RESTORATION PLAN

Wetland Restoration Plan

Glenmere Lake Property
Town Of Chester, Orange County, NY
(Site Registry No. 336071)

Prepared for

D&B Engineers & Architects, P.C.

Prepared by

EcoLogic LLC

Cazenovia, NY

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Table of Contents

List of Tables

List of Figures

1. Background, Goals and Objectives

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH) issued a Record of Decision in March 2011 selecting a remedy for the Glenmere Lake Property located in the Town of Chester, Orange County, NY. The remedial design for this remedy was contracted to D&B Engineers & Architects, P.C. (D&B). D&B retained EcoLogic LLC. (EcoLogic) to prepare this wetland restoration plan, the purpose of which is to provide guidance for restoration of the wetland areas impacted by the selected remedy.

1.1. Background

The Glenmere Lake Property (The Property) is an approximately 9.9-acre site owned by Orange County, located in a rural portion of Orange County at the north end of Glenmere Lake, southeast of the intersection of Glenmere Avenue Extension and Pine Hill Road in the Town of Chester (Figure 1). Glenmere Lake is contained within a 2.5 square mile watershed within the Towns of Warwick and Chester, and the Village of Florida in New York State.

1.1.1. Site Description

Glenmere Lake serves the Village of Florida as a sole source of public water, and as a recreational resource for fishing, non-motorized boating, bird hunting, and passive recreation. The Lake provides habitat for many plant and animal species, including the endangered northern cricket frog (*Acris crepitans*). The NYSDEC recognizes the population of this frog at Glenmere Lake as the largest known population in New York State. (Milone & MacBroom, Inc., 12/2011, revised 02/2012)

A Fish and Wildlife Impact Analysis (FWIA) was conducted in October of 2008 (D&B, 2009). The FWIA concluded that the upland and near shore area of The Property provide important - and perhaps critical - habitat to the New York State endangered northern cricket frog for all phases of its life cycle with vernal ponds and wintering rock edges. The FWIA also stated that while a Spring 2008 drift fence survey confirmed the northern cricket frog does not use the dilapidated buildings as overwintering sites (hibernacula), this species does utilize portions of The Property's habitat. According to the Responsiveness Summary in the ROD (Response 1), the report titled "*Results of a Northern Cricket Frog Drift Fence Survey at Glenmere Lake*" (October 2008) identifies specific locations where these frogs were observed. In general, the frog potentially utilizes upland areas within several hundred feet of the lakeshore (NYSDEC Division of Environmental Remediation, March 2011).

A wetland delineation was conducted at The Property in October 2012. One area, labeled as "Wetland A" (Figure 2), was described as:

> *"…a mixture of low growth herbaceous ground cover on saturated soils south of the buildings with red maple trees spotted. Near flag A6 is an*

> *area of cattails covering approximately 200 square feet. At flag A9, a distinct boundary is created by a large rock pile and a large red maple with a truck diameter over five feet. From this point to the wetland terminus, the area between the shoreline edge and the wetland edge is characterized by a mix of small trees and low growth vegetation with some larger trees mixed in. This is the largest wetland on the property covering approximately 5,000 square feet."* (Sperry, 2012)

During the vegetation survey of September 2013, EcoLogic staff observed that The Property was fenced and vacant. There were remnants of seven buildings on The Property, in various states of deterioration. In addition to the dilapidated structures, there were wooded areas, open meadow, and wetlands fringing along the shoreline of Glenmere Lake (Figure 3).

1.1.2. Regulated Wetlands

On-line resources reviewed for regulated wetland information include both the US Fish and Wildlife Service National Wetlands Inventory (Figure 4) and the NYSDEC Environmental Resource Mapper (Figure 5). Glenmere Lake is a regulated water body identified by the National Wetlands Inventory by classification code L1UBHh. This code indicates the lake is a Lacustrine (L) system and a limnetic (1) subsystem with an unconsolidated bottom (UB) and a permanently flooded water regime (H) and is diked/impounded (h). In New York State, Glenmere Lake is a Class AA water body, and is utilized as a drinking water source for the Village of Florida.

1.1.3. Site Remediation

A remedial investigation conducted at The Property identified soil and sediment contamination by metals. The primary contaminants of concern identified were lead and arsenic in soils, and lead in sediments; the areas where these contaminants exceeded the Soil Cleanup Objectives coincided with the areas where other metals were detected at levels exceeding Soil Cleanup Objectives. In addition, an Interim Remedial Measure was implemented to remove underground storage tanks and associated petroleum-contaminated soils.

A Record of Decision, issued in March 2011 by the NYSDEC in consultation with the New York State Department of Health (NYSDOH), selected a remedy to restore The Property. The selected remedy involves removing what is left of the dilapidated structures, excavating and disposing of contaminated soils and sediments off-site, and restoring the excavated areas to pre-excavation conditions.

As a result of this remediation, approximately 8,715 square feet of wetland will be impacted along the shoreline of Glenmere Lake. The remedy described in the ROD specifies "removal (excavation or dredging) and off-site disposal of contaminated

sediments from the small embayment to the southeast of the remnants of Buildings 1 through 7, in the vicinity of sediment samples SED-4 and SED-5", which is not expected to extend more than 40 ft off-shore into Glenmere Lake. In addition, "excavated sediments will be replaced with an appropriate substrate and the area restored to pre-excavation contours. Disturbed areas will be re-vegetated with locally native nursery stock and/or by stockpiling and re-planting rhizomes."(NYSDEC Division of Environmental Remediation, March 2011)

In addition, due to the presence of the endangered northern cricket frog (*Acris crepitans*), the ROD states efforts will be made to reduce potential impacts to northern cricket frogs and their habitat during construction, and to maximize the value of cricket frog habitat during restoration. The ROD also specifies that all restored areas will be inspected for a period of at least one year following the Department's determination of substantial completion of the site remediation. These inspections will evaluate the restored areas for erosion, settlement and growth of plantings and grass.(NYSDEC Division of Environmental Remediation, March 2011)

1.2. Goals

The goal for this wetland restoration project are two-fold: first, to mitigate the impacts of the remedial actions on the wetland area; and second, to maximize the value of cricket frog habitat during restoration.

The first goal is to mitigate the impacts to the wetland on The Property resulting from the remedial activities. The mitigation will restore the disturbed areas of the wetland to pre-disturbance conditions by restoring the site topography and vegetative cover. Site topography will be restored by using soils comparable in nature to the soils removed, while vegetation will be restored using species native to the area, preferably species that were present at The Property prior to disturbance. The restored vegetative community should also have a similar community structure to the pre-disturbance conditions. By restoring The Property to pre-disturbance conditions, the existing functions and values of this wetland area will be preserved. The wetland presently provides a littoral habitat for wildlife utilizing the resources of both Glenmere Lake and the surrounding upland.

The second goal, pursuant to the ROD, is to maximize the value of northern cricket frog habitat during restoration. One of the critical resources within Glenmere Lake, the northern cricket frog is listed as endangered within the state of New York. The northern cricket frog is a small species of tree frog that prefers the margins of slow moving waterbodies including lakes, ponds, and rivers and overwinters in adjacent upland areas. They are often found living in the same habitat as American bullfrogs, American toads, green frogs and spring peepers (Milone & MacBroom, Inc., 12/2011, revised 02/2012). The northern cricket frog prefers habitat characterized by abundant emergent vegetation on sunny, gently sloping, muddy banks with a

minimum of woody growth and over-story vegetation, according to several sources (refer to (PUB-ER-666, 2010) and (NYSDEC, 2013)).

1.3. Performance Standards

Quantitative measures of success for this wetland restoration will be defined by the pre- and post-excavation conditions of the hydrology, soils, and vegetation. The restoration of this wetland will be considered successful if the hydrologic, soils, and vegetative measures defined below and in Table 1 are met. Cases where the performance standards are not met will be documented and corrective actions will be proposed.

1.3.1. Hydrology

For the restoration of the wetland to be considered a success, the major features of the existing hydrologic regime must be maintained. There are two factors to consider:

1. Changes in groundwater elevation and surface water hydrology relative to lake level.

2. Changes in groundwater and surface water hydrology at each monitoring point relative to baseline.

The hydrology of the impacted wetland area is strongly influenced by the water level of Glenmere Lake. Glenmere Lake is impounded by a dam and spillway located at the northern end of the lake, and is the primary water source for the Village of Florida. Based on information gathered for the Watershed Management Plan (Milone & MacBroom, Inc., 12/2011, revised 02/2012), several important factors were noted:

- A rule curve, established in 2000 to clarify a safe yield for potential withdrawals from the lake, defined a maximum allowable drawdown to elevation of 529.7 feet to preserve water for aquatic life.
- An earthen dam impounding the lake has a reported crest elevation of 535 feet; the spillway elevation was reported at 533.5 feet with flashboards and between 532.5 and 533.3 feet without flashboards.

These data would indicate that the lake level could range in elevation between a minimum of 529.7 ft msl and a maximum of 535 ft msl, a difference of 5.3 feet between lowest and highest elevations of the lake. These minimum/maximum values would most likely occur under extreme conditions of severe drought or excessive flooding. The Watershed Management Plan for Glenmere Lake cites a Village of Florida Comprehensive Plan, which stated that the lake level has never dropped more than two feet (Milone & MacBroom, Inc., 12/2011, revised 02/2012). According to D&B, Glenmere Lake is typically around 531 ft msl (Anthony Caniano personal communication, October 23, 2013). Based on this anecdotal information, it is

assumed for the purpose of this report that the lake level will most typically have an elevation between 530 and 532 ft msl.

Given the strong influence of the lake level on the ground and surface water elevations in the wetland, and the baseline measurements, it is anticipated that the groundwater elevation in the wetland area will be within ±6 inches of the lake elevation. This relationship is estimated using one round of groundwater elevation data collected on October 25, 2013 (see Section 3.1.2). Additional rounds of groundwater and lake elevation data will be gathered during the summer of 2014, and will be used to refine this relationship to provide a more accurate assessment of how elevation changes in the lake influence groundwater elevations in the wetland.

