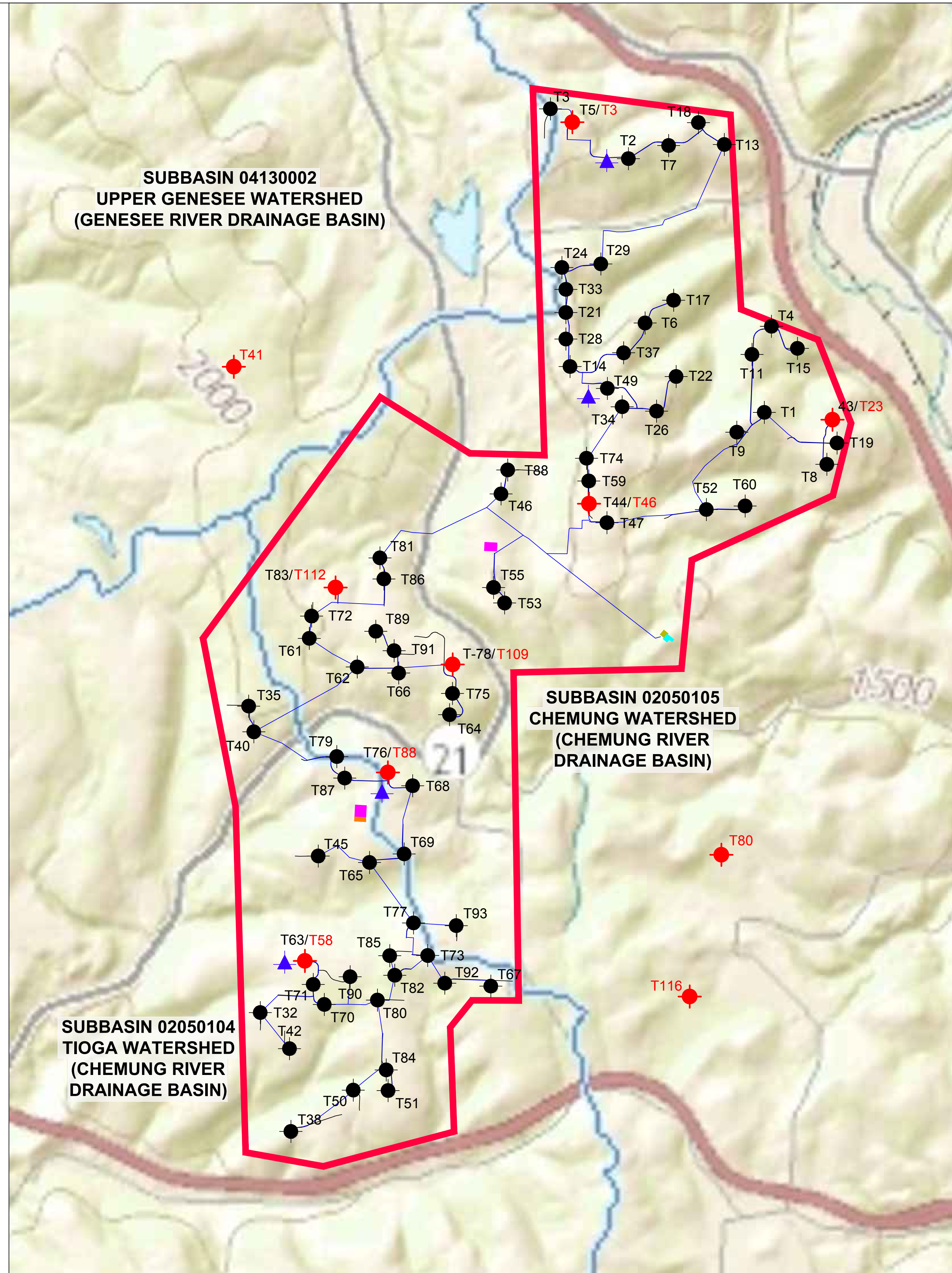
Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

Map Unit Legend

Steuben County, New York (NY101)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
ARC	Arnot channery silt loam, 2 to 20 percent slopes	28.1	2.8%
BaB	Bath channery silt loam, 3 to 12 percent slopes	18.2	1.8%
BaC	Bath channery silt loam, 12 to 20 percent slopes	5.1	0.5%
BBE	Bath soils, steep	4.4	0.4%
Ch	Chenango channery silt loam, fan	4.3	0.4%
FL	Fluvaquents and Ochrepts	29.6	2.9%
FrB	Fremont silt loam, 2 to 8 percent slopes	214.4	21.2%
HrC	Howard-Madrid complex, rolling	0.4	0.0%
LoB	Lordstown channery silt loam, 3 to 12 percent slopes	30.1	3.0%
LoC	Lordstown channery silt loam, 12 to 20 percent slopes	24.7	2.4%
LRE	Lordstown-Arnot association, steep	71.2	7.0%
LRF	Lordstown-Arnot association, very steep	34.6	3.4%
MdB	Mardin channery silt loam, 2 to 8 percent slopes	61.1	6.0%
MdC	Mardin channery silt loam, 8 to 15 percent slopes	113.6	11.2%
MdD	Mardin channery silt loam, 15 to 25 percent slopes	100.4	9.9%
VoB	Volusia channery silt loam, 3 to 8 percent slopes	10.2	1.0%
VoC	Volusia channery silt loam, 8 to 15 percent slopes	97.1	9.6%
VoD	Volusia channery silt loam, 15 to 25 percent slopes	165.0	16.3%
Totals for Area of Interest		**1,012.6**	**100.0%**



N
W E
S

GENERAL NOTES

BASE MAP ADAPTED FROM THE NATIONAL MAP NATIONAL HYDROLOGY DATA SET (USGS)

1. LOCATIONS OF SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

LEGEND

T1 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE (BASED ON UPDATED ARRAY)

T23 — APPROXIMATE LOCATION OF SOIL BORING COMPLETED AT PROPOSED TURBINE (BASED ON ORIGINAL ARRAY) BETWEEN NOVEMBER 1 AND 10, 2016, AND OBSERVED BY GZA PERSONNEL

T83/T112 — APPROXIMATE LOCATION OF PROPOSED WIND TURBINE WITH UPDATED ARRAY TURBINE LABEL (IN BLACK) AND ORIGINAL SOIL BORING LABEL (IN RED)

INDICATES UPDATED STUDY AREA LIMITS

ACCESS ROAD LOCATION

COLLECTION LINE LOCATION

LAYDOWN YARD LIMITS

SUBSTATION LIMITS

COLLECTOR SUBSTATION

O.M. BUILDING

PERMANENT METEOROLOGICAL TOWER

0 3000 6000 12000

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

BARON WINDS PROJECT
PRELIMINARY GEOTECHNICAL ASSESSMENT
STEUBEN COUNTY, NEW YORK

WATERSHEDS IN STUDY AREA

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
EVER POWER
1251 WATERFRONT PLACE, 3RD FLOOR
PITTSBURGH, PENNSYLVANIA 15222

PROJ MGR: DJT	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE
DESIGNED BY: MP	DRAWN BY: TAK	SCALE: AS SHOWN	B-14
DATE: SEPTEMBER, 2017	PROJECT NO. 21.0056796.00	REVISION NO.	

TABLE B-1
Soil Types and Slopes Proximate to Proposed Wind Turbine and Substation Locations
Steuben County, New York

Proposed Wind Turbine Location	Soil Type	Description	Slope (%)	Figure
T1	BaB	Bath channery silt loam	3-12	B-9
T2	MdB	Mardin channery silt loam	2-8	B-12
T3	VoC	Volusia channery silt loam	8-15	B-12
T4	ARC	Arnot channery silt loam	2-20	B-10
T5	FrB	Fremont silt loam	2-8	B-12
T6	LoC	Lordstown channery silt loam	12-20	B-11
T7	MdB	Mardin channery silt loam	2-8	B-12
T8	BaB	Bath channery silt loam	3-12	B-9
T9	MdB	Mardin channery silt loam	2-8	B-9
	MdC	Mardin channery silt loam	8-15	
T11	HfC	Hornell-Fremont silt loams	6-12	B-10
T13	ARC	Arnot channery silt loam	2-20	B-12
T14	BaB	Bath channery silt loam	3-12	B-11
T15	ARC	Arnot channery silt loam	2-20	B-10
T17	LoB	Lordstown channery silt loam	3-12	B-11
T18	ARC	Arnot channery silt loam	2-20	B-12
T19	BaB	Bath channery silt loam	3-12	B-9
T21	MdB	Mardin channery silt loam	2-8	B-11
T22	BaC	Bath channery silt loam	12-20	B-11
T24	MdB	Mardin channery silt loam	2-8	B-11
T26	BaB	Bath channery silt loam	3-12	B-11
T28	BaB	Bath channery silt loam	3-12	B-11
T29	LoB	Lordstown channery silt loam	3-12	B-11
	LoC	Lordstown channery silt loam	12-20	
T32	FrB	Fremont silt loam	2-8	B-13
T33	MdB	Mardin channery silt loam	2-8	B-11
T34	MdB	Mardin channery silt loam	2-8	B-11
T35	FrB	Fremont silt loam	2-8	B-6
T37	BaB	Bath channery silt loam	3-12	B-11
T38	ARC	Arnot channery silt loam	2-20	B-13
T40	FrB	Fremont silt loam	2-8	B-6
T42	MdB	Mardin channery silt loam	2-8	B-13
T43	BaB	Bath channery silt loam	3-12	B-9
	BaC	Bath channery silt loam	12-20	
T44	FrB	Fremont silt loam	2-8	B-8
T45	MdB	Mardin channery silt loam	2-8	B-6
T46	LoB	Lordstown channery silt loam	3-12	B-8
T47	MdB	Mardin channery silt loam	2-8	B-8
T49	LoB	Lordstown channery silt loam	3-12	B-11
	LoC	Lordstown channery silt loam	12-20	
T50	FrB	Fremont silt loam	2-8	B-7
T51	FrB	Fremont silt loam	2-8	B-7
T52	BaB	Bath channery silt loam	3-12	B-9
T53	MdB	Mardin channery silt loam	2-8	B-5
T55	MdB	Mardin channery silt loam	2-8	B-5
T59	MdB	Mardin channery silt loam	2-8	B-8
	BaB	Bath channery silt loam	3-12	
T60	MdB	Mardin channery silt loam	2-8	B-9
T61	FrB	Fremont silt loam	2-8	B-4
T62	VoC	Volusia channery silt loam	8-15	B-4
T63	MdB	Mardin channery silt loam	2-8	B-7
	FrB	Fremont silt loam	2-8	
T64	BaD	Bath channery silt loam	20-30	B-5
T65	VoB	Volusia channery silt loam	3-8	B-6

TABLE B-1
Soil Types and Slopes Proximate to Proposed Wind Turbine and Substation Locations
Steuben County, New York

Proposed Wind Turbine Location	Soil Type	Description	Slope (%)	Figure
T66	BaB	Bath channery silt loam	3-12	B-4
T67	FrB	Fremont silt loam	2-8	B-7
T68	VoC	Volusia channery silt loam	8-15	B-6
T69	LoC	Lordstown channery silt loam	12-20	B-6
T70	FrB	Fremont silt loam	2-8	B-7
T71	FrB	Fremont silt loam	2-8	B-7
T72	FrB	Fremont silt loam	2-8	B-4
T73	FrB	Fremont silt loam	2-8	B-7
T74	LoC	Lordstown channery silt loam	12-20	B-8
T75	MdB	Mardin channery silt loam	2-8	B-5
T76	FrB	Fremont silt loam	2-8	B-6
T77	VoC	Volusia channery silt loam	8-15	B-7
	FrB	Fremont silt loam	2-8	
T78	BaB	Bath channery silt loam	3-12	B-5
	MdB	Mardin channery silt loam	2-8	
T79	MdB	Mardin channery silt loam	2-8	B-6
	FrB	Fremont silt loam	2-8	
T80	FrB	Fremont silt loam	2-8	B-7
T81	MdC	Mardin channery silt loam	8-15	B-4
T82	FrB	Fremont silt loam	2-8	B-7
T83	MdB	Mardin channery silt loam	2-8	B-4
T84	FrB	Fremont silt loam	2-8	B-7
T85	VoC	Volusia channery silt loam	8-15	B-7
	FrB	Fremont silt loam	2-8	
T86	FrB	Fremont silt loam	2-8	B-4
T87	VoC	Volusia channery silt loam	8-15	B-6
T88	MdB	Mardin channery silt loam	2-8	B-8
	MdC	Mardin channery silt loam	8-15	
T89	FrB	Fremont silt loam	2-8	B-4
T90	FrB	Fremont silt loam	2-8	B-7
T91	FrB	Fremont silt loam	2-8	B-4
	BaB	Bath channery silt loam	3-12	
T92	FrB	Fremont silt loam	2-8	B-7
	VoC	Volusia channery silt loam	8-15	
T93	MdB	Mardin channery silt loam	2-8	B-7
	MdC	Mardin channery silt loam	8-15	
	FrB	Fremont silt loam	2-8	
Substations				
Southeast of T53	LoB	Lordstown channery silt loam	3-12	B-5
	LoC	Lordstown channery silt loam	12-20	
	LRE	Lordstown-Arnot association	20-40	
Southeast of T87	FrB	Fremont silt loam	2-8	B-6
South of T18	LRE	Lordstown-Arnot association	20-40	B-12
	LRF	Lordstown-Arnot association	>40	
	FL	Fluvaquents and Ochrepts	0-8	
	HrD	Howard-Madrid complex	20-30	
	VoC	Volusia channery silt loam	8-15	
	Ch	Chenango channery silt loam	gently sloping	
	HoC	Howard gravelly loam	12-20	

Table 9. Summary of Well Construction and Yield Data.

Aquifer	Type1	Total Depth (ft) N2	M3	R4	Casing Length (ft) N	M	R	Depth to Water (ft) N	M	R	Reported Yield (gal/min) N	M	R	Specific Capacity (gal/min/ft) N	M	R
Stratified Drift																
Water-Table	D	115	34	8-109	240	33	6-135	230	13	0-72	73	13	2-50	6	1.0	0.15-5
	N	73	39	11-89							67	300	6-1680	50	41	1.3-410
Confined	D	93	85	34-320	254	69	15-320	216	15	0-145	77	15	2-60	12	0.54	0.06-15
	N	92	74	24-225							88	300	7-2130	96	36	0.07-520
Till	D	28	66	30-192	28	66	30-190	19	18	0-121	27	15	3-100	--	--	--
	N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Devonian Bedrock (New York)	D	51	113	20-225	91	57	3-181	64	22	1-178	62	10	1-30	8	1.1	0.05-4.6
	N	11	114	33-500							12	10	6-100			
Lock Haven Formation	D	120	119	51-390	135	49	9-203	110	38	0-280	111	8	1-72	25	0.30	0.02-14
	N	7	140	81-410							7	25	5-490			
Catskill Formation	D	36	150	52-291	43	40	10-210	29	52	0-170	34	12	2-40	10	0.28	0.02-1.5
	N	3	285	142-305							3	10	5-12			

1 Data separated by use type (D; domestic, or N; non-domestic) only when meaningful and when there are a sufficient number of values.