At each monitoring point, given the potential for lake level fluctuation between 530 and 532 ft msl, it is reasonable to expect that the groundwater in the restored wetland and at the control point would fall within ±12 inches of the baseline measurements.

1.3.2. Soils

The impacted soils in the wetland will be excavated, and fill material used as needed to restore the excavated areas to original grade. The fill material used at The Property will be selected to match closely with the native hydric soil, using grain size, organic carbon content, bulk density, permeability, pH, redox potential, and nutrients (nitrogen and phosphorus) of the native material as guidance in selecting fill material (see Section 3.2).

To evaluate the success of the fill material in replacing the native material, soil sample results in the restored areas post-excavation will be compared both with pre-excavation soil measurements, and measurements of soils in adjacent, undisturbed areas. Measured characteristics of organic carbon content, pH, redox potential, and nutrients in the restored areas should fall within the specified range (see Section 4.2) of measurements taken as baseline.

In addition, visual observations of the presence or absence of hydric soil characteristics (gleying, mottling, oxidized rhizospheres, hue, value and chroma) will be made over time to evaluate both the performance of the fill material and the presence of the appropriate hydrologic regime in the restored areas. Hydric soil characteristics will take time to develop, therefore the absence of these characteristics in restored areas over the short term (e.g. 1 to 3 years) will not be indicative of restoration failure.

1.3.3. Vegetation

Restoration of vegetation is a long-term process, particularly when it comes to restoring a forest canopy. In the wetland area to be impacted, there were few trees, and these were predominantly black (or crack) willow. At the time of the site visit in September 2013, a NYSDEC representative told EcoLogic staff that trees greater than a certain diameter would be left in place during remediation. Therefore, it is assumed that the sparse tree canopy would remain intact.

In the wetland area, shrubs and herbaceous plants will be planted in an effort to speed development of vegetative cover. Much of the herbaceous vegetation will also be allowed to naturally colonize the disturbed areas from the adjacent, undisturbed areas.

Success of vegetation restoration will be measured in terms of the community structure of the disturbed areas compared with the baseline observations and adjacent undisturbed (control) areas. The community structure should be similar in the disturbed areas as compared with the baseline, given allowances for successional stages of growth that will occur. The comparison will include overall percent cover, species composition, vegetation stratification, and photographic documentation, as well as the presence or absence of invasive species (Table 1).

An approvable Invasive Species Management Plan (ISMP) will be developed for this restoration. The ISMP will identify the undesirable species present on-site as well as those which may potentially invade the Property. Resources for invasive species lists include NYSDEC, the Cornell University Ecology and Mangement of Invasive Plants Program, and the New York Invasive Species Clearinghouse. Control measures to eliminate the target species from restored areas will also be defined. The plan will be implemented during the restoration and post-excavation monitoring periods.

1.4. Timeframe

The timeframe for this restoration project extends from development of an approvable workplan to the end of post-restoration monitoring. Table 2 summarizes the timeframe. The starting date for this project will depend on the contract timing and overall project schedule.

The ROD for the project provides some guidance on the seasonal timing of the work based on limiting the potential impact to the northern cricket frog. Specifically:

> "*As a result of the presence of the northern cricket frog (NCF) at the site and in Glenmere Lake, remediation will be limited to certain times of year to limit the impact to the NCF and the near-shore habitat in Glenmere Lake. Since the NCF is an endangered species, remediation must be conducted so as to prevent "takes" of NCFs, as defined by 6 NYCRR Part 182. For the on-site area, remediation can*

> *occur during the winter and summer months. The time available for remediation in the summer will be enough time to implement the on-site remedy. Allowable seasons for removal of lake sediments will need to be determined so as to minimize the potential impact to the NCFs and the near-shore habitat."* (NYSDEC Division of Environmental Remediation, March 2011)

Based on communication with D&B (November 25, 2013), the NYSDEC prefers a summer window (June 1 to August 15) for the upland remediation work, and a winter window (December 1 to February 15) for the wetland/lake remediation work. This approach is compatible with the expected use of different areas of The Property by the northern cricket frog in different seasons.

According to one source, the northern cricket frog is most active from mid-spring to late fall. Breeding occurs from late May through mid-August. Eggs are attached to vegetation at the shoreline and in water up to 1 m deep. Eggs hatch in several days, and the larvae complete metamorphosis in five to 10 weeks between mid-July and mid-September. (Wisconsin Department of Natural Resources, 2010). The active season for the northern cricket frog is the least desirable time for conducting remedial work in the wetland area, as this can disrupt the reproductive cycle and destroy eggs.

Sources indicate that the frogs overwinter at or above the water level, and in a location where they can avoid freezing (Wisconsin Department of Natural Resources, 2010). If the frogs are overwintering at The Property above the water level, their hibernacula may be in the upland portions of the remediation area, and the frogs may not be present in the wetland area. Therefore, wintertime appears to be the best season for conducting the remedial efforts in the wetland area of The Property.

The preferable time for planting herbaceous wetland plants in the remediation area is in the Spring, after the threat of frost has passed. In the region where Glenmere Lake is located, the last spring frost typically occurs between April 30 and May 10; the last spring frost dates across New York State are shown in Figure 6 (Department of Horticulture, Cornell University, 2013). Springtime planting will allow the plants a full growing season to become established. Shrubs are generally available year-round in containers, and bare-rooted in winter and early spring. The options for selecting container-grown versus bare-rooted stock are discussed in Section 4.4.4.

Given the NYSDEC's preferred timing of remediation work on The Property, it is anticipated that the upland area of The Property will be remediated during the summer of 2014, and the wetland area during the winter of 2014/2015. Restoration of the wetland vegetation should therefore occur in the spring of 2015, with the option for re-seeding grasses in the fall.

1.4.1. Work Plan Development

An approvable work plan will be developed, submitted, and approved prior to commencing work activities on The Property.

1.4.2. Pre-excavation Activities

During the pre-excavation phase, piezometers were installed, four sampling sites were established, and baseline sampling in the wetland was implemented (See Section 3). Photographs documenting the Property conditions were also taken as part of the vegetation survey (EcoLogic, LLC, September 2013).

During the pre-excavation phase, sources for fill material and native plant stock will be identified. Fill material will be selected based on the analytical results from the baseline soil samples. The schedule for purchase and delivery of materials will be detailed concurrent with the excavation schedule. The Invasive Species Management Plan will be developed.

1.4.3. Excavation Activities

During the excavation phase, plant materials will be removed from the wetland areas to be excavated and mulched for disposal off-site, unless otherwise directed by the NYSDEC. Soils will be excavated and disposed of off-site. Samples from the excavation areas will be tested to evaluate whether further excavation is required. Where needed, excavation will continue until the samples meet remedial action objectives, unless otherwise directed by NYSDEC. Refer to the project remediation work plan for information about soil erosion and dewatering controls.

It is recommended that large logs be left in place, if possible, to enhance the habitat value for the northern cricket frog (see Section 1.4.4).

Once excavation in an area has been completed, restoration should begin as soon as feasible.

1.4.4. Post-excavation/Restoration Activities

The restoration phase will begin with applying fill material as specified in the work plan, and grading The Property to pre-excavation elevations. Compaction of the fill will be sufficient to remove air pockets, but must not be too tightly compacted. If the material is too tightly compacted, plant roots will have difficulty becoming established.

As specified in the ROD, it is desirable to maximize the restored habitat for the northern cricket frog. The resources reviewed concerning ideal habitat for the northern cricket frog cited several components to consider; in addition to emergent

vegetation, overwintering habitat is important. Sources indicate that the frogs overwinter at or above the water level, and in a location where they can avoid freezing. Hibernacula include shoreline cracks and crevices, under logs, among leaves, beneath vegetation masses, and burrowed into gravel at depths of 20-36 cm (Wisconsin Department of Natural Resources, 2010).

Since overwintering habitat is important, it is recommended that the restoration of the topography include logs that would provide hibernacula for the frogs. During the vegetation survey (EcoLogic, LLC, September 2013), one large log was documented in the wetland between Zones C and D. If this log needs to be removed during remediation, a suitable replacement should be brought in.

Once the fill is in place, shrubs and herbaceous plants will be planted. Photographs will be taken to document the restoration activities. An As-Built Report will be written to document the final grade, water levels, and corrective actions taken during construction.

1.4.5. Post-restoration Monitoring

As defined in the ROD, all restored areas will be inspected for a period of at least one year following the Department's determination of substantial completion of the site remediation by the contractor (NYSDEC Division of Environmental Remediation, March 2011). During this time, the restored areas will be inspected for erosion, settlement and growth of plantings and grass.

To evaluate whether the wetland has been restored to pre-existing conditions, a monitoring program extending over five growing seasons past the completion of restoration is recommended. Monitoring will include evaluation of hydrology, soils and vegetation. The objective of post-restoration monitoring is to gather observations sufficiently detailed to verify whether the restored wetland areas are comparable with the baseline measurements and adjacent undisturbed (control) areas.

If post-restoration monitoring results indicate that the restoration is not meeting the performance standards after three growing seasons (for example, invasive species have flourished), corrective actions will be taken and the monitoring period extended to verify that the corrective actions have been successful.

The minimum post-restoration monitoring period recommended under this plan would last for five growing seasons, unless otherwise directed by the NYSDEC. It is anticipated that post-restoration monitoring years 2 through 5 would be included as part of the Site Management plan for this site.

2. Quality Control Documentation

During the restoration process, there will undoubtedly be site conditions not anticipated in this plan, and changes will be required. As part of this restoration project, the procedures to document adjustments made to the restoration plan during construction will be defined. These procedures may include mechanisms such as memoranda to file or periodic status reports to the NYSDEC.

3. Baseline Measurements

Prior to disturbance, measurements of the baseline conditions of the wetland were gathered for comparison with post-restoration conditions. These measurements included ground elevation, hydrology, soils and vegetation in the areas that will be excavated as well as in an area that will remain undisturbed. These baseline data provide a benchmark against which the wetland restoration can be assessed.

To gather baseline measurements for hydrology, soils and vegetation, four sampling sites were established: three in the areas to be excavated and one as a control in an area that will remain undisturbed (Figure 7). These sampling sites will be used for both pre-excavation baseline measurements and post-excavation monitoring.

3.1. Hydrology

3.1.1. Rationale for baseline measurements of hydrology

Baseline measurements for hydrology should include both groundwater and surface water elevations. Ideally, measurements would be collected for 12 months prior to excavation to establish year-round baseline hydrologic conditions and characterize seasonal variation in the extent and duration of flooding in the wetland. As a second choice, should the project remediation schedule preclude a baseline monitoring period of this duration, a minimum of three measurements collected during one growing season (May, July and September, for example) would also be acceptable. If the pre-excavation hydrologic monitoring period is unusual (extreme drought or extreme wet conditions), justification for the use of these extreme conditions data for baseline measurements will be documented.

The rationale for collecting baseline data during the growing season – rather than any other time of the year - is to develop a benchmark to evaluate whether significant changes in the hydrology occur once the vegetative canopy has been removed. During the growing season, the canopy impacts the hydrologic regime in three ways:

- providing shade which can moderate soil temperatures and reduce evaporation of moisture from the soil
- providing surface area for transpiring moisture that the plants draw from the soil
- intercepting rainfall, which evaporates from the leaves rather than reaching the soil.

Removing the vegetative canopy will likely change the evapotranspiration balance in the excavated areas to some degree; without a pre-excavation benchmark for comparison, it will not be possible to evaluate if this change has a significant impact on the hydrology and the success of the restoration effort.

Based on the NYSDEC's preferred scheduling of the remediation work, as defined in Section 1.4, it is anticipated that the D&B staff will be present on-site frequently during the summer months of 2014 prior to the winter remediation of the wetland in 2014-2015. It should therefore be possible for D&B staff, or other designated subcontractors, to take additional hydrologic measurements during the growing season at the four piezometers installed on The Property, as well as recording the lake level at the dam.

3.1.2. Baseline measurements

Baseline groundwater elevations were measured using three piezometers installed in the restoration area of the wetland, and one piezometer located in the control area (Figure 7). Measurements of lake level elevation were collected from the location at the earthen dam.

The excavation in "Wetland A" on the Property is not likely to significantly impact the existing hydrologic regime of the area, since the hydrology of this wetland is strongly influenced by the elevation level of the lake. Note that the elevation of the lake (530.81 ft msl) is within half a foot of the groundwater measurements taken in the piezometers (Table 3). As more data is collected, the relationship between changes in lake level and groundwater elevation in this area will become more apparent.

Based on the groundwater elevations collected on October 25, 2013 (Table 3), the excavation of six inches of soil during remediation will likely not intercept the groundwater in the vicinity of PZ-1 or PZ-2, the locations furthest from the lake shore. Depending on the lake elevation at the time of excavation, groundwater may be intercepted in the vicinity of PZ-3. As described in Section 3.1.1, additional measurements will be taken during the summer of 2014 prior to the winter remediation of the wetland area.

In the littoral zone of the lake, the depth of the excavation is anticipated to be 12 inches, and fill material will be used to restore the elevation to within six inches of the original elevation. This area is within the lake, and surface water depth will vary with lake elevation.

3.2. Soils

Baseline measurements of the native hydric soil and lake sediment were gathered in October 2013 from one wetland location and one lake location. Measurements included grain size, organic carbon content, bulk density, permeability, pH, redox potential, and nutrients (nitrogen and phosphorus). The results of these measurements are presented in Table 4. These measurements will be used both to select appropriate fill material for the excavation and for post-restoration monitoring.

3.3. Vegetation

Baseline measurements of the community structure at The Property were gathered in September 2013 (EcoLogic, LLC, September 2013) from four sampling locations in the wetland: three locations in areas to be impacted, and one location as a control in an area that will remain undisturbed (Figure 7). The results of the baseline vegetation survey are presented in Attachment 1.

Pre-excavation baseline data included percent cover overall, percent cover by vertical stratification (canopy, understory and herbaceous layers), and percent cover by species (community composition). Invasive species were not observed or documented during this survey.

4. Wetland Restoration

The wetland restoration will begin once the excavation is completed (see Section 1.4). Restoration will begin with modifying the substrate, and then the desired vegetation will be planted. It is assumed, based on available information, that excavation in the wetland areas will not exceed 6 inches, while excavations in the littoral zone will not exceed 2 ft.

According to communication between a NYSDEC representative and EcoLogic staff on-site (September 17, 2013), trees with a specific diameter will be left standing, while smaller trees will be removed. It is anticipated that the trees in the wetland area, with diameters ranging between 8 and 11 inches, will be left intact.

As noted in the Vegetation Survey (EcoLogic, LLC, September 2013), there was a large willow trunk lying horizontally across Wetland "A" at The Property, between Piezometers 2 and 3 (Figure 7). It is recommended that such structures be maintained in place - or replaced with similar features - to provide diversity in the micro-topography habitat. This will benefit the northern cricket frog as well as other species that would use the cracks and crevices as refuge.

4.1. Substrate Restoration

An "if-then" approach to restoring the topography and soils of the disturbed wetland area will be implemented, unless otherwise directed by the NYSDEC. Using an "if-then" approach, samples collected from the bottom and edges of the excavation are tested to evaluate whether the contaminated material has been removed. If concentrations of target compounds are below the remedial action objectives, then excavation is completed; otherwise, excavation continues and more samples are collected. This cycle continues until all the sample results are less than the remedial action objectives.

Where fill material is introduced, it should not be compacted too tightly, to ensure that plants are able to establish a strong root system. At the most upgradient edge of the wetland, farthest from the shoreline, the fill should not be completely level, but undulated to mimic natural micro-topography. Small hills and valleys are acceptable, if the maximum vertical distance from peak to trough is no more than 6 inches. At the water's edge, the topography is a mud flat leveled by the repeated action of the lake level rising and falling. In this area, leveling the fill material would not be detrimental.

As suggested above, structures such as downed tree trunks or logs should be left in place if possible, or replaced with similar structures, to enhance diversity of the micro-topography. Northern cricket frogs require overwintering sites such as shoreline cracks and crevices, spaces under logs and among leaves (Wisconsin Department of Natural Resources, 2010). The substrate restoration should include provisions to create these potential overwintering sites.

4.2. Selection of Fill Material

Wetlands are characterized by hydric soils, which take time to develop naturally under saturated, anaerobic conditions. The more closely the fill approximates the existing soils on-site, the more likely it is that the vegetative character of the wetland will be sustained.

There are two sources of fill material for this restoration: (1) wetland hydric soils obtained from another site, or (2) clean fill material. Since it is not known whether wetland hydric soils from another site will be available to coincide with the schedule of this project, fill material will be discussed.

The fill material selected should match the native material as closely as possible, and be free of invasive species and contamination. Measurements taken of the native material included grain size, organic carbon content, bulk density, permeability, pH, redox potential, and nutrients (nitrogen and phosphorus). These provide the guidelines for selecting an appropriate fill material (Table 4).

Over time, as the fill is exposed to the hydrologic regime of the wetland, hydric characteristics should develop.

4.3. Hydrology

The hydrologic regime of the wetland will not likely be impacted by the excavation on-site, unless measures are required to dewater the excavation area for work to proceed. Any such measures will be removed once the excavation and grading are completed. It is assumed that remedial activities upgradient of the littoral wetland will not significantly alter the general groundwater flow toward the lake.

With the removal of the existing vegetation, there will likely be a change in the evapotranspiration rate in the impacted area of the wetland. This may result in some variation in the hydrology over the short term, until the vegetative cover is re-established. Since the area to be impacted is predominantly herbaceous, with a thin tree canopy, it is anticipated that the timeframe to restore vegetative cover will be relatively short.

4.4. Planting

Shrubs and herbaceous vegetation will be planted on The Property to begin the restoration of the wetland vegetative cover. It is anticipated that larger trees present in the wetland at The Property will be left in place, therefore there should be no need to plant replacement trees. If during the course of remediation it becomes necessary to remove the trees from the wetland area, replacement trees will be planted. It is likely that natural re-colonization will also occur from the plant community in the surrounding, undisturbed areas, as well as from the seed bank in the soils exposed at the six-inch excavation depth.

4.4.1. Selected Species

The shrub and herbaceous species to be planted were selected based on the observations from the vegetation survey (EcoLogic, LLC, September 2013). This list consists of the species that are native to the area and that are not considered invasive (Table 5). It is assumed that the other species present in the wetland and along the shoreline that are not represented on this planting list – such as duckweed - will naturally re-colonize the disturbed areas over time. The species selected for planting will provide immediate vegetative cover. Tree species are included on this list, although it is not anticipated that trees will need to be planted.

On this list of potential species to plant, three were identified as "weedy" (USDA-NRCS, 2013), and one identified as exploitably vulnerable (6 NYCRR §193.3(d), 2013). Two of the weedy species – red maple (*Acer rubrum*) and nutsedge (*Cyperus esculentus*) – are not recommended for planting since they are present on The Property and are likely to re-colonize the restoration area on their own due to their more aggressive growth habits.

Cattails (*Typha* species) were present in the driest portion of the wetland restoration area. Cattails can be aggressive in disturbed wetlands, out-competing other emergent vegetation and creating monotypic stands (USDA-NRCS, 2006). Based on review of habitat descriptions for the northern cricket frog (refer to (PUB-ER-666, 2010) and (NYSDEC, 2013)), there does not appear to be a required habitat linkage between cattails and the northern cricket frog. Remediation activities will disturb the wetland and create conditions potentially beneficial to the establishment of a monotypic cattail stand during restoration; a monotypic stand of cattails would not provide optimal vegetative habitat for the northern cricket frog. Therefore, it is recommended that the cattails removed during remediation not be replanted. Should rhizomes of the existing cattails remain behind after remediation, cattails may re-grow on their own. It would not be necessary to eradicate these plants, but the re-growth and expansion of the stand should occur slowly enough to allow other emergent vegetation to become firmly established in the restoration area.