2 Number of wells

3 Median

4 Range

Source: Taylor 1988

ATTACHMENT C

SOIL BORING LOGS AND LABORATORY TEST RESULTS

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/1/16	END DATE: 11/1/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)		NOTES
	3	S-1	0-2	10	70	Stiff, light brown w/ light gray mottling, Silty CLAY, trace fine to coarse Sand, trace fine to medium angular Gravel, trace Organics (roots top 7"), moist.	P = 2.5 TSF
1	2						
	8						
2	12						
	17	S-2	2-4	46	90	Grades to:..hard, friable, damp.	P = > 4.5 TSF
3	20						
	26						
4	30						
	33	S-3	4-6	60	70	Grades to:..little fine to coarse subangular to angular Gravel.	P = 4.0 TSF
5	31						
	29						
6	52						
	20	S-4	6-8	61	100	Grades to:..trace fine to coarse subangular to angular Gravel, moist.	P = 4.0 TSF
7	24						
	37						
8	27						
	32	S-5	8-10	60	100		P = > 4.5 TSF
9	28						
	32						
10	42					Grades to:..trace fine to medium subrounded to angular Gravel.	
	23	S-6	10-12	71	100		
11	34						
	37						
12	60						
13							
	50/1"	S-7	13-13.1	NV	0	- -	Auger refusal at approx. 13.6 ft. bgs.
14		C-1	13.6-18.6	40	96	Soft to hard, slight to moderately weathered, aphanitic to fine-grained, bluish gray to med. gray, interbedded SANDSTONE and SHALE, very close to closely spaced sub-horizontal to sub-vertical fractures, iron-oxide stained fractures, fossiliferous (MACHIAS FORMATION).	
15							
16							
17							
18							
19		C-2	18.6-19.6	0	92		Core barrel plugged at 19.6 ft. bgs and 20.1 ft. bgs.
20		C-3	19.6-20.1	0	25		

NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
		C-4	20.1-23.6	0	93	Soft to hard, slight to moderately weathered, aphanitic to fine-grained, bluish gray to med. gray, interbedded SANDSTONE and SHALE, very close to closely spaced sub-horizontal to sub-vertical fractures, iron-oxide stained fractures, fossiliferous (MACHIAS FORMATION).	
21							
22							
23							
24						End of Boring T-3 at approximately 23.6 ft. bgs.	
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/1/16	END DATE: 11/2/16	GZA REPRESENTATIVE	J. Beninati
WATER LEVEL DATA		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)		NOTES
	2	S-1	0-2	12	50	Stiff, light brown with light gray mottling, Silty CLAY,	P = 1.5 TSF
1	5					trace fine to coarse Sand, trace fine to medium	T = 4.0 Kg/cm^2
	7					subangular Gravel, trace Organics (roots top 4"),	
2	9					moist.	
	7	S-2	2-4	33	67	Grades to:..hard, trace fine to medium subangular	P = > 4.5 TSF
3	14					to angular Gravel.	T = 4.5 Kg/cm^2
	19						
4	16						
	11	S-3	4-5.8	R	100		P = > 4.5 TSF
5	13						T = 4.0 Kg/cm^2
	50/3"						
6		C-1	5.5-8.1	0	15	Bluish gray to olive brown, SANDSTONE fragments	Auger refusal at
						(4" pulverized sample recovered from boulder)	approx. 5.5 ft. bgs.
7							
8						Light brown, Silty CLAY, trace to to coarse Sand,	Clay material in
	16	S-4	8-10	71	100	trace fine to medium subangular to angular Gravel,	bottom of core
9	39					moist.	barrel.
	32					Grades to:..hard, trace fine to coarse subangular	Moved location
10	62					to angular Gravel (at 8 ft. bgs).	approx, 7 ft. south
	28	S-5	10-12	65	100	Grades to:..trace fine to coarse subrounded	due to refusal.
11	32					to angular Gravel.	Cont. augered
	33						to 8 ft. bgs at new
12	35						location. Resumed
							sample collection.
13							
	25	S-6	13-15	65	100	Grades to:..light brown to grayish brown.	P = > 4.5 TSF
14	37						T = 5.5 Kg/cm^2
	28						
15	30						
16							
17							
							Very difficult to
18							advance augers
		C-2	18-20.1	24	83	Hard, slight to moderately weathered, fine-grained,	from 17-18 ft. bgs.
19						bluish gray to olive brown, SANDSTONE, very close	
						to closely spaced sub-horizontal to sub-vertical	
20						iron oxide stained fractures, 4" thick bluish gray	

NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
		C-3	20.1-25.1	0	20	Silty CLAY layer within moderately dipping fracture at bottom of core sample. Core barrel plugged early in core run C-3 resulting in retrieval of poor sample (pulverized SANDSTONE and SHALE fragments and light gray, Silty CLAY - MACHIAS FORMATION).	
21							
22							
23							
24							
25							
		C-4	25.1-28	0	34	Soft to hard, slight to moderately weathered, aphanitic to fine-grained, bluish gray to medium gray, interbedded SANDSTONE and SHALE, iron oxide staining within portions of Sandstone matrix, moderately to extremely fractured (MACHIAS FORMATION).	
26							
27							
28							
						End of Boring T-41 at approx. 28 ft. bgs.	
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:

1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/2/16	END DATE: 11/3/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA . 3 7/8" Roller Bit, 3" Dia. Casing
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	3	S-1	0-2	15	63	Medium, brown, CLAY & SILT, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, trace Organics (roots), moist.	P = 0.5 TSF
1	3						
	12						
2	13						
	22	S-2	2-3.4	R	82	Hard, brown to light brown, SILT & CLAY, little fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist. Gray Sandstone fragments in end of spoon sample.	P = 3.5 TSF
3	42						
	80/5"						
4							Difficult to advance auger from 3.5 to 8 ft. bgs.
	43	S-3	4-5.8	112	100	Hard, yellowish brown, Clayey SILT, some fine to coarse Sand, trace fine to coarse subangular to angualr Gravel, damp.	
5	63						
	49						P = 2.5 TSF
6	50/4"						
	54	S-4	6-6.8	R	50	Very dense, fine to coarse SAND, some Silt & Clay, trace fine to coarse subangular to angular Gravel, damp.	
7	50/4"						P = 3.25 TSF
8							
	55/0.5"	S-5	8-8.1	R	0		Use 3 7/8" tri-cone roller bit from 8 to 23 ft bgs due to abundant cobbles and boulders.
9							
10							
	12	S-6	10-12	80	42	Very dense, brown, fine to coarse subangular to angular GRAVEL, little fine to coarse Sand, trace Silt & Clay, wet.	
11	34						
	46						
12	20						
13							
	16	S-7	13-15	56	42		
14	25						
	31						
15	31						
16							
17							
18							
	100/2"	S-8	18-18.1	R	0		
19							
20							

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R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
21							
22						Assumed top of bedrock at 21.5 ft. bgs based on characteristics of roller bit advancement.	Spun 3" dia. casing to 23.5 ft bgs. Prior to coring bedrock.
23							
	100/6"	S-9	23-23.5	R	0		
24		C-1	23.5-25.5	0	50	Soft to hard, slightly to moderately weathered, aphanitic to fine-grained, brownish gray to bluish gray, interbedded SANDSTONE and SHALE, very close to closely spaced sub-horizontal to moderately dipping iron oxide stained fractures. Brown, silty clay seam within moderately dipping fracture at bottom of core sample.	
25							
26		C-2	25.5-30.5	68	95		
27						Very soft to hard, very slightly weathered to fresh, aphanitic to fine-grained, medium gray to bluish gray, interbedded SANDSTONE, SILTSTONE, and SHALE, very close to moderately closely spaced sub-horizontal to sub-vertical fractures, iron oxide stained sub-vertical clay-filled fracture from 25.5 to 26.2 ft. bgs., intermittent fossiliferous bedding (MACHIAS FORMATION). Grades to:..very close to moderately closely spaced sub-horizontal fractures.	(MACHIAS FORMATION).
28							
29							
30							
31		C-3	30.5-33.5	42	92		
32							
33							
34						End of Boring T-112 at approx. 33.5 ft. bgs.	
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/7/16	END DATE: 11/7/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)		NOTES
	2	S-1	0-2	16	75	Very stiff, brown to light gray w/iron oxide staining, Clayey SILT, trace fine to coarse Sand, trace fine angular Gravel, trace Organics (roots top 7"), moist.	P = 1.5 TSF
1	6						
	10						
2	6						
	23	S-2	2-4	49	90	Hard, yellowish brown, CLAY & SILT, trace fine to coarse Sand, trace Fine angular Gravel, moist.	P = 4.25 TSF
3	23						
	26						
4	28						
	10	S-3	4-6	41	100	Grades to:..trace fine to coarse subangular to angular Gravel.	P = > 4.5 TSF
5	19						
	22						
6	28						
	11	S-4	6-8	43	100		P = > 4.5 TSF
7	19						
	24						
8	31						
	18	S-5	8-9.8	60	90	Siltstone fragments at bottom of spoon sample (Cobble).	P = > 4.5 TSF
9	26						
	34						
10	50/3"						
	24	S-6	10-12	99	100		P = > 4.5 TSF
11	35						
	64						
12	54						
13							
	23	S-7	13-13.8	R	100		P = 0 TSF
14	50/3"						
15							
16							
17							
18							
	51	S-8	18-19.4	R	60	Hard, yellowish brown with iron oxide staining, Clayey SILT, little fine to coarse Sand, trace fine to coarse subrounded to angular Gravel, moist.	P = > 4.5 TSF
19	92						
	100/5"						
20		C-1	19.7-25.1	44	91	See page 2 for bedrock description.	

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2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
						Medium to hard, very slightly weathered to fresh, aphanitic to fine-grained, medium gray to bluish gray, interbedded SANDSTONE and SILTSTONE, very close to moderately closely spaced sub-horizontal to sub-vertical fractures, some iron oxide stained fractures, intermittent fossiliferous bedding (MACHIAS FORMATION).	
21							
22							
23							
24							
25							
		C-2	25.1-29.7	96	100	Grades to..fresh, sub-vertical healed fracture at 25.8 to 26.1 ft. bgs.	
26							
27							
28							
29							
30						End of Boring T-88 at approx. 29.7 ft. bgs.	
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/7/16	END DATE: 11/8/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	2	S-1	0-2	10	96	Stiff, brown with light gray mottling, CLAY & SILT, trace fine to coarse Sand, trace fine subangular Gravel, trace Organics (roots top 6"), moist.	P = 2.5 TSF
1	1						
	9						
2	13						
	15	S-2	2-4	41	100	Grades to:..hard, iron oxide staining, trace fine to medium subangular to angualr Gravel.	P = >4.5 TSF
3	20						
	21						
4	27						
	18	S-3	4-6	36	100	Hard, brown, Silty CLAY, trace fine to coarse Sand, trace fine to medium subangular to angular Gravel, moist.	P = >4.5 TSF
5	16						
	20						
6	23						
	12	S-4	6-8	43	96		P = >4.5 TSF
7	18						
	25						
8	21					Hard, brown, CLAY & SILT, trace fine to coarse Sand, trace fine to coarse subrounded to angular Gravel, moist.	
	12	S-5	8-10	42	100		P = >4.5 TSF
9	16						
	26						
10	24						
	23	S-6	10-12	53	100		P = >4.5 TSF
11	30						
	23						
12	30					Reddish brown, fine to coarse SAND seam from approx. 11.5-11.6 ft. bgs.	
13							
	20	S-7	13-14.3	R	100	Grades to:..grayish brown, little fine to coarse Sand.	P = 3.0 TSF
14	43						
	50/4"						
15							
16							
17							
18							
	18	S-8	18-19.3	R	82	Grades to:..gray, fossiliferous, damp. (Severely weathered SILTSTONE bedrock)	Augered through weathered bedrock to 21.5 ft. bgs.
19	43						
	50/4"						
20							

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2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
21							
22		C-1	21.5-24.4	11	46	Medium to hard, moderately weathered to fresh, aphanitic, gray, SILTSTONE, extremely to moderately fractured, very close to closely spaced sub-horizontal fractures, intermittent iron oxide staining, intermittent fossiliferous bedding (MACHIAS FORMATION).	
23							
24							
25		C-2	24.4-30	47	98	Grades to:..soft to hard, very slightly weathered to fresh, very close to closely spaced sub-horizontal to sub-vertical fractures, partially healed sub-vertical fracture from 27.9 to 28.6 ft. bgs, intermittent very thin shaly partings (MACHIAS FORMATION).	
26							
27							
28							
29							
30							
		C-3	30-31.5	53	100	Grades to:..medium to hard, slightly weathered to fresh (MACHIAS FORMATION).	
31							
32						End of Boring T-58 at approx. 31.5 ft. bgs.	
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/8/16	END DATE: 11/8/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	Not Applicable

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	2	S-1	0-2	7	80	Medium, brown to light yellowish brown w/light gray mottling, Silty CLAY, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, trace organics (roots top 6"), moist. Grades to:..hard, intermittent iron oxide staining.	P = 2.5 TSF
1	2						
	5						Augered through channery soil from 0 to 5 ft. bgs.
2	9						
	17	S-2	2-4	42	100		
3	20						P = 3.5 TSF
	22						
4	27						
	12	S-3	4-6	28	100	Very stiff, light yellowish brown, CLAY & SILT, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist.	P = >4.5 TSF
5	13						
	15						
6	14						
	5	S-4	6-8	20	68	Very stiff, yellowish brown w.light gray mottling, SILT & CLAY, trace fine to coarse Sand, trace fine to coarse subrounded to angular Gravel, moist.	P = 2.5 TSF
7	8						
	12						
8	14						
	7	S-5	8-10	22	100	Very stiff, yellowish brown, Clayey SILT, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist.	P = 4.25 TSF
9	10						
	12						
10	19						
	11	S-6	10-12	34	63	Hard, grayish brown, SILT & CLAY, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist	P = 4.25 TSF
11	16						
	18						
12	27						
13							
	6	S-7	13-15	27	100	Very stiff, gray, CLAY & SILT, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist.	P = >4.5 TSF
14	12						
	15						
15	17					Very stiff, dark yellowish brown, Clayey SILT, trace fine Sand, moist.	
16							
17							
18							
	4	S-8	18-20	35	100	Hard, gray, SILT & CLAY, trace fine to coarse Sand, trace fine to coarse subrounded to angular Gravel, moist.	P = >4.5 TSF
19	12						
	23						
20	26						

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R - Split-Spoon Refusal

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2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
21							
22							
23						- - - - - - - - - -	
	5	S-9	23-25	30	95	Very stiff, gray, CLAY & SILT, trace fine to coarse Sand, trace fine subangular to angular Gravel, moist.	
24	12						
	18						
25	21						
26							
27							
28							
	12	S-10	28-28.8	R	60		
29	50/3"						
30							
31							
32							
33							
	15	S-11	33-34.1	R	100	Grades to:..hard, trace fine to coarse subrounded to angular Gravel.	
34	48						
	50/1"					Auger refusal at approx. 34.1 ft. bgs.	
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Brian Bartron	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/9/16	END DATE: 11/9/16	GZA REPRESENTATIVE	J. Beninati
WATER LEVEL DATA		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	Not Applicable

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	3	S-1	0-2	9	100	Stiff, brown to light yellowish brown w/light gray mottling, CLAY & SILT, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, trace Organics (roots top 10"), moist.	P = 1.75 TSF
1	4						
	5						
2	12						
	12	S-2	2-4	33	96	Hard, grayish brown w/light gray mottling, Silty CLAY, trace fine to coarse Sand, trace fine subangular to angular Gravel, moist.	P = >4.5 TSF
3	14						
	19						
4	20						
	13	S-3	4-6	41	96	Grades to:..trace fine to coarse subangular to angular Gravel.	P = >4.5 TSF
5	18						
	23						
6	30						
	18	S-4	6-8	84	100		P = >4.5 TSF
7	33						
	51						
8	58						
	32	S-5	8-9.8	104	100	Grades to:..trace fine to coarse subrounded to angular Gravel.	P = >4.5 TSF
9	44						
	60						
10	50/4"						
	11	S-6	10-11.8	69	100	Grades to:..little fine to coarse Sand, damp.	P = >4.5 TSF
11	37						
	32						
12	50/3"						
13							
	11	S-7	13-15	50	100		P = >4.5 TSF
14	19						
	31						
15	37						
16							
17							
18							
	12	S-8	18-19.6	46	90	Grades to:..gray, moist.	P = >4.5 TSF
19	18						
	28						
20	50/1"						

NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
21							
22							
23							
	28	S-9	23-25	51	20		P = >4.5 TSF
24	28						
	23						
25	28						
26							
27							
28							
	24	S-10	28-30	64	80		P = >4.5 TSF
29	32						
	32						
30	29						
31							
32							
33							
	9	S-11	33-33.9	R	<5	Siltstone fragments in end of spoon sample.	
34	60/5"						
35							
36							
37							
38							
	15	S-12	38-39.8	68	70		P = >4.5 TSF
39	21						
	47						
40	60/4"						
						End of Boring T-80 at approx. 39.8 ft. bgs.	
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