The marsh fern (*Thelypteris palustris var. pubescens*) is listed as an exploitably vulnerable native plant (6 NYCRR §193.3(d), 2013). According to the NYCRR, exploitably vulnerable native plants are "likely to become threatened in the near future throughout all or a significant portion of their ranges within the state if causal factors continue unchecked". It was not determined whether the marsh fern identified during the vegetation survey (EcoLogic, LLC, September 2013) was of the variety *pubescens*; regardless, however, replanting this species is highly recommended.

4.4.2. Planting Locations

The hydrologic regime of the wetland is a gradient of saturation conditions that vary with the lake elevation level. Areas at lower elevation closest to the lake (approximately 531 ft msl average elevation of the lake[1]) will be saturated more frequently and for longer durations that areas at higher elevation (approximately 534 ft msl) further from the lake's edge.

During the vegetation survey (EcoLogic, LLC, September 2013) EcoLogic staff identified several zones of plant communities within the wetland remediation area. Based on anecdotal information from D&B, an area that was devoid of surface water during the vegetation survey had been under water earlier in the year, accessible by boat for the collection of sediment samples. This highlights the variability in water level along the shoreline at different times of the year.

Using the vegetation community zones identified during the survey, four planting zones were defined, and are presented below from driest to wettest:

- Zone D – extending from the wetland delineation boundary toward the shoreline approximately 50 ft. This zone is the driest of the wetland areas, adjacent to the upland. In this area, shrubs such as staggerbush (*Lyonia mariana*) and smooth azalea (*Rhododendron arborescens*) should be planted. For the herbaceous layer, sensitive fern (*Ononclea sensibilis*) is recommended. A seed blend[2] of native grasses, recommended for wetland restoration, may be used to provide protective cover of the soil. An example of an appropriate seed blend for this drier portion of the wetland area is "Native Detention Pond Mix" (ERNMX-183) as produced by Ernst Conservation Seeds. This blend includes species ranging in moisture requirements from obligate (OBL) to facultative upland (FACU), similar to the indicator status of the species community documented during the vegetation survey (Attachment 1). It is recommended to verify that the species in the seed mix are not classified as noxious weeds for Orange County; consult with the Cornell Cooperative Extension of Orange County.

- Zone C – extending from the edge of Zone D lakeward approximately 20 ft. In this zone, the recommended herbaceous plants are false nettle (*Boehmeria cylindrica*), swamp loosestrife (*Decodon verticillatus*), marsh fern (*Thelypteris palustris*), arrow arum (*Peltandra virginica*), and marsh St. John's wort

[1] Personal communication with Anthony Caniano, D&B, with EcoLogic LLC.

[2] The seed tag contains specific information on the types of seed, proportion of live seed, and weed seed contained in the mix. Purchased seed can legally contain seed that is classified as noxious in one state that may not be considered noxious in another. The NRCS Plant Materials Web site (http://www.plant-materials.nrcs.usda.gov/pubs/IDPMSTN04265.pdf) contains information on reading seed tags. It is recommended that certified seed be purchased and planted when a seed mix is specified. Certified seed contains a higher germination and purity rates. This will reduce the kinds and number of weeds that are planted with the desired grasses and forbs. (USDA - NRCS, 2007)

(*Hypericum virginicum*). Other herbaceous species will re-colonize from the surrounding plant communities. For shrubs, button bush (*Cephalanthus occidentalis*) is appropriate in this zone.

- Zone B – extending from the edge of Zone C approximately 15 ft lakeward. In this zone, herbaceous plants that would do well are swamp smartweed (*Persicaria hydropiperoides*), swamp loosestrife (*Decodon verticillatus*), arrow arum (*Peltandra virginica*), and nodding burr marigold (*Bidens cernua*).

- Zone A – extending from the edge of Zone B lakeward, consisting of a small low island of assorted shrubs and small trees. This area is not expected to be excavated, therefore no planting will be required. However, if in the course of remediation it becomes clear that this area will require replanting, acceptable replacement shrubs include buttonbush (*Cephalanthus occidentalis*), hazel alder (*Alnus serrulata*), sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and silky dogwood (*Cornus amomum*). These shrubs were identified in the Watershed Management Plan as commonly occurring on Glenmere Lake (Milone & MacBroom, Inc., 12/2011, revised 02/2012).

4.4.3. Planting Densities and Numbers of Plants

Shrubs and larger herbaceous species should be planted in a natural, random way relative to one another; avoid placing the plants in straight rows. The distance between shrubs and larger herbaceous plants should not be less than four feet. Smaller herbaceous plants should be inter-spersed with larger plants, spaced from two to four feet apart.

The larger herbaceous species on the planting list are false nettle (*Boehmeria cylindrica*) and swamp loosestrife (*Decodon verticillatus*); these plants were observed at The Property growing in clumps up to three feet in height. The smaller herbaceous plants are sensitive fern (*Ononclea sensibilis*), marsh fern (*Thelypteris palustris*), arrow arum (*Peltandra virginica*), marsh St. John's wort (*Hypericum virginicum*), swamp smartweed (*Persicaria hydropiperoides*) and nodding burr marigold (*Bidens cernua*); these plants were growing at The Property less than two feet in height.

The preferred habitat of the northern cricket frog is characterized by the presence of abundant emergent vegetation on sunny, gently sloping, muddy banks with a minimum of woody growth and over-story vegetation, according to several sources (refer to (PUB-ER-666, 2010) and (NYSDEC, 2013)). The planting list compiled in Subsection 4.4.1, combined with these planting density guidelines, should optimize the vegetative cover suitable for the northern cricket frog.

The guidelines presented below are not requirements, but suggestions for planting densities and number of plants based on field observations.

Zone	Field Photograph
Zone D Although cattails are present in Zone D, it is not recommended to re-plant them. Cattails can be invasive in disturbed areas, therefore to protect the rest of the restoration area it is recommended to use instead sensitive fern (*Ononclea sensibilis*) and a seed mix of native grasses appropriate for wetland restoration. Sensitive fern may be planted at a density of three plants per square meter. It is also recommended to remove European buckthorn shrubs. Appropriate shrubs in this zone are staggerbush (*Lyonia mariana*) and smooth azalea (*Rhododendron arborescens*), spaced at intervals of one per 15 square meters.	 ***Photograph 1*** *- Herbaceous layer of Zone D, with meter-square for scale reference.*
Zone C Based on field observations, for the herbaceous layer it is recommended to plant either one false nettle (*Boehmeria cylindrica*) or one swamp loosestrife (*Decodon verticillatus*) per square meter. To each square meter, include up to three marsh ferns (*Thelypteris palustris*) and one each arrow arum (*Peltandra virginica*) and marsh St. John's wort (*Hypericum virginicum*). For the shrub layer, one button bush (*Cephalanthus occidentalis*) for every 10 square meters would be appropriate.	 ***Photograph 2*** *– Herbaceous layer of Zone C, with meter-square for scale reference.*
Zone B Recommended planting density in this zone is approximately eight swamp smartweed (*Persicaria hydropiperoides*) and four arrow arum (*Peltandra virginica*) per square meter. In every other square meter, plant one swamp loosestrife (*Decodon verticillatus*) or one nodding burr marigold (*Bidens cernua*).	 ***Photograph 3*** *– Herbaceous layer of Zone B, with meter-square for reference.*

Zone	Field Photograph
Zone A It is not anticipated that this area will be remediated. However, if restoration of this area is necessary, the recommended planting density is one shrub every five square meters, interspersed with swamp loosestrife (*Decodon verticillatus*). Recommended shrubs: buttonbush (*Cephalanthus occidentalis*), hazel alder (*Alnus serrulata*), sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and silky dogwood (*Cornus amomum*).	 ***Photograph 4*** *– Shrub layer of Zone A.*

4.4.4. Ordering Plants

The shrubs purchased for this restoration may include both container grown (for larger size) and bare-rooted (for smaller size) plants. The amount and kind for each will depend on the project schedule and availability. There are different benefits and drawbacks for using container-grown or bare-root shrubs; these are summarized in Table 6.

Shrubs and herbaceous plants purchased for this restoration will have a normal habit of growth and be typically characteristic of their respective kinds. Plants will be free from injury. Plants will be nursery grown and bear evidence of proper nursery care normal to current nursery practice. Container grown plants will exhibit a well-rooted condition as evidenced by the firmness of the ball. The outside of the ball will be well netted with healthy working roots that have not been restricted. Plants will have been adequately hardened off before shipment. The plants selected for use in this wetland environment will be healthy, with reasonably straight trunks and good branching structure (e.g. properly pruned to remove crossing branches).

4.5. As-Built Report

An as-built report will be written to document the final elevations and planting layout. The report will include a summary of the corrective actions taken during restoration to address issues that may have occurred during the construction of the project.

5. Monitoring

The monitoring time frame is presented in Section 1.4 (Timeframe). This section presents details of the monitoring program. The parameters to be measured are defined under Section 1.3 (Performance Standards). The monitoring program is summarized in Table 7.

As defined in the ROD, all restored areas will be inspected for a period of at least one year following the NYSDEC's determination of substantial completion of the site remediation by the contractor. During this time the restored areas will be inspected for erosion, settlement and growth of plantings and grass (NYSDEC Division of Environmental Remediation, March 2011).

To evaluate whether the wetland has been restored to pre-existing conditions, a monitoring program extending over five growing seasons past the completion of restoration is recommended. The objective of monitoring is to gather observations sufficiently detailed to verify whether the restored wetland areas are comparable with the baseline measurements and adjacent undisturbed (control) areas.