GZA GEOENVIRONMENTAL OF NY	EVERPOWER	BORING No. T-46
535 WASHINGTON ST, 11th FL.	BARON WIND PROJECT	SHEET 1 OF 2
BUFFALO, NY	PRELIMINARY GEOTECHNICAL ASSESSMENT	GZA FILE # 21.0056796.00
	STEUBEN COUNTY, NEW YORK	CHECKED BY: D. TROY

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Brian Bartron	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/9/16	END DATE: 11/10/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	Not Applicable

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES
11/10/16	10:30	29 ft. bgs		tape down augers

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)		NOTES
	1	S-1	0-2	6	75	Medium, brown to light yellowish brown w/light	P = 0.75 TSF
1	2					gray mottling, SILT & CLAY, trace fine to coarse	
	4					Sand, trace fine to coarse subangular Gravel,	
2	12					trace Organics (roots top 6"), moist.	
	12	S-2	2-4	46	100	Grades to:..hard, little fine to coarse Sand, damp.	P = 1.25 TSF
3	15						
	31						
4	33						
	27	S-3	4-6	88	100	Hard, yellowish brown, Clayey SILT, little fine to	P = 4.25 TSF
5	31					coarse Sand, trace fine to coarse subangular to	
	57					angular Gravel, damp.	
6	34						
	12	S-4	6-8	37	100	Hard, yellowish brown, CLAY & SILT, trace fine	P = 4.25 TSF
7	17					to coarse Sand, trace fine to coarse subangular	
	20					to angular Gravel, damp.	
8	25						
	17	S-5	8-10	60	100	Grades to:..trace fine to coarse subrounded to	P = 3.0 TSF
9	24					angular Gravel.	
	36						
10	50						
	58	S-6	10-11.6	97	96		P = >4.5 TSF
11	47						
	50						
12	50/1"						
13							
	26	S-7	13-13.7	R	100	Hard, yellowish brown, Clayey SILT, trace fine	P = 0 TSF
14	50/1"					Sand, trace fine angular Gravel, moist.	
15							
16							
17							
18							
	9	S-8	18-20	41	63	Dense, yellowish brown with iron oxide staining,	P = 0 TSF
19	20					SILT, trace fine to coarse Sand, trace fine	
	21					subangular to angular Gravel, moist to wet.	
20	26						

NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater
may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
21							
22							
23							
	70	S-9	23-23.6	R	100	Hard, yellowish brown to gray, SILT & CLAY, some fine to coarse Sand, trace fine to coarse Gravel, moist.	P = 0 TSF
24	50/1"						
25							Difficult to advance augers from 25.5 to 27 ft. bgs in channery soil.
26							
27							
28							
	41	S-10	28-28.8	R	0		
29	80/3"						
30							
31							
32							
33							
	56	S-11	33-34.1	R	100	Hard, yellowish brown, CLAY & SILT, some fine to coarse Sand, trace fine to coarse subangular to angular Gravel, moist to wet. Gray, Shale fragments top 4", wet.	Difficult to advance augers from 34 to 38 ft. bgs in channery soil.
34	28						
	55/1"						
35							
36							
37							
38							
	70/2"	S-12	38-38.2	R	100	Gray, fine to coarse SAND & GRAVEL, wet.	
39						End of Boring T-46 at approx. 38.2 ft. bgs (split-spoon refusal).	
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Brian Bartron	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/10/16	END DATE: 11/11/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	4	S-1	0-2	8	50	Medium, yellowish brown w/ iron oxide staining, SILT & CLAY, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, trace Organics (roots top 8"), moist to wet.	P = 0 TSF
1	4						
	4						Very difficult to auger through Channery soil from 1 to 4 ft. bgs.
2	33						
	50/3"	S-2	2-2.3	R	0		
3							
4							
	43	S-3	4-4.8	R	100	Medium gray, Shale fragments.	Advance augers through apparent severely weathered Shale bedrock from approx. 4 to 11 ft. bgs.
5	75/4"						
6							
	71	S-4	6-7.2	R	70	Medium gray to brownish gray, Shale fragments.	
7	75						
	50/2"						
8							
	50/2"	S-5	8-8.2	R	0		
9							
10							
	50/1"	S-6	10-10.1	R	0		
11							
		C-1	11-14.4	0	59	Very soft to moderately hard, moderately severe to slightly weathered, aphanitic, medium to dark gray, interbedded SILTSTONE & SHALE, extremely fractured, very closely spaced subhorizontal to moderately dipping fractures, intermittent iron oxide stained fractures, fossiliferous (WISCOY FORMATION).	
12							
13							
14							Core barrel plugged at 14.4 ft. bgs.
15		C-2	14.4-16.9	0	60		
16							
17							
		C-3	16.9-19.4	0	40		Core barrel plugged 16.9 ft. bgs.
18							
19							
							Lost core water at 20 ft. bgs.
20		C-4	19.4-21.9	0	80	See page 2 for bedrock description.	

NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
						Medium to hard, moderately severe to slighty weathered, extremely to moderately fractured, aphanitic to fine-grained, gray to brownish gray with iron oxide staining, interbedded SILTSTONE/ SHALE/SANDSTONE, very close to closely spaced sub-horizontal to sub-vertical fractures.	
21							
22							
23							(WISCOY FORMATION)
						End of Boring T-23 at approx. 21.9 ft. bgs.	
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

CONTRACTOR	Earth Dimensions, Inc. (EDI)	BORING LOCATION	See Location Plan - Figure 2
DRILLER	Andy Kempisty	GROUND SURFACE ELEVATION	N/A DATUM N/A
START DATE: 11/4/16	END DATE: 11/4/16	GZA REPRESENTATIVE	J. Beninati
		TYPE OF DRILL RIG	CME 550
		CASING SIZE AND DIAMETER	4 1/4" I.D. HSA
		OVERBURDEN SAMPLING METHOD	ASTM 1586
		ROCK DRILLING METHOD	NQ

WATER LEVEL DATA

DATE	TIME	WATER	CASING (Y/N)	NOTES

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	DESCRIPTION	NOTES
	1	S-1	0-2	14	75	Stiff, brown, SILT & CLAY, trace fine to coarse Sand, trace fine to coarse subangular to angular Gravel, trace Organics (roots top 7"), moist.	P = 2.5 TSF
1	4						
	10						
2	14						
	10	S-2	2-4	39	80	Hard, yellowish brown, Clayey SILT, trace fine to coarse Sand, trace fine to medium subangular to angular Gravel, moist.	P = >4.5 TSF
3	18						
	21						
4	25						
	12	S-3	4-6	39	88	Grades to:..yellowish to grayish brown with iron oxide staining.	P = 1.5 TSF
5	17						
	22						
6	22						
	36	S-4	6-8	R	80	Hard, grayish brown with iron oxide staining, CLAY & SILT, trace fine to coarse Sand, trace fine subrounded to angular Gravel, moist. Shale fragments in bottom of spoon sample.	P = 2.5 TSF
7	80/3"						
8							
	42	S-5	8-10	R	75	Hard, yellowish brown with iron oxide staining, SILT & CLAY, trace fine to coarse Sand, trace fine subangular to angular Gravel, damp.	P = 2.0 TSF Very difficult to advance augers.
9	70/3"						
10							
	31	S-6	10-12	120	100	Very dense, yellowish brown with iron oxide staining, SILT, little fine to coarse Sand, trace fine to medium subangular to angular Gravel, damp.	
11	57						
	63						
12	50/3"						
13							
	68	S-7	13-15	R	100	Hard, Clayey SILT, some fine to coarse Sand, trace fine subangular to angular Gravel, damp.	Added water to facilitate auger advancement.
14	50/2"						
15							
16							
17							
18							
	100/3"	S-8	18-20	R	<5	Assumed top of bedrock at 17.5 ft bgs. based on auger advancement. Shale fragments in split spoon sample.	
19							
20							

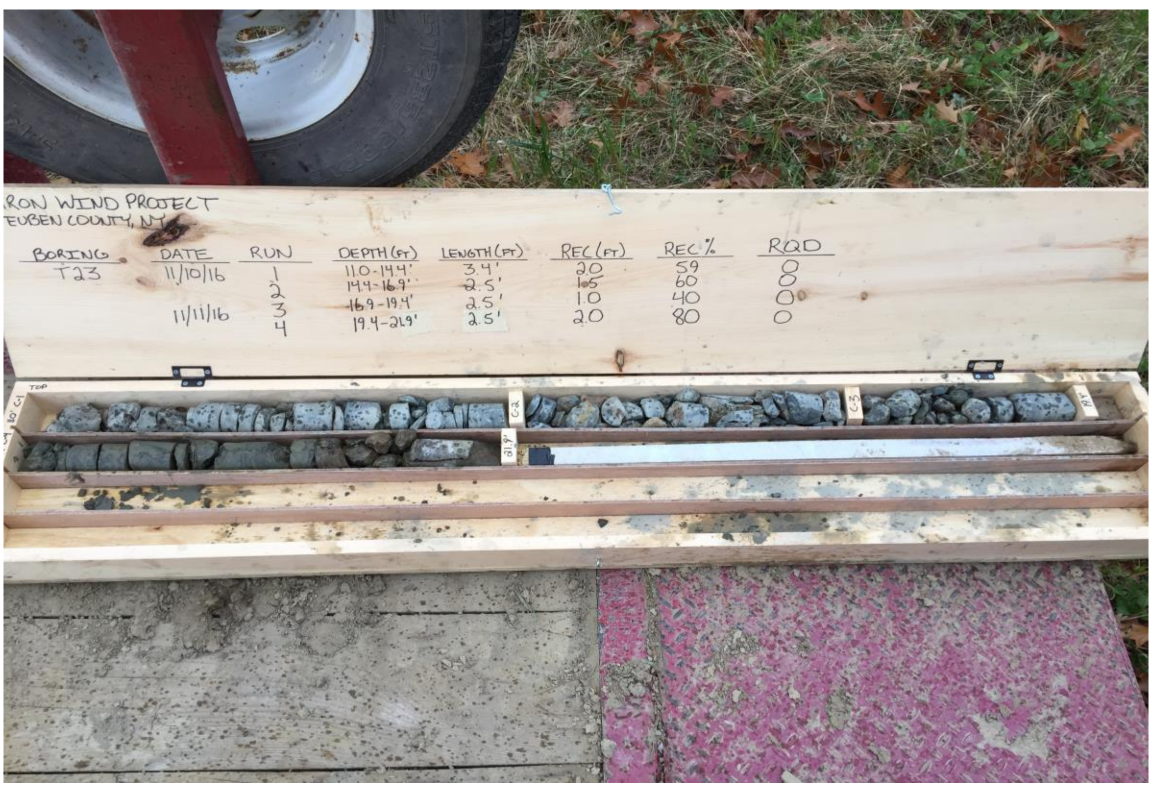
NOTES: P - Pocket Penetrometer, T - Torvane, HSA - Hollow Stem Augers, TSF - Tons/Square Foot, NV - No Value, BGS - Below Ground Surface
R - Split-Spoon Refusal

1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

DEPTH	BLOWS (/6")	SAMPLE NO.	DEPTH (ft.)	N-VALUE / RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	NOTES
		C-1	20-25	25	15	Moderately hard to hard, moderately weathered to fresh, aphanitic, medium gray to olive brown, SILTSTONE, moderately fractured, very close to closely spaved subhorizontal to subvertical fractures, some fractures iron oxide stained, gray silty clay-filled subvertical fracture at 22-22.3 ft. bgs., very thin intermittent shaly partings (MACHIAS FORMATION).	
21							
22							
23							
24							
25							
		C-2	25-28.5	0	38	Grades to:..soft to moderately hard, moderate to slightly weathered, extremely fractured.	
26							
27							
28							
29		C-3	28.5-30	28	100	Hard, very slightly weathered to fresh, aphanitic to fine-grained, medium gray to bluish gray, interbedded SANDSTONE & SILTSTONE, moderately fractured, very close to closely spaced subhorizontal to subvertical fractures, 1" thick bluish gray silty clay seam at approx. 29.8 ft. bgs.	(MACHIAS FORMATION)
30						End of Boring T-109 at approx. 30 ft. bgs.	
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							

ADDITIONAL NOTES:
1) Borehole backfilled with cuttings upon completion.

ROCK CORE AT BORING LOCATION T3 AND T41



ROCK CORE AT BORING LOCATION T23

<u>ROCK CORE AT BORING LOCATIONS T58 and T88</u>

<u>ROCK CORE AT BORING LOCATIONS T109 and T112</u>

Project Name	**Baron Wind Project**	Location	Steuben County, NY	Reviewed By	[signature]
Project No.	**21.0056796.00**	Assigned By	John Beninati		
Project Manager	Daniel Troy	Report Date	11.30.16	Date Revised	*12.2.16*

Boring No.	Sample No.	Depth (ft)	Lab No.	Identification Tests: Water Content %	LL %	PL %	Gravel %	Sand %	Fines (<#200) %	pH	Dry unit wt. pcf	γ_d MAX (pcf) W_{opt} (%) (Corrected)	γ_d MAX (pcf) W_{opt} (%)	Perme-ability cm/sec	Laboratory Log and Soil Description
T-58	S-5	8-10	1	13.5	25	16									Brown SILT & CLAY
T-58	S-8	18-20	2	7.7			30.3	36.3	33.4						Grey-Brown f-c SAND, some Silt, some f-c Gravel
T-46	S-2	2-4	3	10.5											
T-46	S-4	6-8	4	11.1	25	15									Brown SILT & CLAY
T-46	S-5	8-10	5	10.5											
T-46	S-7	13-15	6	12.8											
T-46	S-8	18-20	7	19.2			17.6	28.0	54.4						Light Brown SILT, some f-c Sand, little fine Gravel
T-46	S-9	23-25	8	9.2											
T-46	S-11	33-35	9	13.3											

THIELSCH ENGINEERING

195 Frances Avenue
Cranston, RI 02910
401-467-6454

LABORATORY TESTING DATA SHEET (2 of 3)

Project Name **Baron Wind Project** Location Steuben County, NY Reviewed By [signature]
Project No. **21.0056796.00** Assigned By John Beninati
Project Manager Daniel Troy Report Date 11.30.16 Date Revised *12.2.16*

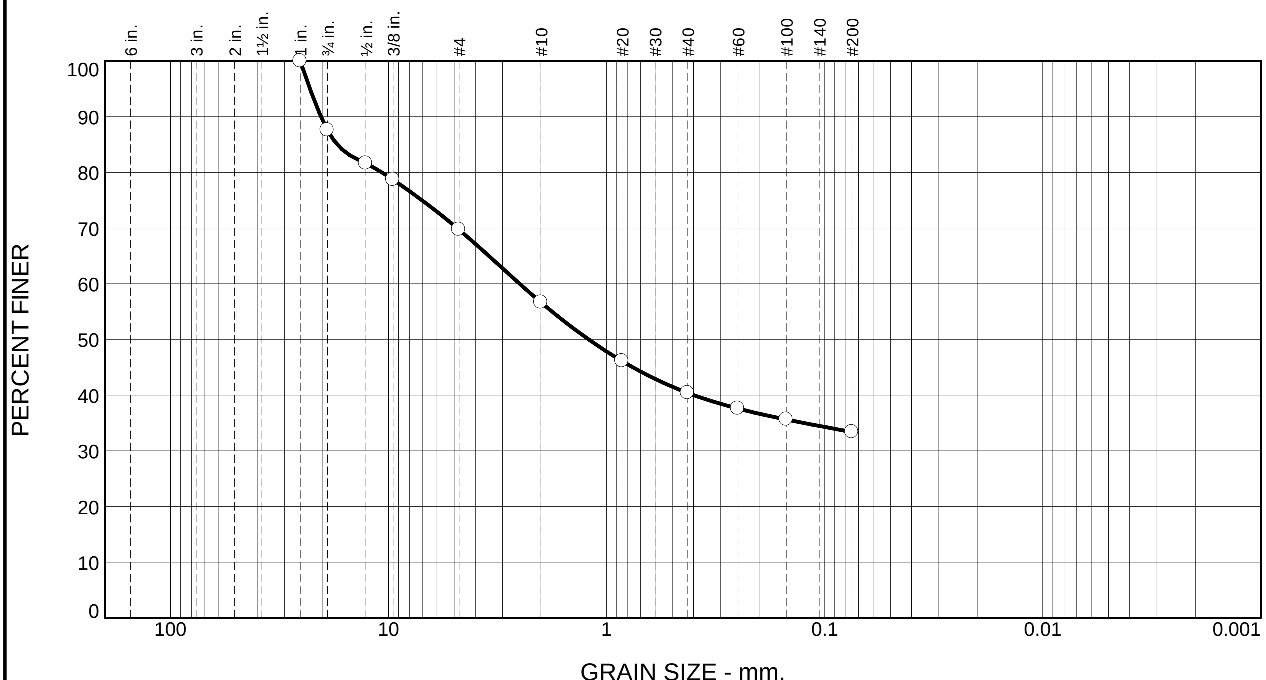
Boring No.	Sample No.	Depth (ft)	Lab No.	Identification Tests: Water Content %	LL %	PL %	Gravel %	Sand %	Fines (<#200) %	pH	Dry unit wt. pcf	γ_d MAX (pcf) / W_{opt} (%) (Corrected)	γ_d MAX (pcf) / W_{opt} (%)	Perme-ability cm/sec	Laboratory Log and Soil Description
T-80	S-6	10-12	10	11.6	31	17									Light Brown CLAY & SILT
T-80	S-8	18-20	11	10.7			16.0	29.2	54.8						Grey SILT, some f-c SAND, little fine Gravel
T-80	S-10	28-30	12	12.2			24.7	25.1	50.2						Grey SILT, some f-c Sand, some fine Gravel
T-41	S-3	4-6	13	14.7			4.6	20.3	75.1						Brown SILT, some f-c Sand, trace fine Gravel
T-41	S-6	13-15	14	10.8	32	16									Light Brown CLAY & SILT
T-112	S-2	2-4	15	12.1	25	18									Light Brown SILT & CLAY
T-112	S-6	10-12	16	12.1			66.7	20.7	12.6						Light Brown f-c GRAVEL, some f-c Sand, little Silt
T-23	S-1	0-2	17	22.4	NV	NP									Brown SILT
T-109	S-4	6-8	18	8.1	NV	NP									Brown SILT
T-109	S-6	10-12	19	8.5			38.6	30.1	31.3						Brown f-c GRAVEL, some Silt, some f-c Sand

THIELSCH ENGINEERING
195 Frances Avenue
Cranston, RI 02910
401-467-6454

Project Name **Baron Wind Project** Location Steuben County, NY Reviewed By [signature]
Project No. **21.0056796.00** Assigned By John Beninati
Project Manager Daniel Troy Report Date 11.30.16 Date Revised *12.2.16*

Boring No.	Sample No.	Depth (ft)	Lab No.	Identification Tests												
				Water Content %	LL %	PL %	Gravel %	Sand %	Fines (<#200) %	pH	Dry unit wt. pcf	γ_d MAX (pcf) W_{opt} (%) (Corrected)	γ_d MAX (pcf) W_{opt} (%)	Perme-ability cm/sec	Laboratory Log and Soil Description
T-3	S-3	4-6	20	9.9											
T-3	S-5	8-10	21	14.4	25	16									Brown SILT & CLAY
T-88	S-3	4-6	22	11.9	25	15									Brown SILT & CLAY
T-88	S-7	13-15	23	11.3			17.3	24.2	58.5						Brown SILT, some f-c Sand, little fine Gravel
T-116	S-3	4-6	24	12.2	25	15									Brown SILT & CLAY
T-116	S-5	8-10	25	17.3											
T-116	S-7	13-15	26	19.0			2.4	8.2	89.4						Brown SILT, trace f-c Sand, trace fine Gravel
T-116	S-8	18-20	27	16.5											
T-116	S-9	23-25	28	26.6			0.8	0.8	98.4						Grey SILT, trace f-c Sand, trace fine Gravel
T-116	S-10	28-30	29	12.1											
T-116	S-11	33-35	30	9.7											

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.4	17.9	13.1	16.2	7.0	33.4	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100.0		
.75	87.6		
0.5	81.6		
.375	78.7		
#4	69.7		
#10	56.6		
#20	46.1		
#40	40.4		
#60	37.6		
#100	35.6		
#200	33.4		

* (no specification provided)

Material Description

Grey-Brown f-c SAND, some Silt, some f-c Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 20.4235 D_{85}= 17.1833 D_{60}= 2.5068
D_{50}= 1.2092 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

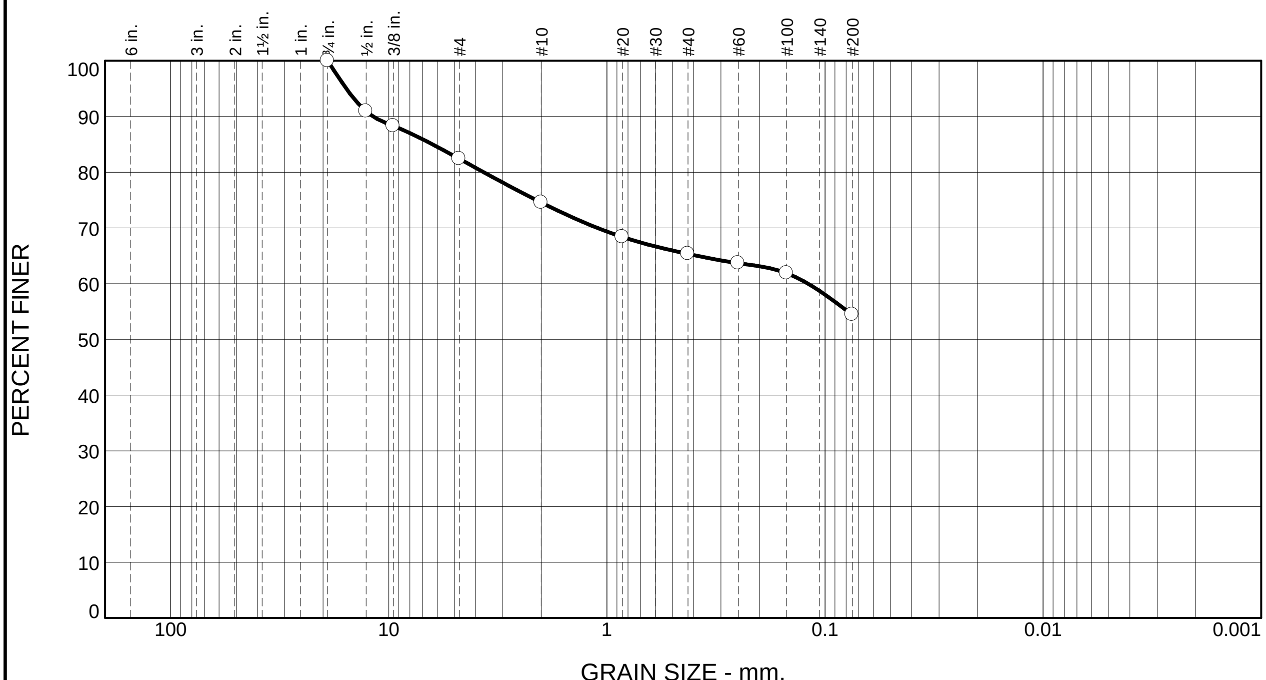
Source of Sample: Borings **Depth:** 18 to 20' **Date Sampled:**
Sample Number: T-58 S-8

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.6	7.8	9.3	10.9	54.4	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
0.5	90.9		
.375	88.3		
#4	82.4		
#10	74.6		
#20	68.4		
#40	65.3		
#60	63.7		
#100	61.9		
#200	54.4		

* (no specification provided)

Material Description

Light Brown SILT, some f-c Sand, little fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 11.7989 D_{85}= 6.2991 D_{60}= 0.1196
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16
Tested By: IA
Checked By: Matthew Colman, P.E.
Title: Laboratory Manager

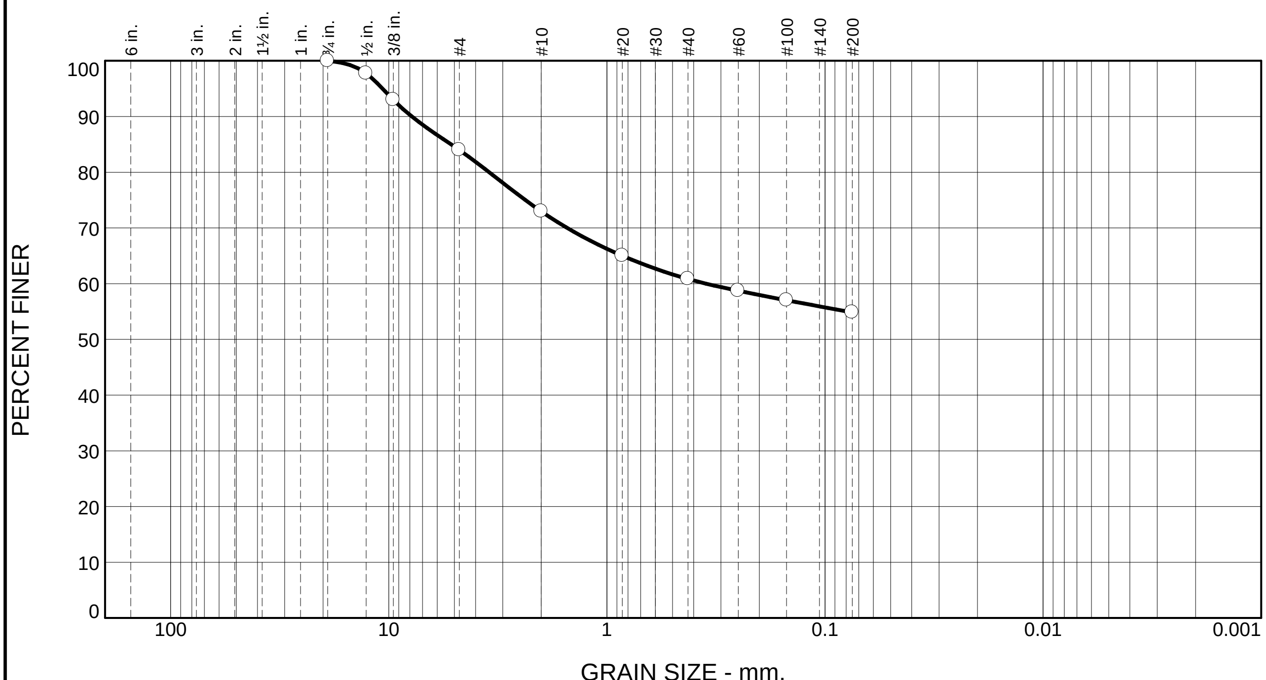
Source of Sample: Borings **Depth:** 18 to 20' **Date Sampled:**
Sample Number: T-46 S-8

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S7

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.0	11.0	12.2	6.0	54.8	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
0.5	97.7		
.375	93.0		
#4	84.0		
#10	73.0		
#20	65.0		
#40	60.8		
#60	58.7		
#100	57.0		
#200	54.8		

* (no specification provided)

Material Description

Grey SILT, some f-c SAND, little fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 7.8371 D_{85}= 5.1794 D_{60}= 0.3512
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

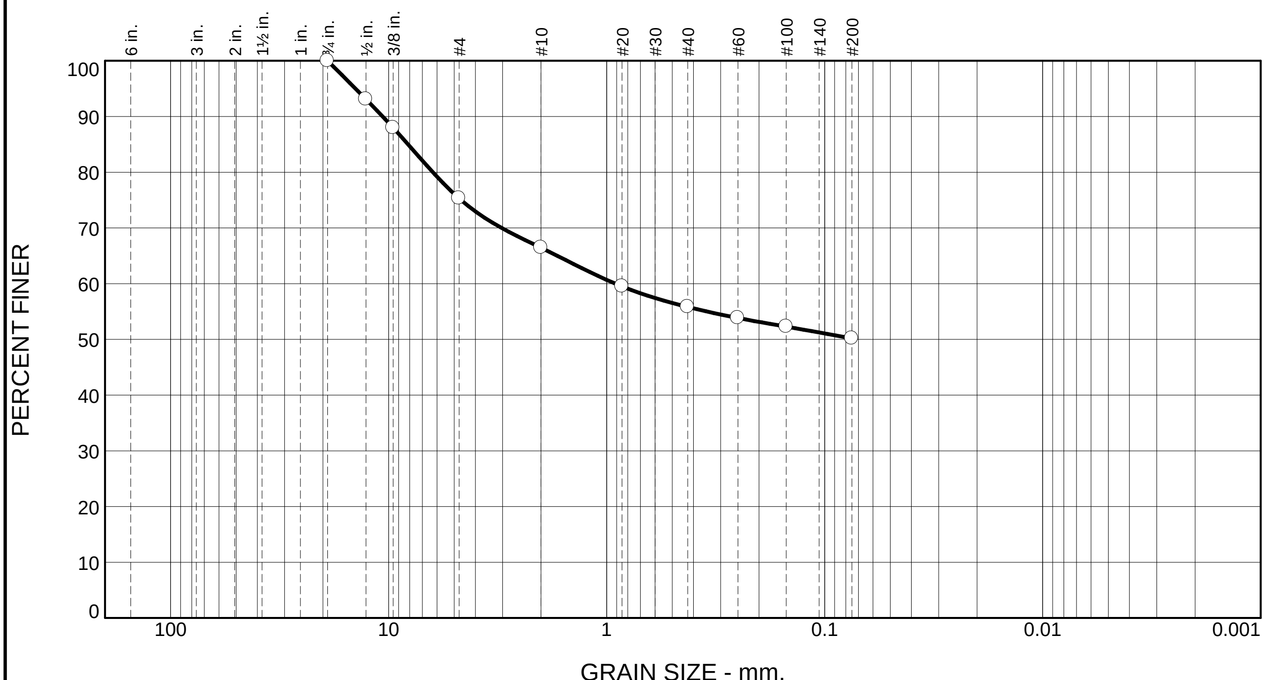
Source of Sample: Borings **Depth:** 18 to 20' **Date Sampled:**
Sample Number: T-80 S-8

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S11

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	24.7	8.9	10.6	5.6	50.2	

TEST RESULTS (D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
0.5	93.1		
.375	88.0		
#4	75.3		
#10	66.4		
#20	59.5		
#40	55.8		
#60	53.8		
#100	52.3		
#200	50.2		

* (no specification provided)

Material Description

Grey SILT, some f-c Sand, some fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 10.6472 D_{85}= 8.1464 D_{60}= 0.9127
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16
Tested By: IA
Checked By: Matthew Colman, P.E.
Title: Laboratory Manager