Four sampling sites were established for baseline measurements – three were located in excavated areas, and one in an undisturbed area as a control (Figure 7). Soil and vegetation sampling will occur in these sample plots during the summer (July-September) once a year. Piezometers that were installed at The Property for baseline measurements will be used to monitor post-restoration hydrology three times during the growing season.

During the first growing season, evaluate whether the plantings have survived – survival should be 80% or greater. Evaluate the plantings and the status of colonization of the herbaceous layer. Document and justify decisions for replanting or not replanting areas that experience die-off of more than 20%.

The soils in the areas where fill was introduced should be evaluated against the baseline measurements as discussed in previous sections, and visually examined for development of hydric characteristics.

The Invasive Species Management Plan will be implemented during post-restoration monitoring. If a non-native invasive species becomes established in the restored areas of The Property, corrective measures defined in the Plan will be used to remove the invasive species. The affected area will be replanted with native, desirable species, and monitored for re-occurrence of the invasive. One invasive plant already documented as present on the shores of Glenmere Lake is purple loosestrife (*Lythrum salicaria*) (Milone & MacBroom, Inc., 12/2011, revised 02/2012). The Invasive Species Management Plan should highlight particular attentiveness to the potential presence of purple loosestrife in the restoration area. While Eurasian water milfoil is another invasive aquatic plant identified in Glenmere Lake, it grows in deep water areas beyond the scope of this wetland restoration plan.

Annual reports will be submitted to NYSDEC, and should include:

- Identification of disturbances on or adjacent to The Property during the monitoring period
- Description of activities and corrective actions implemented
- Sample location map
- Invasive species assessment
- Data collected during the monitoring period
- Representative site photographs
- Assessment of the degree to which the performance standards are being met.

It is anticipated that the second and any subsequent years of monitoring will occur under the Site Management plan for The Property.

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Tables

Table 1. Wetland restoration performance standards, Glenmere Lake Property, Town of Chester, NY.

Matrix	Purpose	Measurements	Criteria
Hydrology	Evaluate changes in groundwater and surface water elevation	• Groundwater depth in piezometers in the wetland • Elevation of lake surface water measured from dam	• Consistent relationship of groundwater elevation with lake level elevation, preliminary estimate of ±6 inches. • Groundwater elevation within 12 inches of the baseline measurements from each piezometer.
Soils	Evaluate condition of fill material introduced to The Property	Measure organic carbon content, pH, redox potential and nutrients (nitrogen and phosphorus).	Measurements should fall within the minimum and maximum range of baseline measurements for these parameters.
Vegetation	Evaluate community structure in the restored areas on a seasonal basis, starting with the first growing season after restoration.	Percent Cover – estimated overall percent cover in the three restoration zones.	Overall percent cover will be within ±30% of the baseline.
		Percent Cover by layer – stratification of the community by layers, using estimated percent cover for canopy, shrub, and herbaceous layers in the three restoration zones.	Herbaceous percent cover will be within ±30% of baseline during the period of monitoring. Shrub percent cover should reach ±30% of baseline by the third year of monitoring. Canopy percent cover – assuming trees have not been removed during remediation – should remain unchanged unless natural blow-down or die-off should occur.
		Percent Cover by species – species composition using percent cover calculated as a percent contribution of species from the total number of species identified in the three restoration zones.	Species composition will be within ±30% of the baseline during the monitoring period, allowing for natural colonization of other native vegetation from adjacent undisturbed habitat.
		Photographs of the three restoration zones	Photographs will be used to document changes in the vegetative community
		Presence of invasive species, including both those documented to occur on-site and those discovered in restoration area.	Invasive species will account for less than 2% of the species in the restoration area, based on stem count.

Table 2. Summary of Wetland Restoration Plan Timeframe

Phase	Activities
Work Plan development	Develop an approvable workplan for restoration project.
Pre-excavation activities	• Establish four sampling sites for soil/vegetation sampling. • Install piezometers for ground water depth monitoring, and establish a location to monitor lake water level. • Conduct baseline sampling. • Identify sources for fill material and native plant stock. • Select fill material meeting the specifications defined by the baseline sampling results. • Schedule delivery of fill material and plants concurrent with excavation schedule. • Develop an Invasive Species Management Plan.
Excavation activities	• Plants and soils will be removed for disposal off-site. • Excavation will be followed by sampling to verify removal of contamination levels to below remedial action objectives. • Recommended to leave trees and large logs in-place to enhance habitat value for the northern cricket frog. • Begin restoration as soon as feasible.
Restoration activities	• Apply and grade fill material where needed. • Plant shrubs and herbaceous vegetation • Submit As-Built report.
Post-restoration monitoring	• Collect hydrologic measurements three times during the growing season (May, July and September) for the next five growing seasons. • Collect soils data at four established sampling sites once per growing season for five growing seasons. • Collect vegetation data at four established sampling sites in summer (July-August) for five growing seasons. • Photographic documentation at each of the four established sampling sites, and the surrounding areas. • Submit annual reports.

Table 3. Baseline measurements of hydrology

Piezometer Location	10/25/13 Groundwater Elevation (ft msl)	Ground Elevation (ft msl)	Calculated Depth to Water Below Ground Surface (ft)
PZ-1 (furthest from lake shore)	531.22	534.22	3.00
PZ-2 (mid-point)	531.27	533.44	2.17
PZ-3 (closest to lake shore)	530.98	531.75	0.77
PZ-4 (control point)	530.91	531.44	0.53
Lake Level (surface water at dam)	530.81	--	--

msl = mean sea level
Data source: D&B, personal communication, October 2013.

Table 4. Analytical results for two soil/sediment samples collected on 09/17/2013.

Analysis	Parameter	Range of Values
D422 Grain Size	Sieve Size 3 inch - Percent Finer	100 - 100 % passing
	Sieve Size 2 inch - Percent Finer	100 - 100 % passing
	Sieve Size 1.5 inch - Percent Finer	100 - 100 % passing
	Sieve Size 1 inch - Percent Finer	100 - 100 % passing
	Sieve Size 0.75 inch - Percent Finer	100 - 100 % passing
	Sieve Size 0.375 inch - Percent Finer	95.1 - 97.7 % passing
	Sieve Size NO. 4 - Percent Finer	77.2 - 95.8 % passing
	Sieve Size NO. 10 - Percent Finer	63.5 - 94 % passing
	Sieve Size NO. 20 - Percent Finer	57.2 - 93 % passing
	Sieve Size NO. 40 - Percent Finer	53.7 - 91.4 % passing
	Sieve Size NO. 60 - Percent Finer	51.1 - 88.8 % passing
	Sieve Size NO. 80 - Percent Finer	49.6 - 86.8 % passing
	Sieve Size NO. 100 - Percent Finer	48.6 - 85.2 % passing
	Sieve Size NO. 200 - Percent Finer	45.1 - 79.2 % passing
	Hydrometer Reading 1 - Percent Finer	34.2 - 53.8 % passing
	Hydrometer Reading 2 - Percent Finer	29.2 - 47.9 % passing
	Hydrometer Reading 3 - Percent Finer	25.8 - 38.1 % passing
	Hydrometer Reading 4 - Percent Finer	20.8 - 32.2 % passing
	Hydrometer Reading 5 - Percent Finer	18.3 - 28.3 % passing
	Hydrometer Reading 6 - Percent Finer	12.3 - 17.3 % passing
	Hydrometer Reading 7 - Percent Finer	7.1 - 9.3 % passing
Texture	Gravel	4.2 - 22.8 %
	Sand	16.6 - 32.1 %
	Coarse Sand	1.8 - 13.7 %
	Medium Sand	2.6 - 9.8 %
	Fine Sand	8.6 - 12.2 %
	Silt	26.8 - 50.9 %
	Clay	18.3 - 28.3 %
D2974 Moisture, Ash and Organic Matter	Total Organic Matter	3.3 - 3.7 %
	Moisture Content	23.2 - 39.4 %
	Ash Content	96.3 - 96.7 %
	Fractional Organic Carbon	1.9 - 2.2 %
D2937 Density of Soil in Place by the Drive-Cylinder Method	Density	1.29 - 1.62 g/cc
General Chemistry	Total Kjeldahl Nitrogen	550 - 1260 mg/kg
	Nitrate Nitrite as N-ASTM Leach	0.99 - 2.7 mg/kg
	Phosphorus, total (as P)	276 - 362 mg/kg
	Phosphorus, total orthophosphate (as PO4)	847 - 1110 mg/kg
	pH	6.07 - 6.64 SU
	Percent Moisture	17.4 - 18.7 %
	Percent Solids	81.3 - 82.6 %
	Oxidation Reduction Potential - Soluble	74 - 128 millivolts
Pneumatic Permeability by Flowing Air - ASTM D6539	Average Pneumatic Permeability	5.4E-14 - 2.4E-12 m^2

Table 5. Summary of plant species present on-site in the wetland areas of the Glenmere lake Property, based on September 2013 survey (EcoLogic, LLC, September 2013).

Common Name	Scientific/Botanical Name	Regional Wetland Indicator Status[1]	Invasive Status[2]	Endangered/ Threatened Status[6,7]
TREES				
Black Willow	*Salix nigra*	OBL	--	--
Red Maple	*Acer rubrum*	FAC	Weedy[3]	--
ERECT SHRUBS				
Button Bush	*Cephalanthus occidentalis*	OBL	--	--
Arrow Wood	*Viburnum recognitum*	FAC	--	--
Smooth Azalea	*Rhododendron arborescens*	FAC	--	--
Staggerbush	*Lyonia mariana*	FAC	--	--
HERBACEOUS				
Arrow Arum	*Peltandra virginica*	OBL	--	--
Cattail	*Typha* spp	OBL	Weedy[4]	--
False Nettle	*Boehmeria cylindrica*	OBL	--	--
Marsh St. John's Wort	*Hypericum virginicum*	OBL	--	--
Nodding Burr Marigold	*Bidens cernua*	OBL	--	--
Swamp Smartweed	*Persicaria hydropiperoides*	OBL	--	--
Swamp Loosestrife	*Decodon verticillatus*	OBL	--	--
Marsh Fern	*Thelypteris palustris*	FACW	--	Exp.Vuln.[6]
Nutsedge	*Cyperus esculentus*	FACW	Weedy[5]	--
Sensitive Fern	*Onoclea sensibilis*	FACW	--	--

Wetland Indicators:

FAC: Facultative – equally likely to occur in wetlands or nonwetlands (34-66% probability)

FACW: Facultative wetland – usually occur in wetlands but occasionally found in nonwetlands (67-99% probability)

OBL: Obligate wetland – occur almost always under natural conditions in wetlands (>99% probability)

"Weedy" denotes that the plant has the capacity to grow and reproduce aggressively in the environment.

"Exp.Vuln" denotes that the plant is an Exploitably Vulnerable Native Plant.

References:

[1] The National Wetland Plant List: 2013 wetland ratings (Lichvar, 2013)

[2] USDA Plants Database, accessed October 28, 2013(USDA-NRCS, 2013)

[3] USDA Plants Database, Weeds of the Northeast (Uva, Neal, & DiTomaso, 1997)

[4] USDA Plants Database, Plant Guide Narrow-leaved Cattail (USDA-NRCS, 2006)

[5] USDA Plants Database, Weeds of the Northeast (Uva, Neal, & DiTomaso, 1997)

[6] New York State Code, Rules and Regulations (6 NYCRR §193.3(d), 2013)

[7] New York Natural Heritage Program, New York Rare Plant Status Lists (Young, 2010)

Table 6. Comparison of container-grown and bare-rooted plant stock.

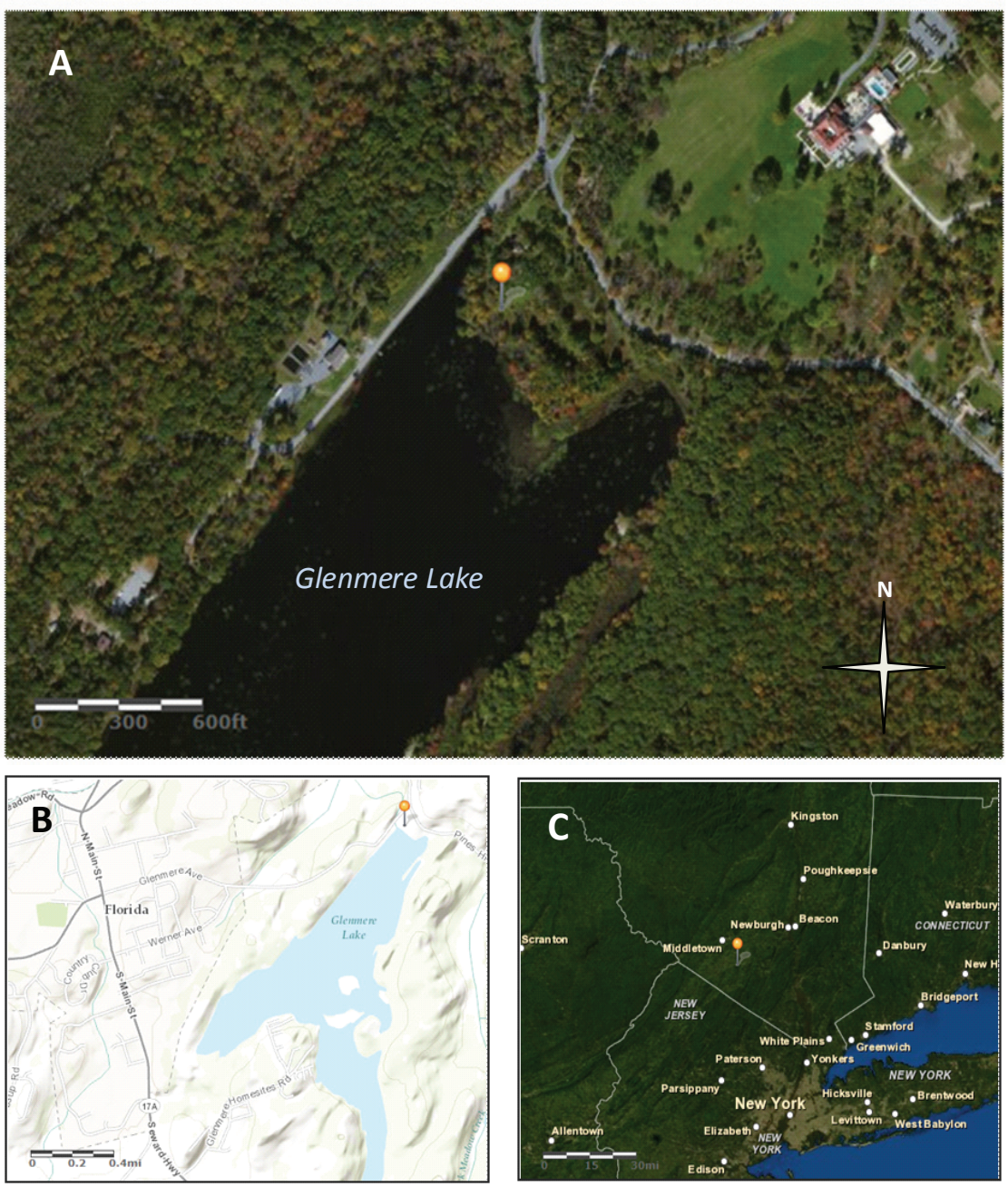
	Container-grown	**Bare-rooted**
Availability	Available throughout the growing season	Sold late fall through early spring
Cost	Variety of sizes and prices	Less expensive than container grown
Timing	Need not be planted immediately	Plant as soon as possible after purchase
Growth	Better survivability	Establish more quickly and grow better initially
When buying	Look for healthy foliage and strong shoots. Check for insect infestations. Avoid root-bound plants.	Select plants with strong stems and fresh-looking, well-formed roots. Reject any that have already leafed out.

Source: *Sunset Northeastern Garden Book*, Anne Halpin, editor. 2001 Sunset Publishing Corporation.

Table 7. Guidelines for post-restoration monitoring.

Data Collection	Data Evaluation
Collect hydrologic measurements every other month during the growing season (May, July and September)	• Compare elevations to baseline conditions • Compare surface water discharge to baseline conditions
Collect soils data at four established sampling sites once a year	• Compare analytical results with baseline measurements • Document presence or absence of hydric soil characteristics
Collect vegetation data at four established sampling sites during summer (July-August)	• Compare observed community structure with baseline • Identify invasive species • Determine whether corrective actions are required.
Assemble local climatological data (precipitation records and drought status) for the monitoring period	• Evaluate hydrologic conditions against recorded precipitation and drought status • Document whether hydrologic measurements occurred during normal, drought, or wet conditions.

Figures



Legend

Location of The Property relative to: (A) Glenmere Lake; (B) Village of Florida; (C) New York State.

Source of imagery: IPC, NHD, METI/NASA, Esri, DeLorme, NAVTEQ, USGS, USDA, EPA, and Intermap via ESRI ArcGIS My Map on-line (http://www.arcgis.com/home/webmap/viewer.html)