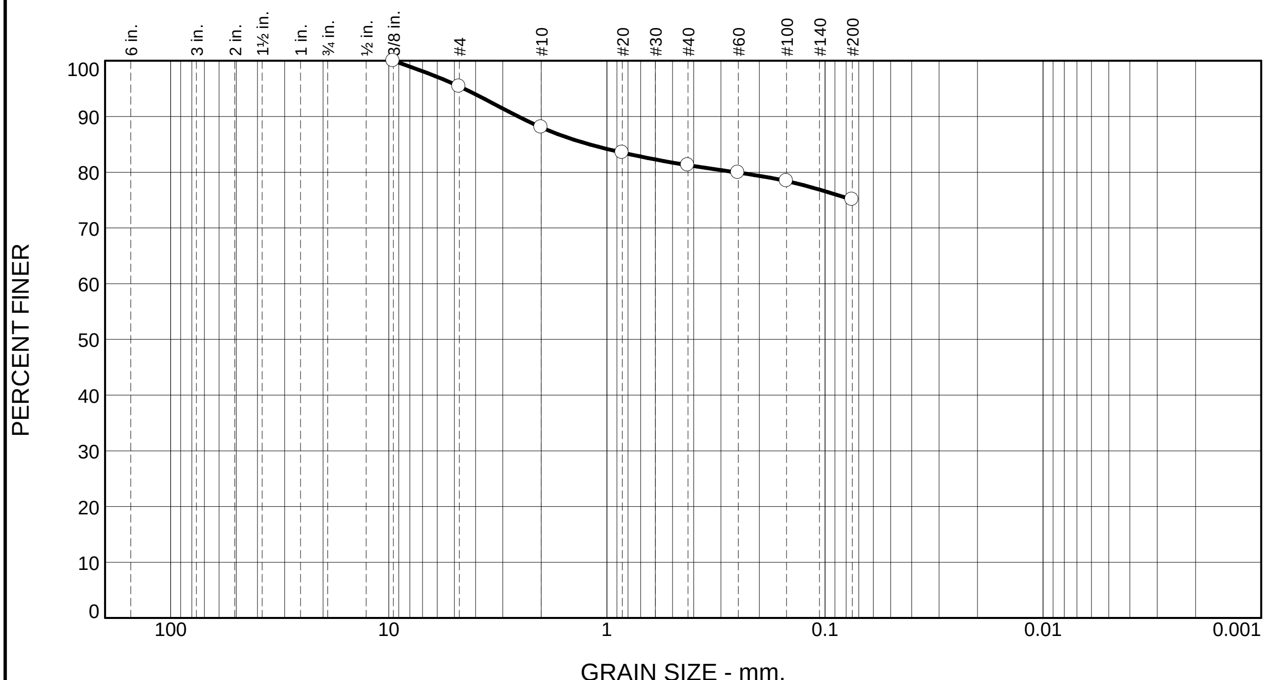
Source of Sample: Borings **Depth:** 28 to 30' **Date Sampled:**
Sample Number: T-80 S-10

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S12

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.6	7.4	6.7	6.2	75.1	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.375	100.0		
#4	95.4		
#10	88.0		
#20	83.5		
#40	81.3		
#60	79.9		
#100	78.4		
#200	75.1		

* (no specification provided)

Material Description

Brown SILT, some f-c Sand, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 2.5492 D_{85}= 1.2015 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16
Tested By: IA
Checked By: Matthew Colman, P.E.
Title: Laboratory Manager

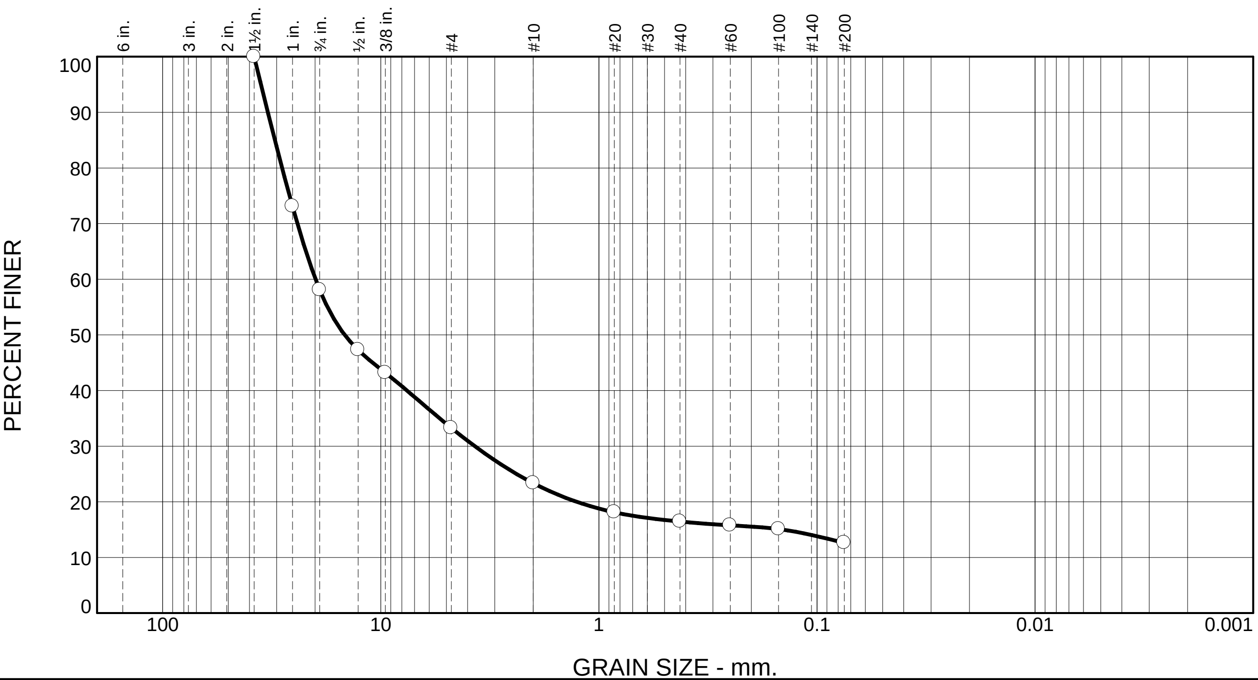
Source of Sample: Borings **Depth:** 4 to 6' **Date Sampled:**
Sample Number: T-41 S-3

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S13

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	41.9	24.8	10.0	6.8	3.9	12.6	

TEST RESULTS (D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	73.1		
.75	58.1		
0.5	47.3		
.375	43.2		
#4	33.3		
#10	23.3		
#20	18.1		
#40	16.5		
#60	15.8		
#100	15.1		
#200	12.6		

* (no specification provided)

Material Description

Light Brown f-c GRAVEL, some f-c Sand, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 32.9368 D_{85}= 30.5796 D_{60}= 19.9228
D_{50}= 14.6470 D_{30}= 3.7063 D_{15}= 0.1439
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

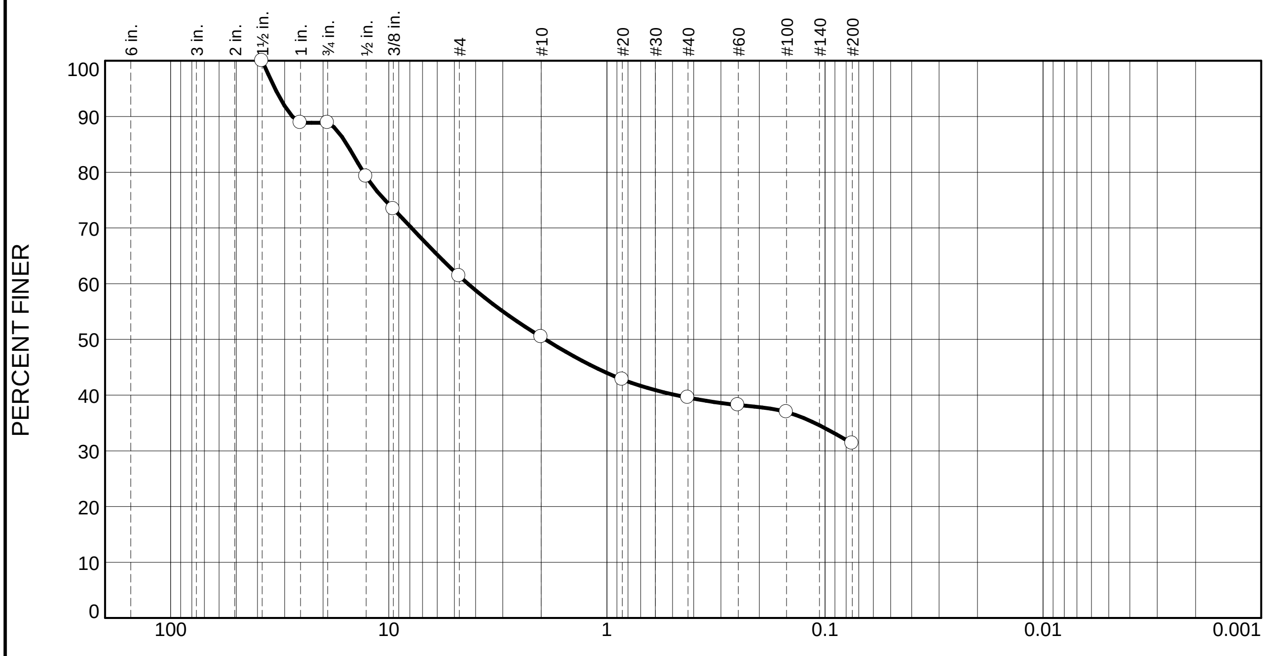
Source of Sample: Borings **Depth:** 10 to 12' **Date Sampled:**
Sample Number: T-112 S-6

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S16

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.1	27.5	11.0	10.8	8.3	31.3	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	88.9		
.75	88.9		
0.5	79.2		
.375	73.4		
#4	61.4		
#10	50.4		
#20	42.8		
#40	39.6		
#60	38.2		
#100	37.0		
#200	31.3		

* (no specification provided)

Material Description

Brown f-c GRAVEL, some Silt, some f-c Sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 27.6726 D_{85}= 15.5595 D_{60}= 4.3406
D_{50}= 1.9189 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

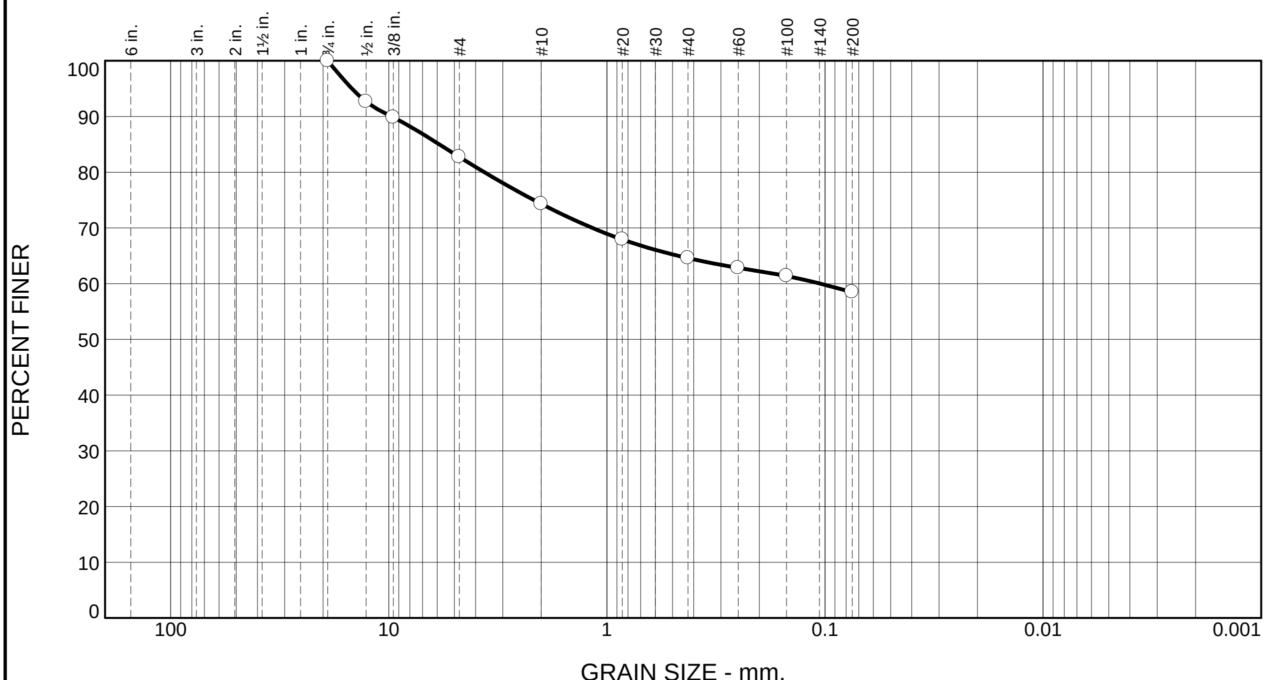
Source of Sample: Borings **Depth:** 10 to 12' **Date Sampled:**
Sample Number: T-109 S-6

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S19

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.3	8.4	9.7	6.1	58.5	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
0.5	92.7		
.375	89.8		
#4	82.7		
#10	74.3		
#20	67.9		
#40	64.6		
#60	62.8		
#100	61.4		
#200	58.5		

* (no specification provided)

Material Description

Brown SILT, some f-c Sand, little fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 9.7040 D_{85}= 5.8644 D_{60}= 0.1051
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

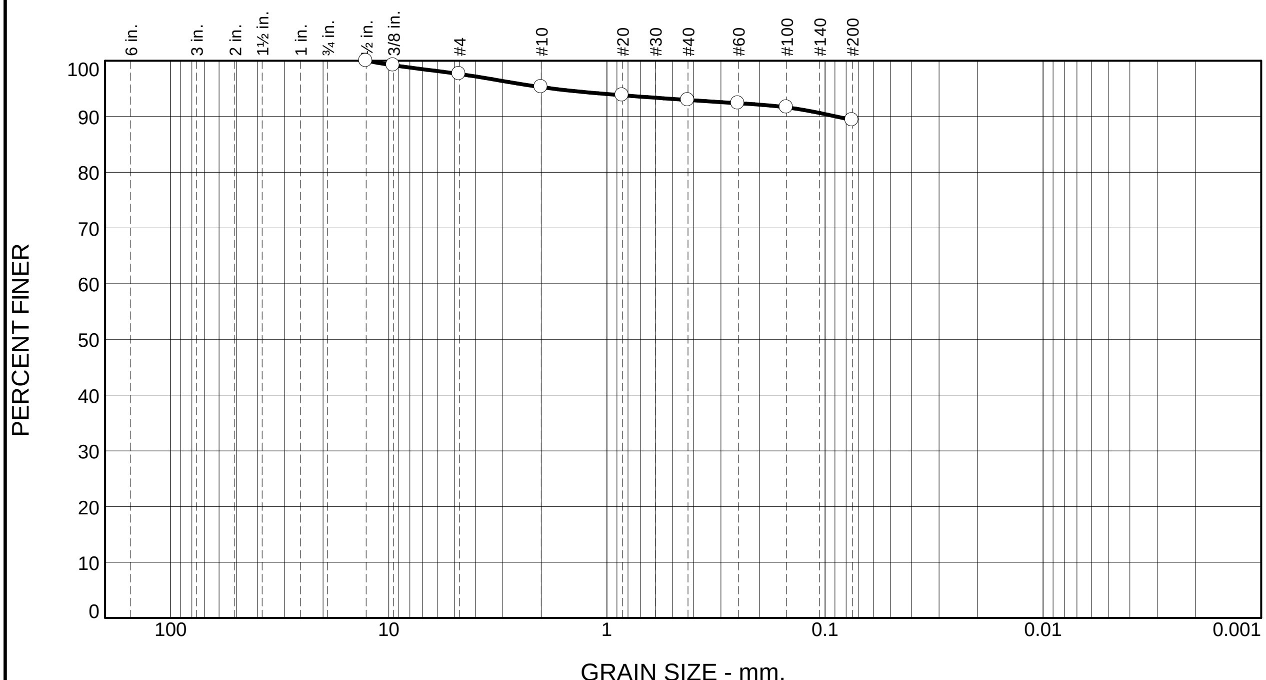
Source of Sample: Borings **Depth:** 13 to 15' **Date Sampled:**
Sample Number: T-88 S-7

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S23

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	2.3	2.3	3.6	89.4	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5	100.0		
.375	99.2		
#4	97.6		
#10	95.3		
#20	93.8		
#40	93.0		
#60	92.4		
#100	91.6		
#200	89.4		

* (no specification provided)

Material Description

Brown SILT, trace f-c Sand, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-4(0)