Figure 1. Location Map for the Glenmere Lake Property in Orange County, NY

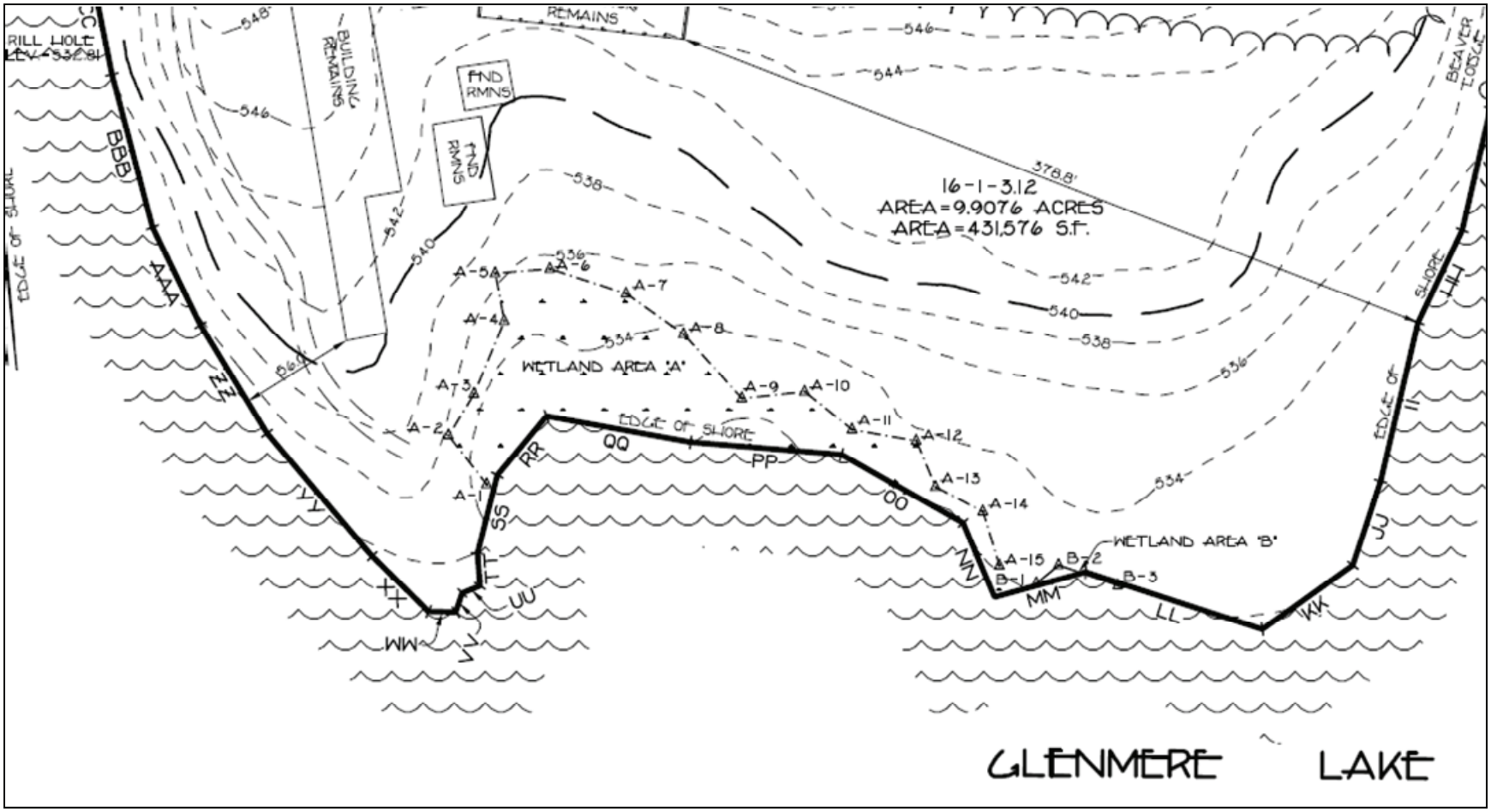
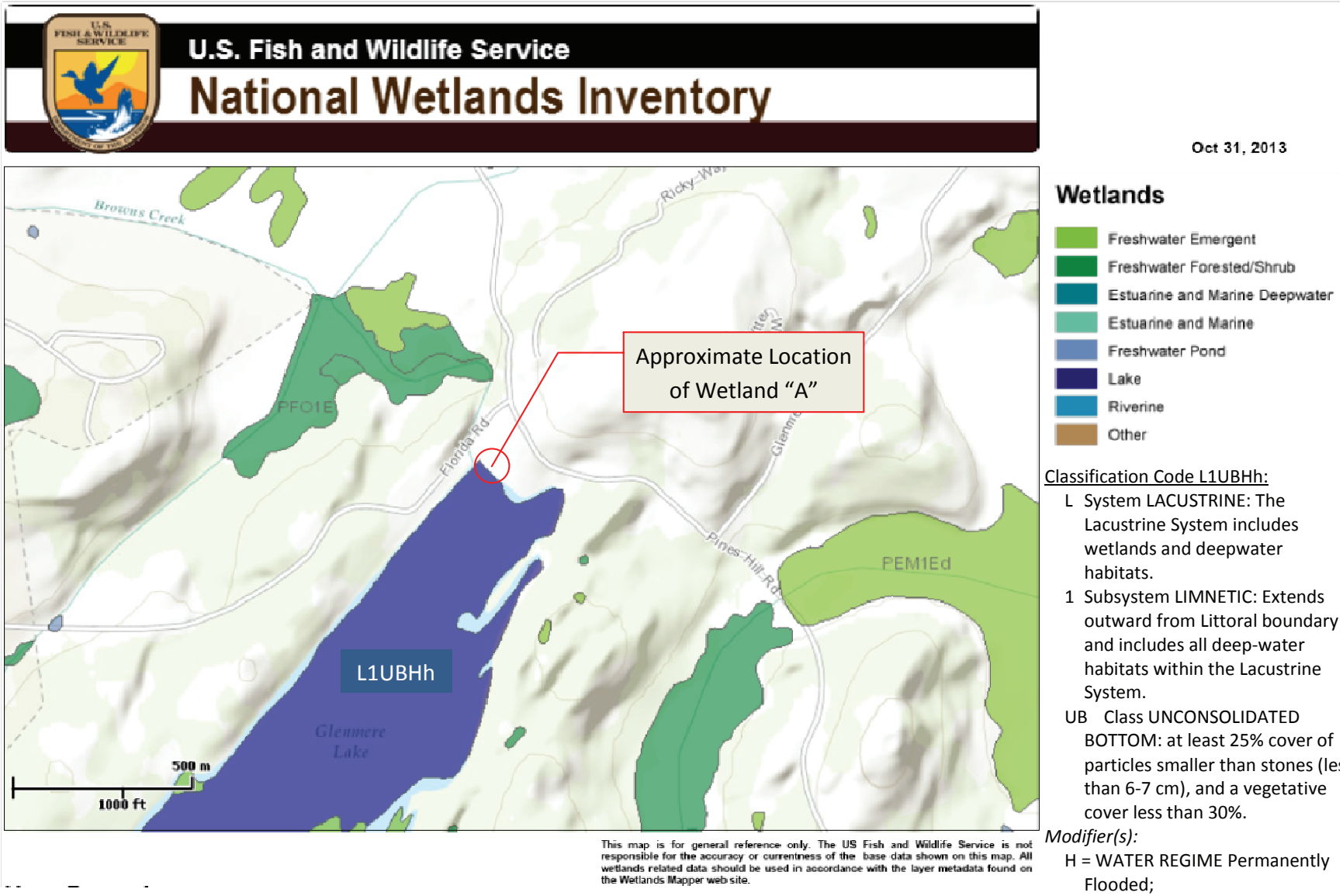


Figure 2. Map of wetland border for Wetlands "A" and "B", as delineated on October 18 2012 by T. Sperry for A. Caniano.

Map source: William D. Youngblood Land Surveying, P.C. (file# O-3344, Oct. 25, 2012), screen clipping from PDF file "O-3344_WETLANDS_10-26-12 Model" provided to EcoLogic LLC by D&B.

Figure 3. Aerial image, circa 2011, of the vegetation survey area (EcoLogic, LLC, September 2013).



Classification Code L1UBHh:

L System LACUSTRINE: The Lacustrine System includes wetlands and deepwater habitats.

1 Subsystem LIMNETIC: Extends outward from Littoral boundary and includes all deep-water habitats within the Lacustrine System.

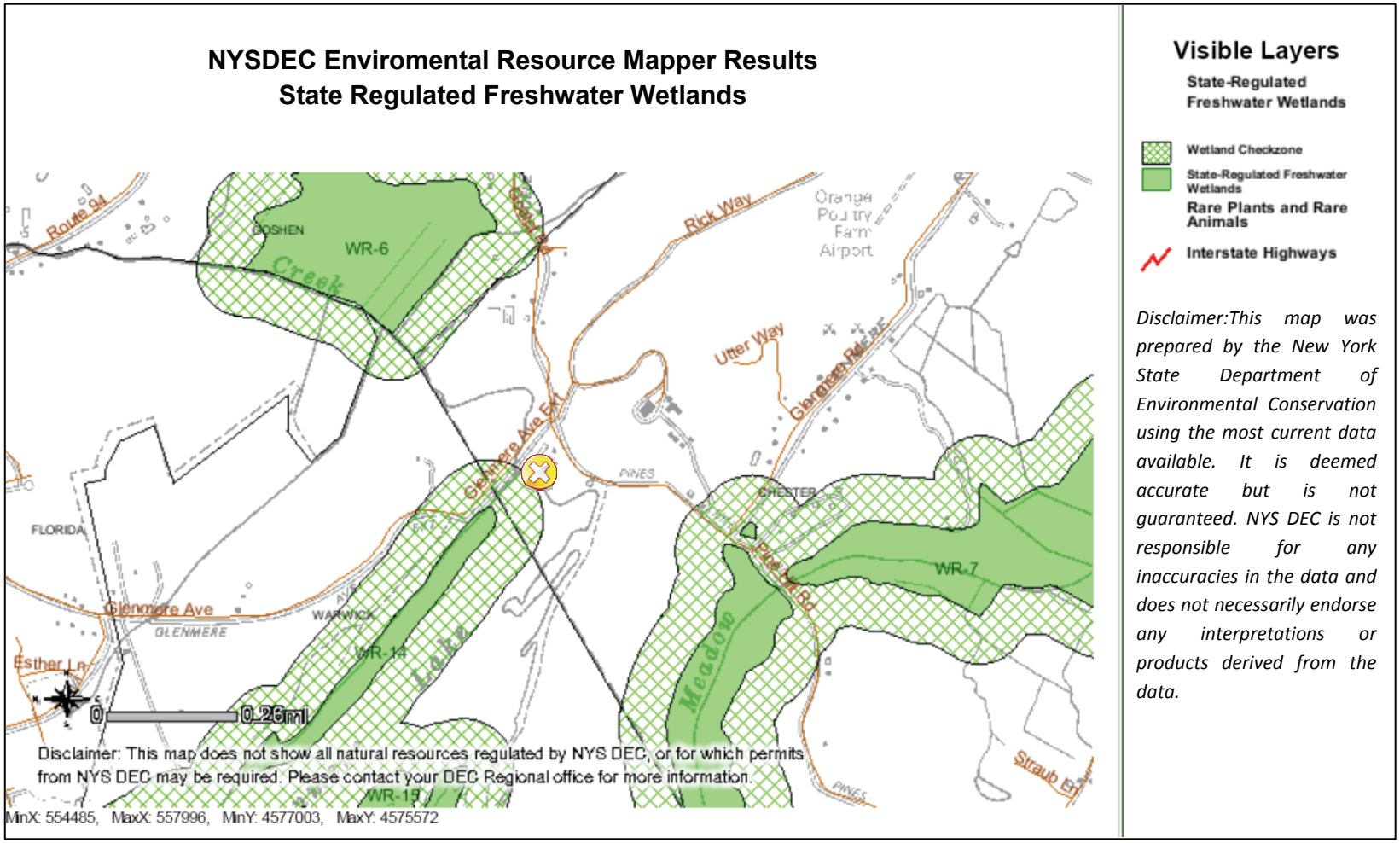
UB Class UNCONSOLIDATED BOTTOM: at least 25% cover of particles smaller than stones (les than 6-7 cm), and a vegetative cover less than 30%.

Modifier(s):

H = WATER REGIME Permanently Flooded;

h = SPECIAL MODIFIER Diked/Impounded.