Coefficients

D_{90}= 0.0888 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

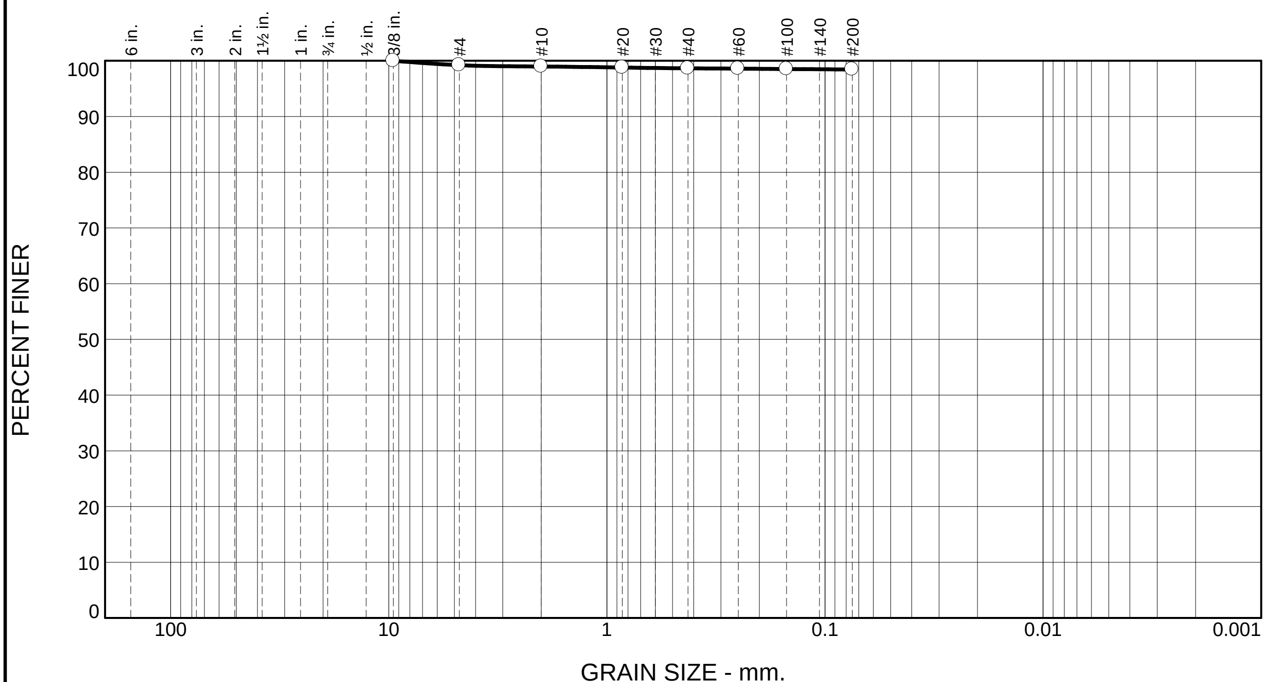
Source of Sample: Borings **Depth:** 13 to 15' **Date Sampled:**
Sample Number: T-116 S-7

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S26

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.2	0.3	0.3	98.4	

TEST RESULTS (D422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.375	100.0		
#4	99.2		
#10	99.0		
#20	98.8		
#40	98.7		
#60	98.6		
#100	98.5		
#200	98.4		

* (no specification provided)

Material Description

Grey SILT, trace f-c Sand, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-4(0)

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 11.28.16

Tested By: IA

Checked By: Matthew Colman, P.E.

Title: Laboratory Manager

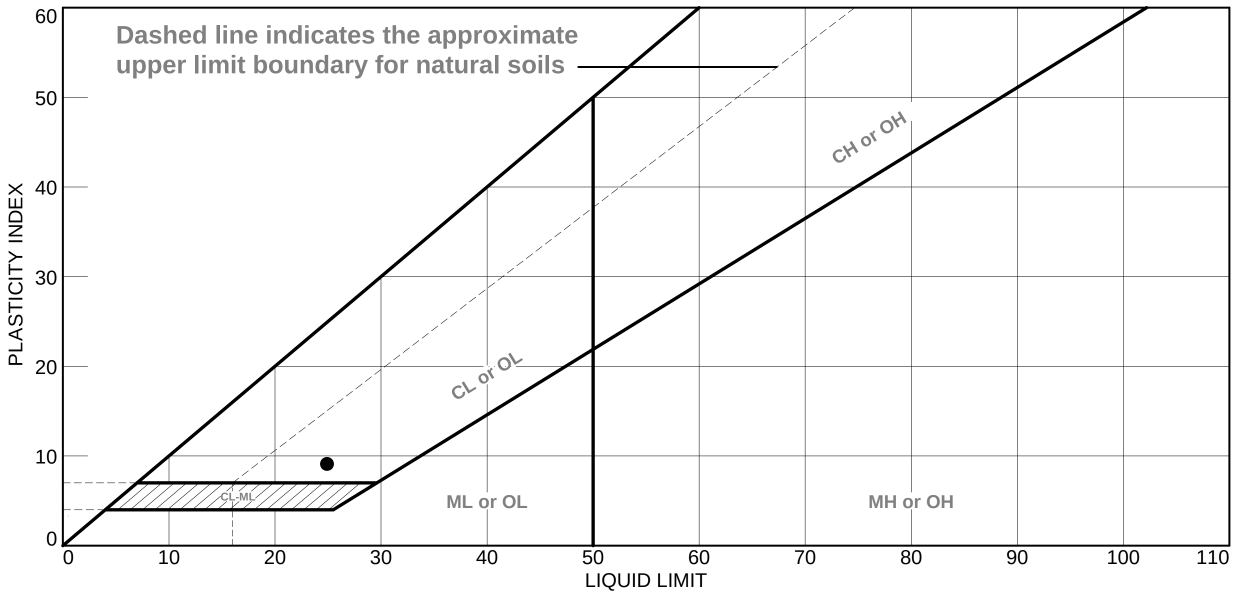
Source of Sample: Borings **Depth:** 23 to 25' **Date Sampled:**
Sample Number: T-116 S-9

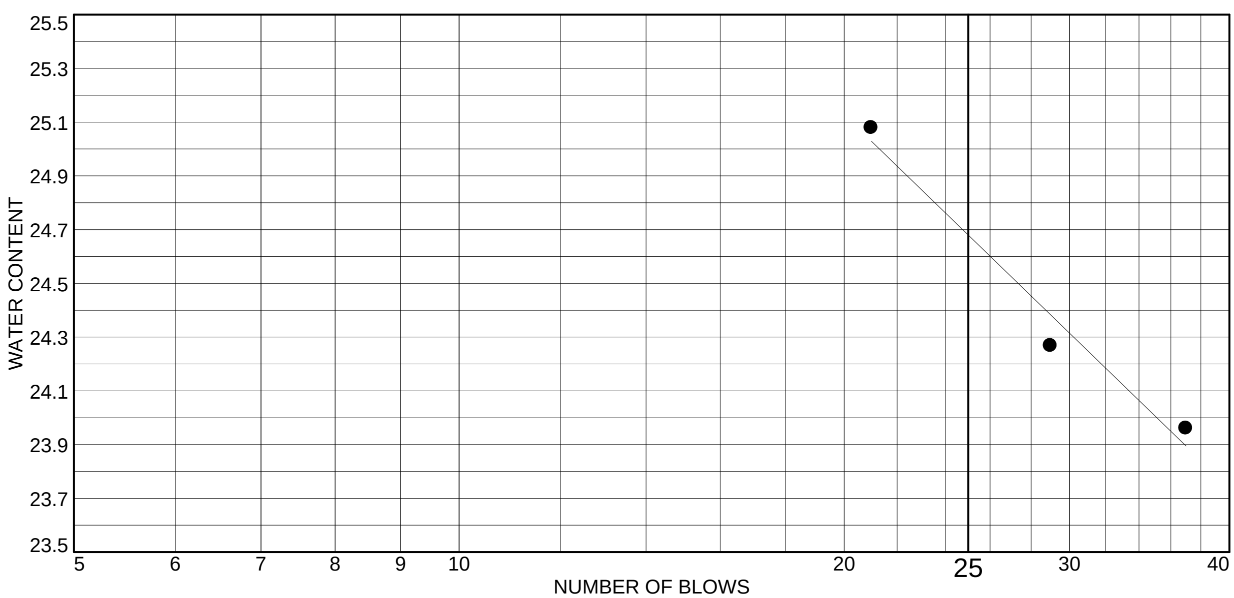
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Baron Wind Project
Steuben County, NY
Project No: 21.0056796.00 **Figure** S28

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT & CLAY	25	16	9			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 8 to 10'

Sample Number: T-58 S-5

Thielsch Engineering Inc.

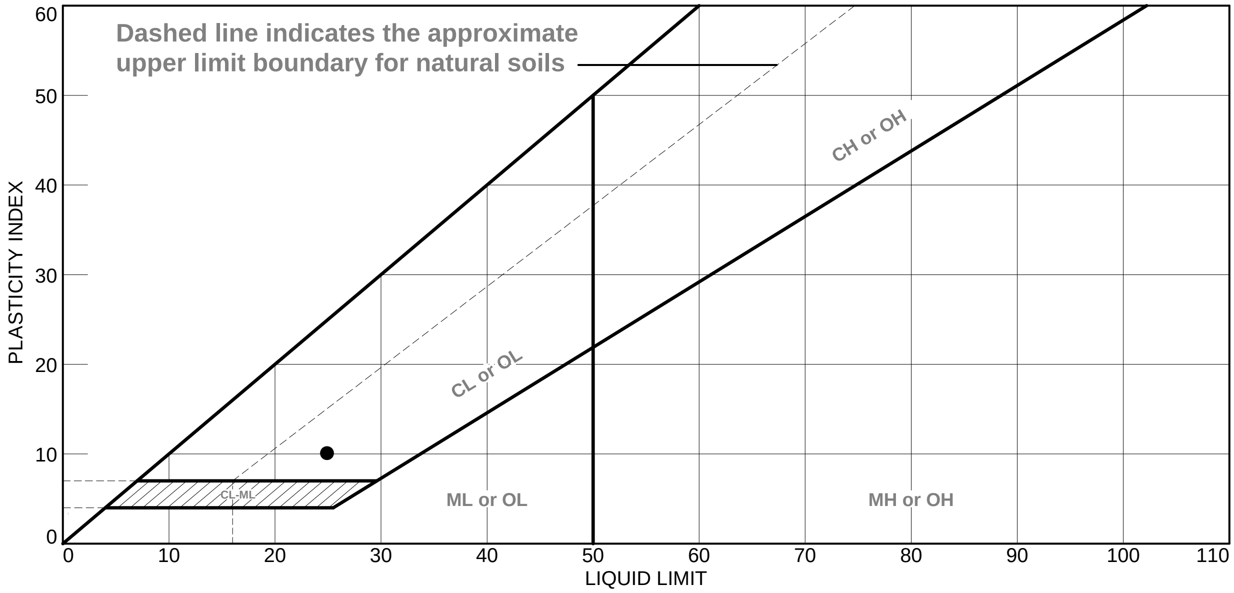
Cranston, RI

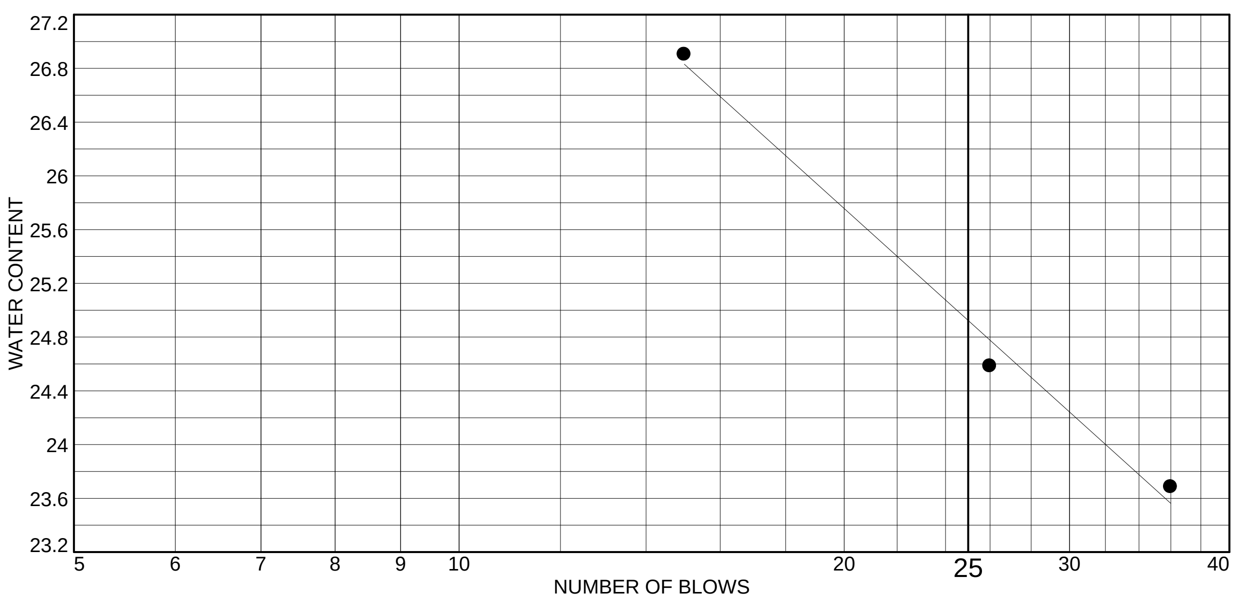
Remarks:

Figure L1

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT & CLAY	25	15	10			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 6 to 8'

Sample Number: T-46 S-4

Thielsch Engineering Inc.

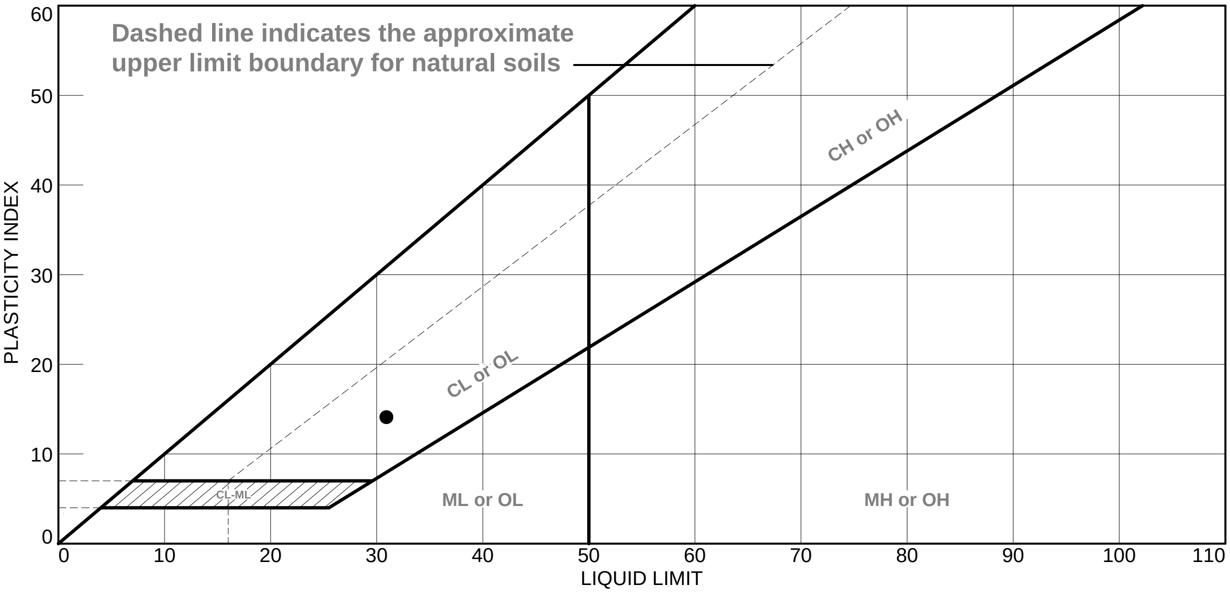
Cranston, RI

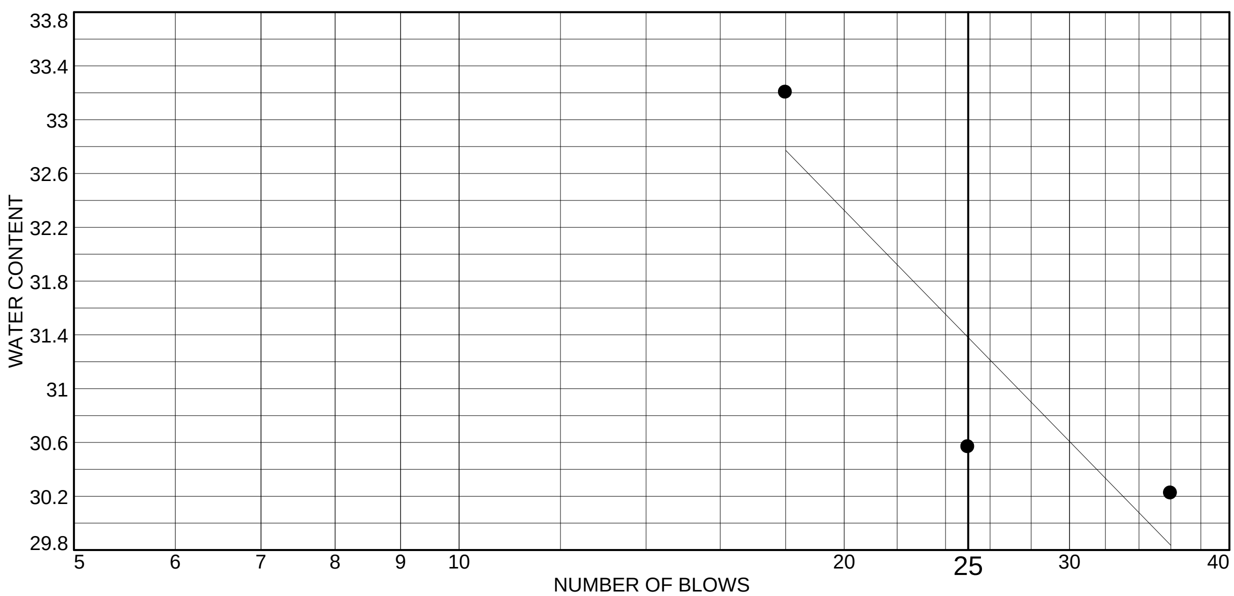
Remarks:

Figure L4

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Brown CLAY & SILT	31	17	14			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 10 to 12'

Sample Number: T-80 S-6

Remarks:

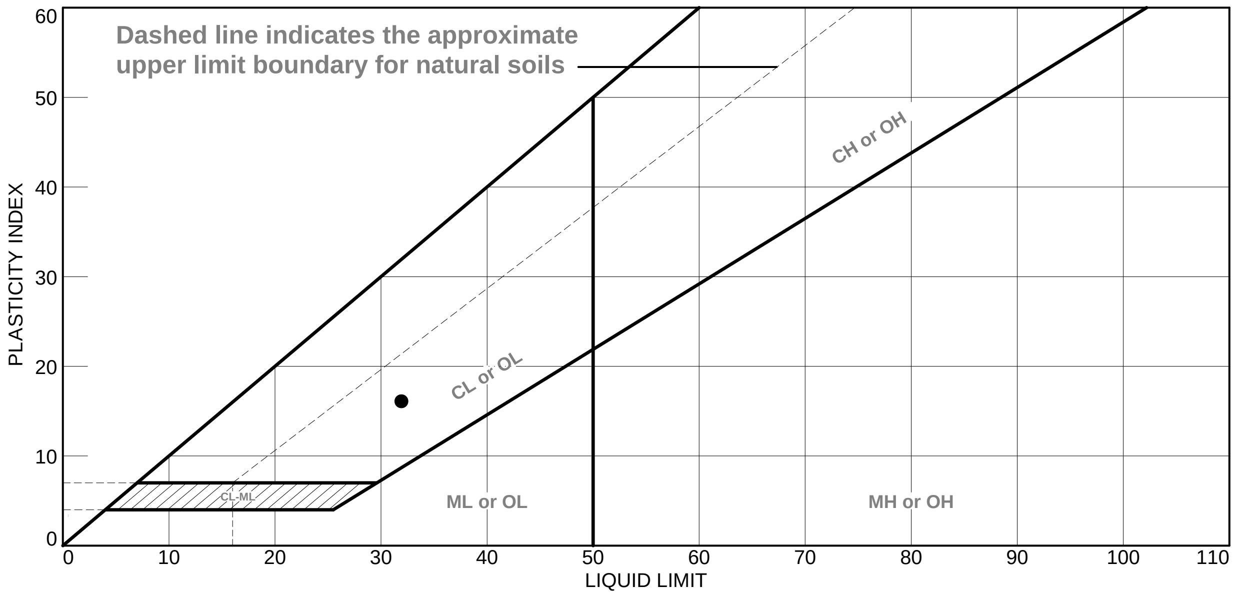
Thielsch Engineering Inc.

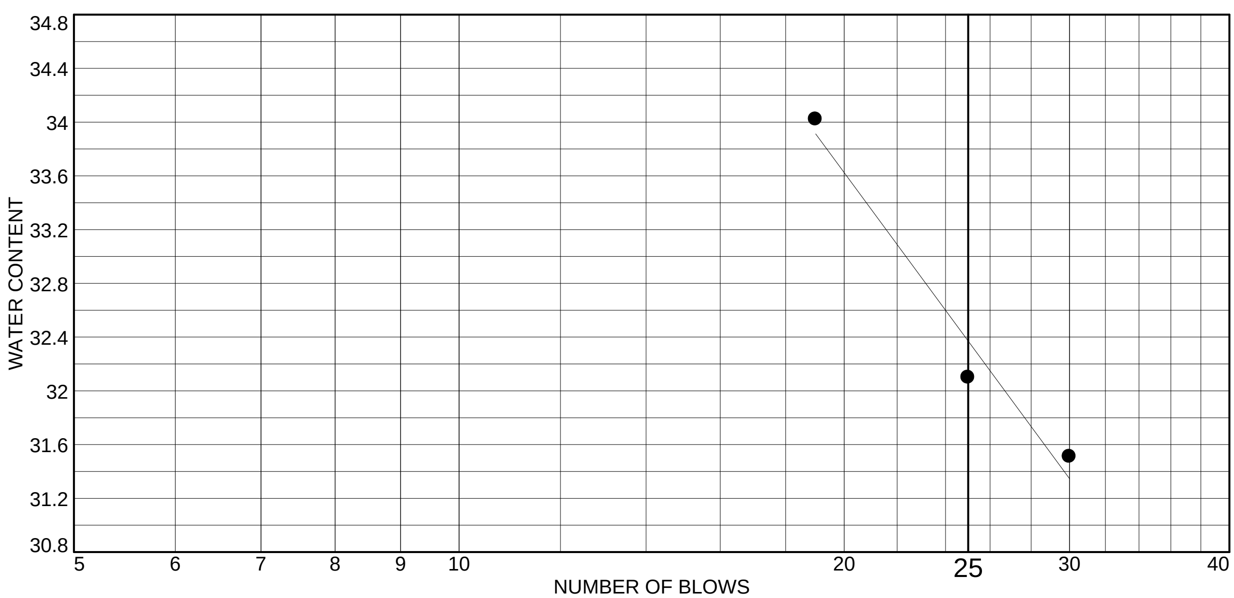
Cranston, RI

Figure L10

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Brown CLAY & SILT	32	16	16			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 13 to 15'

Sample Number: T-41 S-6

Thielsch Engineering Inc.

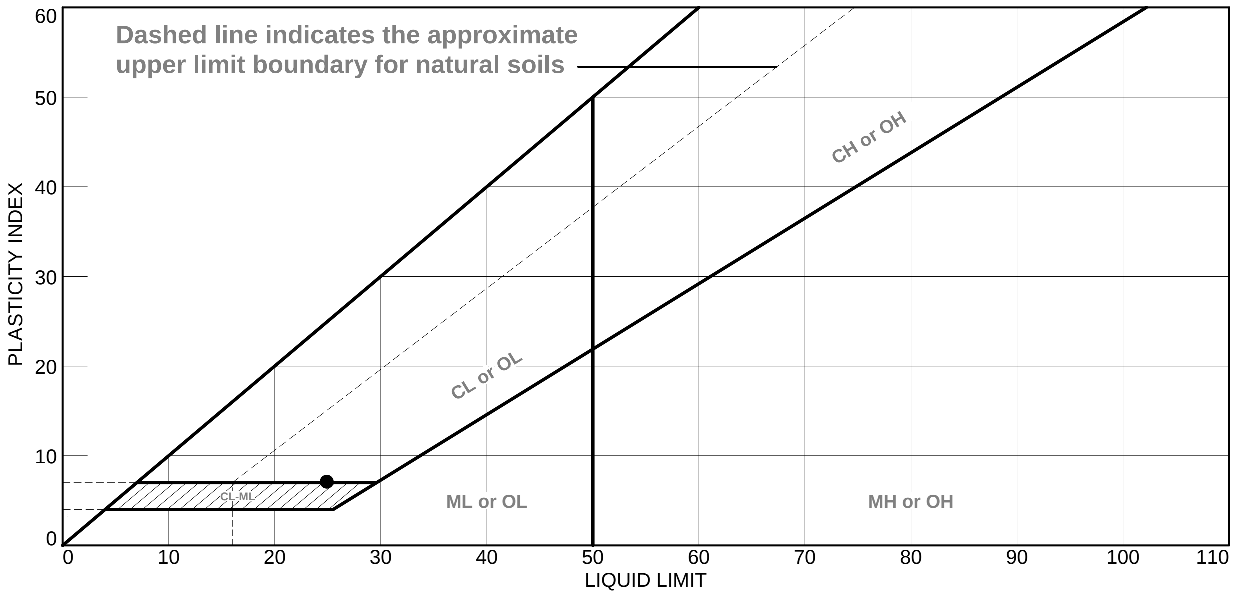
Cranston, RI

Remarks:

Figure L14

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Brown SILT & CLAY	25	18	7			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 2 to 4'

Sample Number: T-112 S-2

Thielsch Engineering Inc.

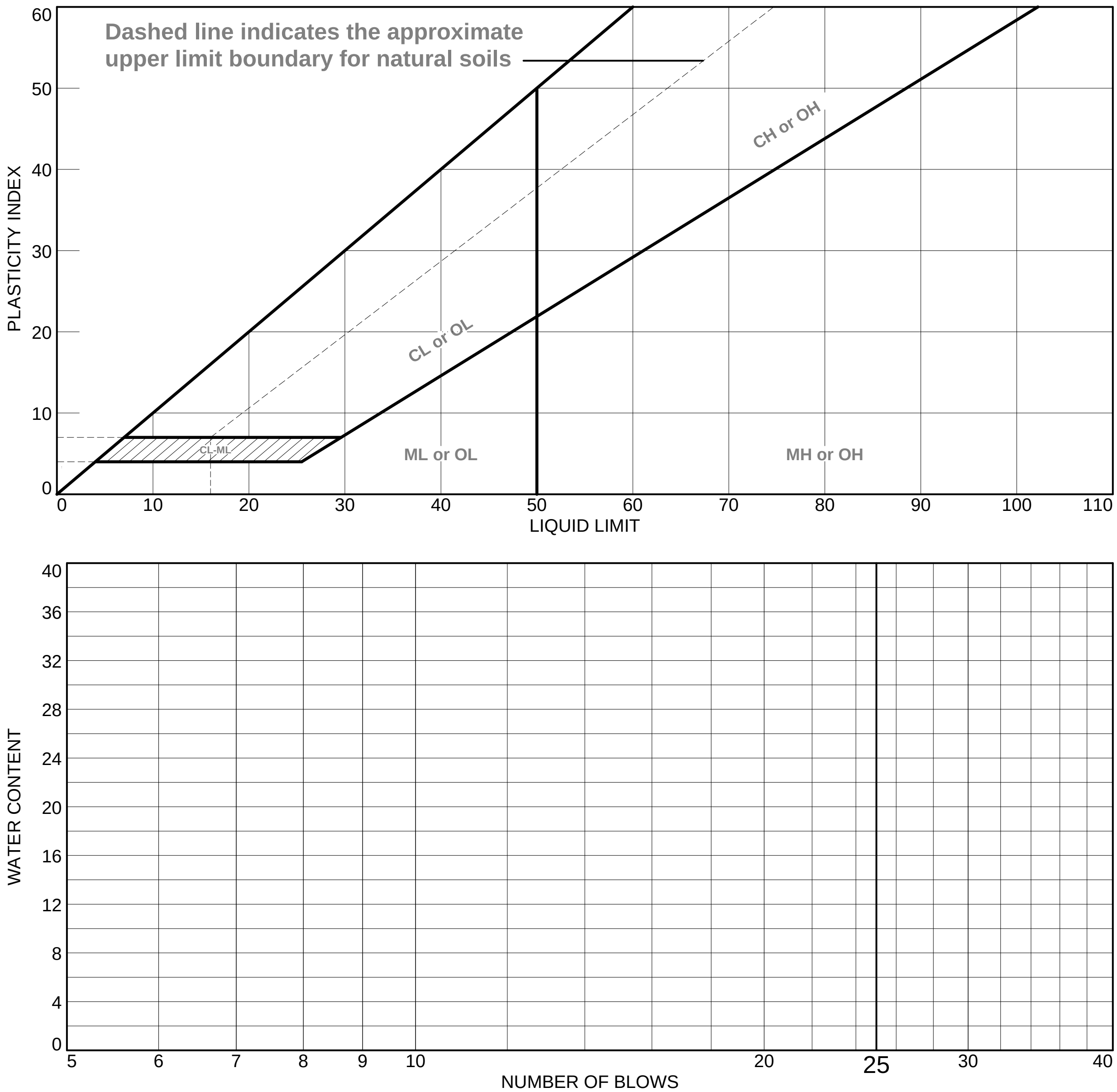
Cranston, RI

Remarks:

Figure L15

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT	NV	NP	NP			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 0 to 2'

Sample Number: T-23 S-1

Thielsch Engineering Inc.

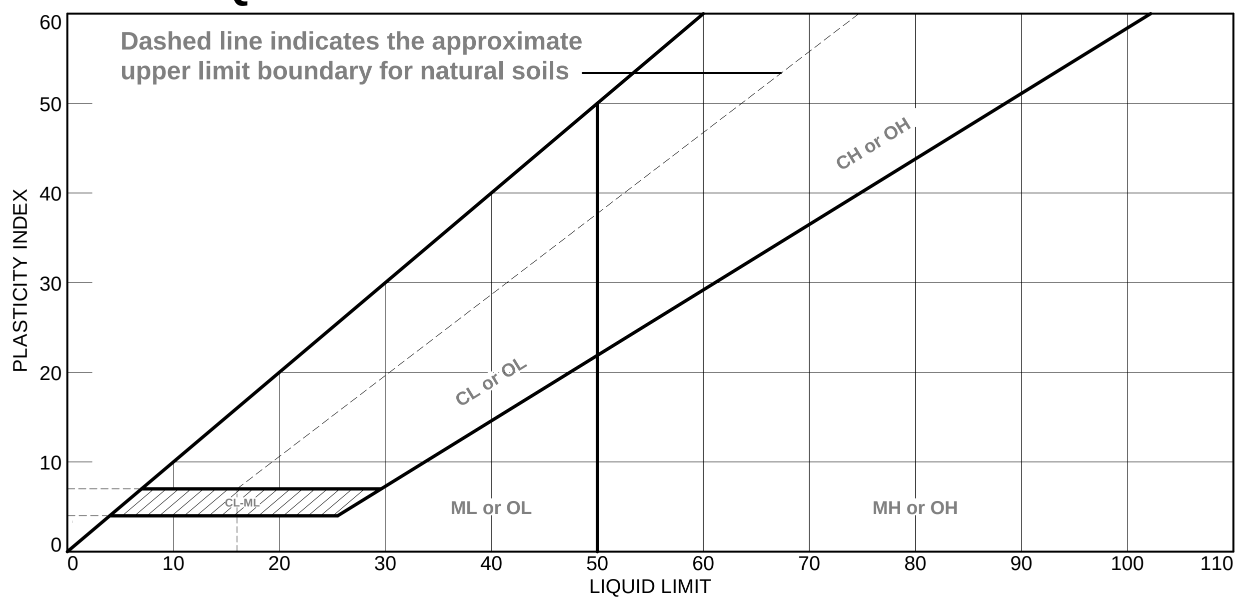
Cranston, RI

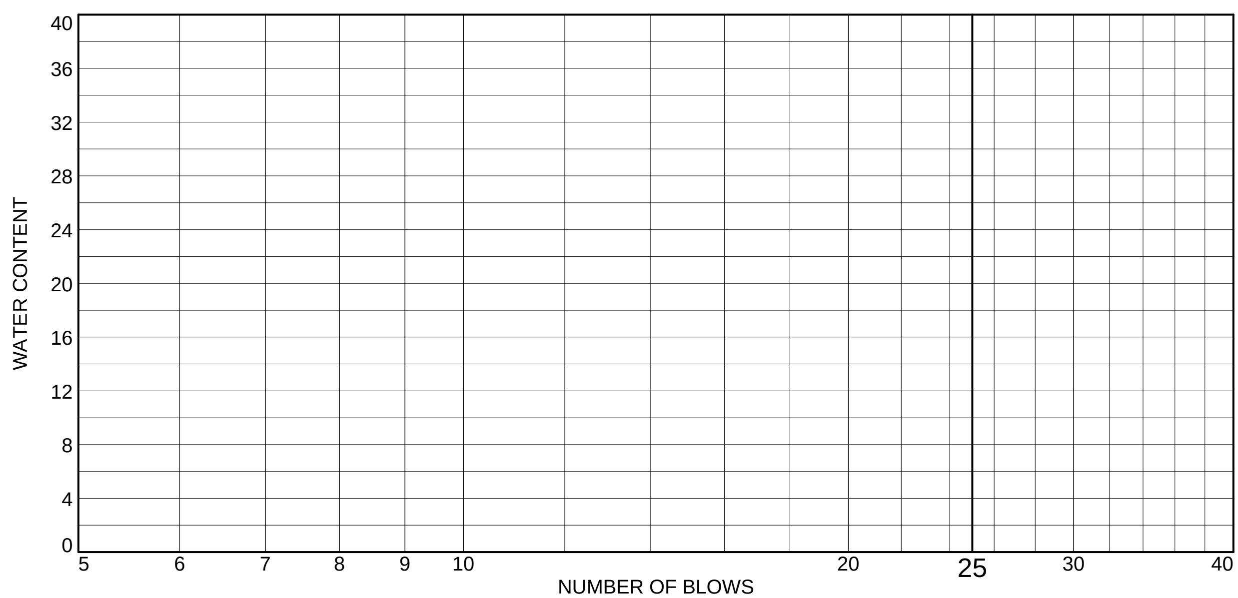
Remarks:

Figure L17

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT	NV	NP	NP			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 6 to 8'

Sample Number: T-109 S-4

Thielsch Engineering Inc.

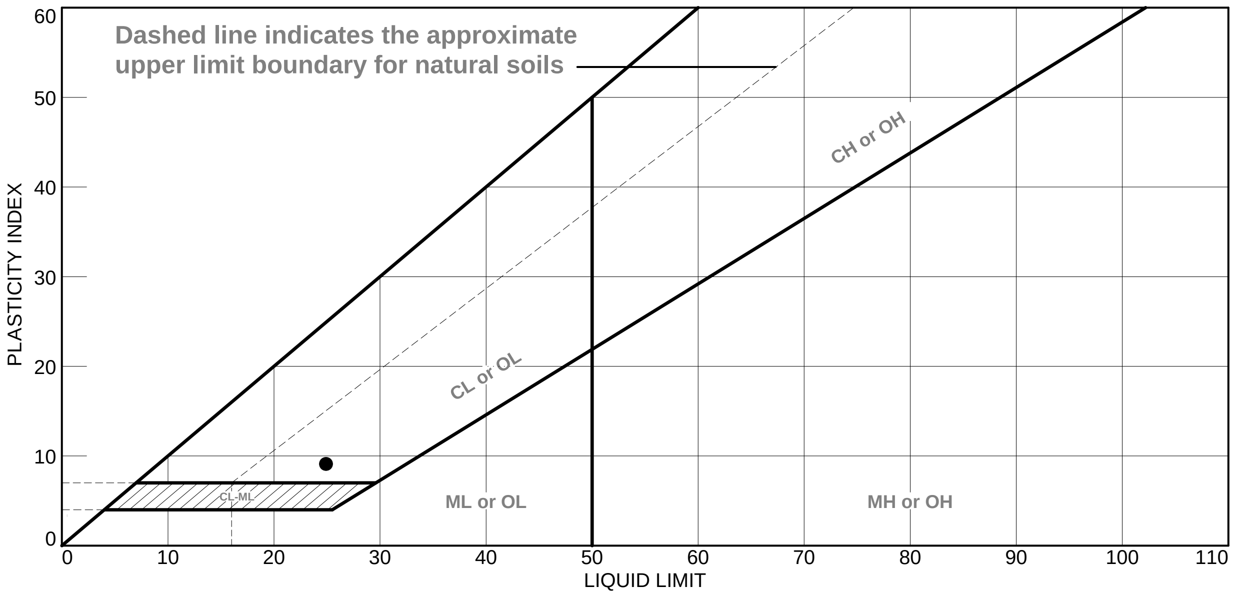
Cranston, RI

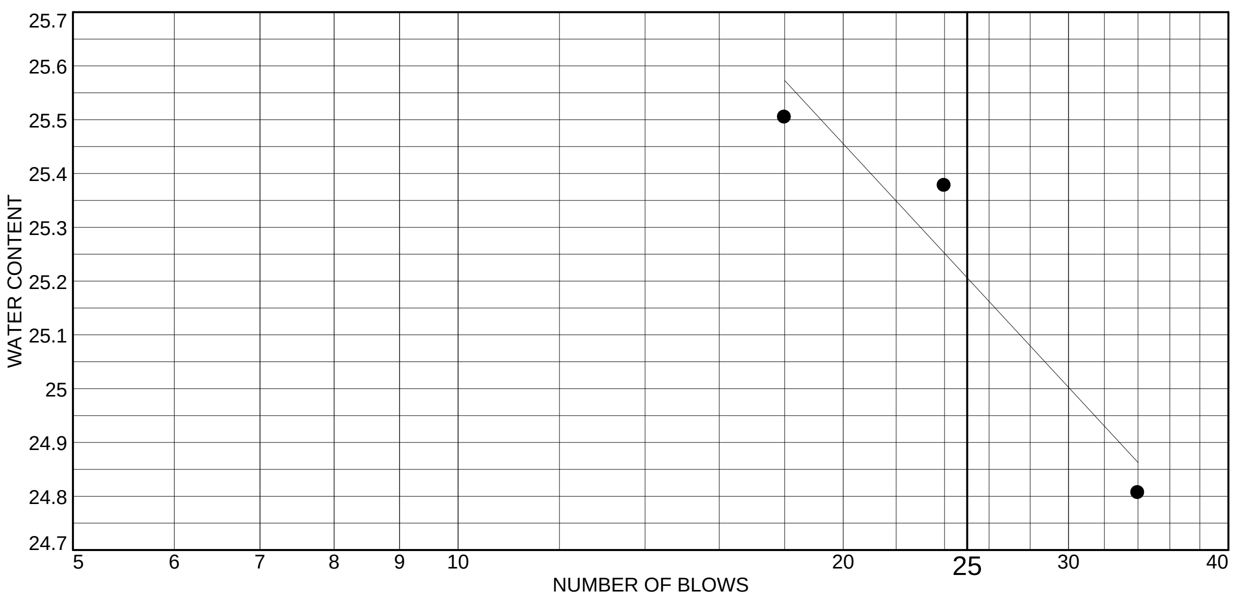
Remarks:

Figure L18

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT & CLAY	25	16	9			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 8 to 10'

Sample Number: T-3 S-5

Thielsch Engineering Inc.

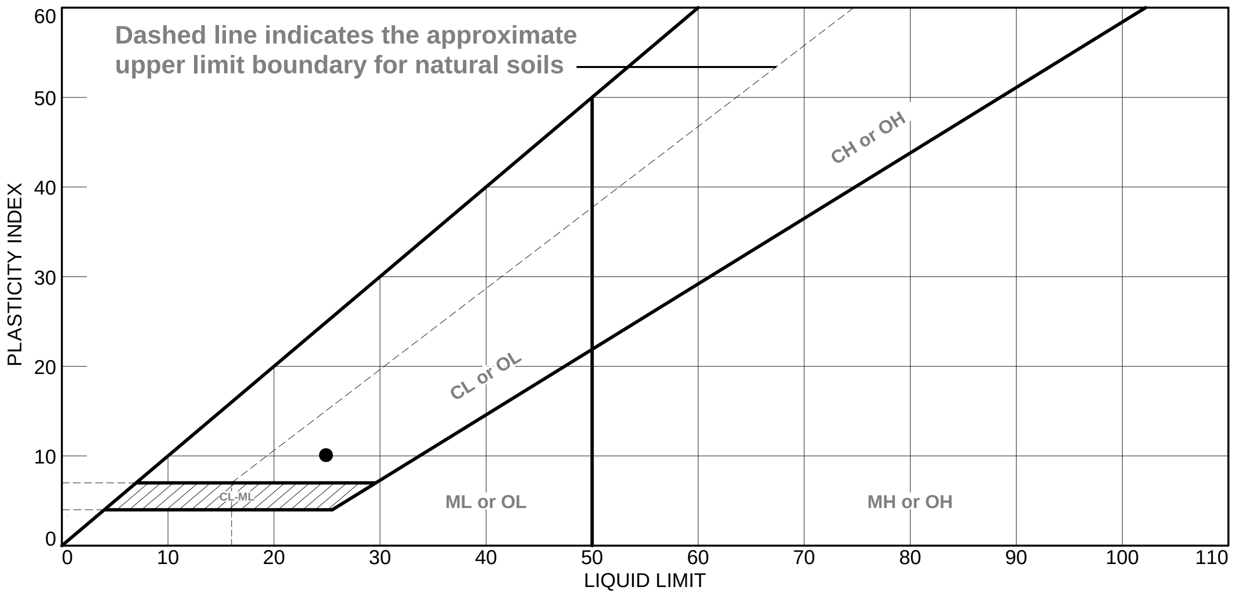
Cranston, RI

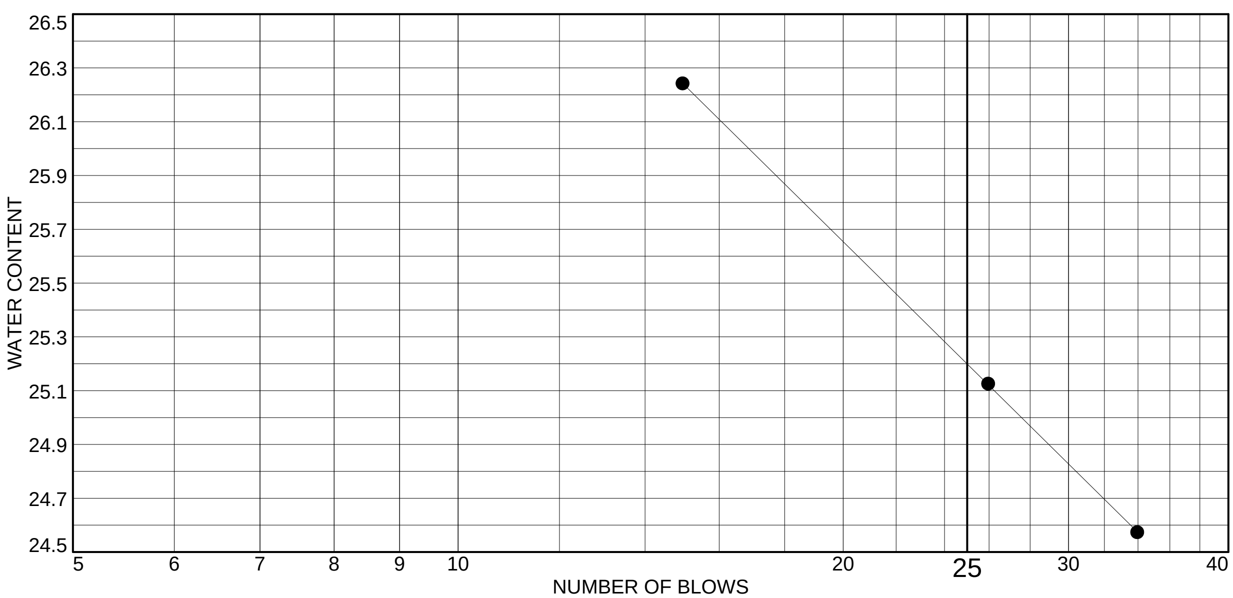
Remarks:

Figure L21

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT & CLAY	25	15	10			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 4 to 6'

Sample Number: T-88 S-3

Thielsch Engineering Inc.

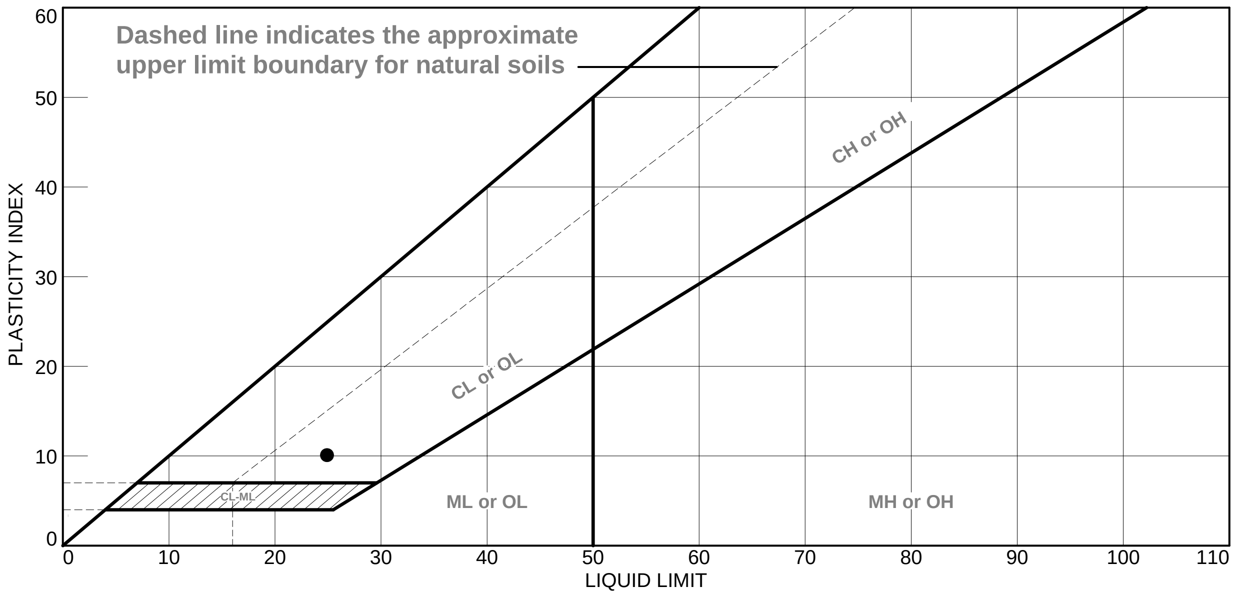
Cranston, RI

Remarks:

Figure L22

Tested By: IA **Checked By:** Matthew Colman, P.E.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SILT & CLAY	25	15	10			

Project No. 21.0056796.00 **Client:** GZA GeoEnvironmental

Project: Baron Wind Project

Steuben County, NY

Source of Sample: Borings **Depth:** 4 to 6'

Sample Number: T-116 S-3

Thielsch Engineering Inc.

Cranston, RI

Remarks:

Figure L24

Tested By: IA **Checked By:** Matthew Colman, P.E.