Figure 4. US Fish and Wildlife Service National Wetlands Inventory showing regulated wetlands in the vicinity of Glenmere Lake.



Source: Map obtained on-line using the NYSDEC Environmental Resource Mapper (http://www.dec.ny.gov/imsmaps/ERM/viewer.htm). Accessed 10/31/2013

Figure 5. New York State regulated wetlands in the vicinity of Glenmere Lake. The "X" marked the location of the wetland are to be remediated and restored.

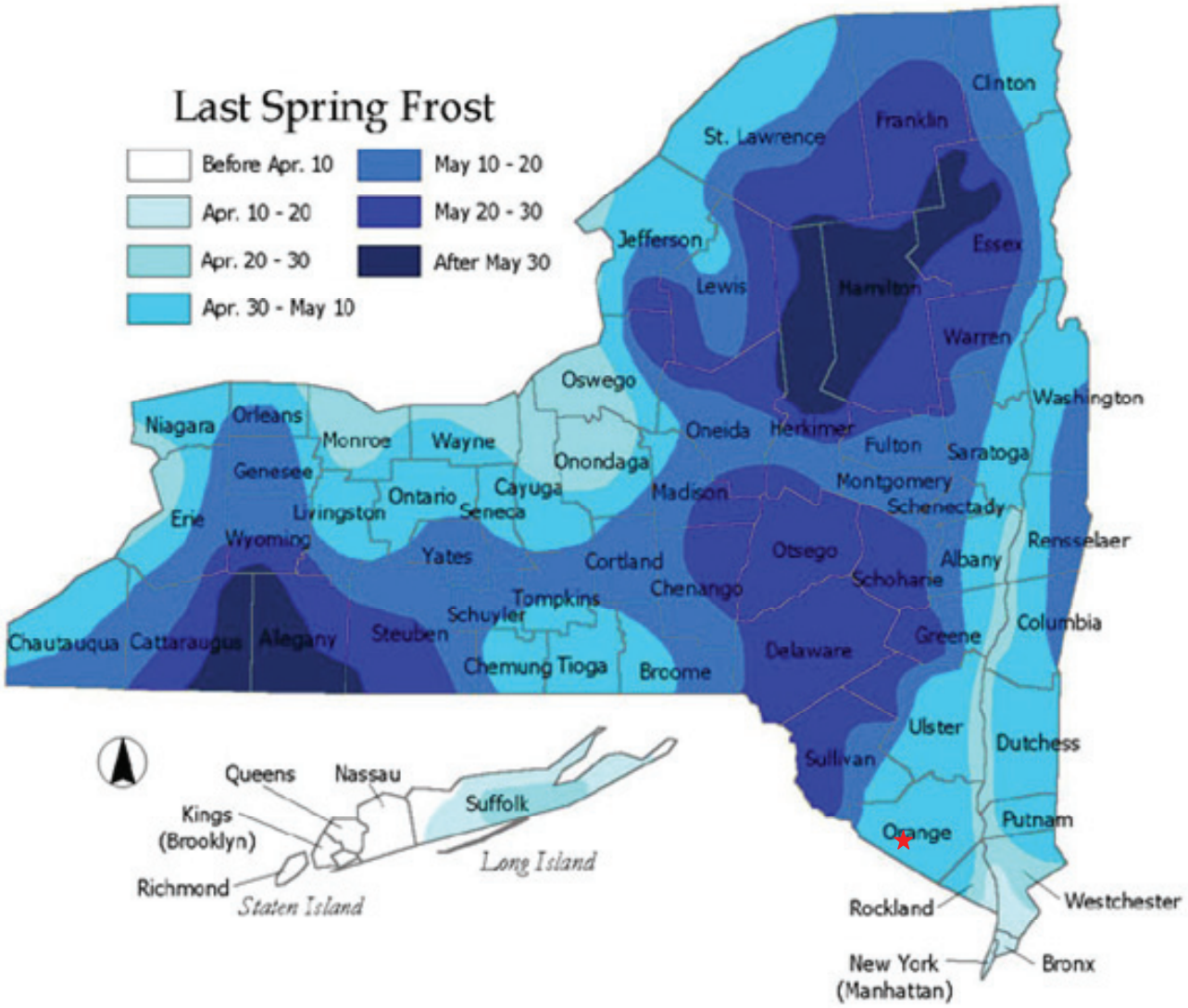


Figure 6. Range of dates for last spring frost in New York State (Department of Horticulture, Cornell University, 2013) The red star shows the approximate location of the Glenmere Lake property.

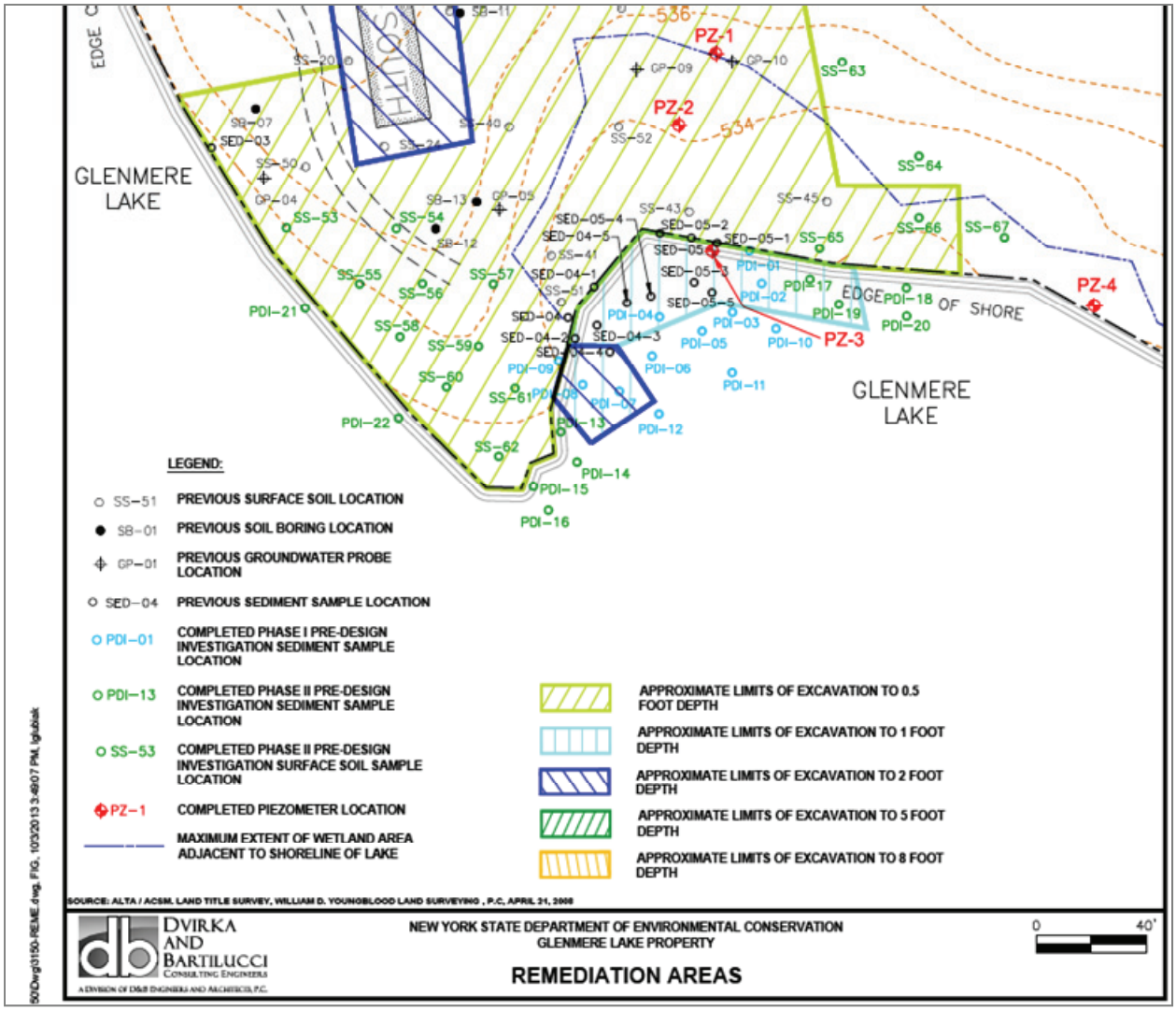


Figure 7. Portion of map showing remediation areas in wetland "A", along with piezometer monitoring locations, as revised 10/03/13. Provided by D&B.

Attachments

Attachment 1 Vegetation Survey Summary

Remediation area wetland "A" vegetation description and summary, based on field observations by EcoLogic, LLC on September 17, 2013.

<table>
<tr><th>Zone</th><th>Location</th><th>Description with vegetation cover</th></tr>
<tr><td>Zone A</td><td>Extends approximately 15 ft inland from lake</td><td>Low island consisting of shrubs and small trees. Based on conversation with D&B and NYSDEC, this island is not expected to be part of the remediation area.</td></tr>
<tr><td>Zone B</td><td>Extends approximately 15 ft inland from end of Zone A</td><td>At the time of the site visit, water depths ranged from 2 to 8 inches in this zone. The vegetation was primarily herbaceous ground cover less than 2 ft in height, with overall percent cover around 75%.

Estimated relative percent cover by species, with wetland indicator status:

<u>Herbaceous</u>
Swamp Smartweed — Persicaria hydropiperoides — 50% — OBL
Swamp Loosestrife — Decodon verticillatus — 20% — OBL
Arrow Arum — Peltandra virginica — 20% — OBL
Duckweed — Lemna spp. — 5% — OBL
Nutsedge — Cyperus esculentus — 3% — FACW
Nodding Burr Marigold — Bidens cernua — 2% — OBL</td></tr>
</table>

Remediation area wetland "A" vegetation description and summary, based on field observations by EcoLogic, LLC on September 17, 2013.

<table>
<tr><th>Zone</th><th>Location</th><th>Description with vegetation cover</th></tr>
<tr><td>Zone C</td><td>Extends approximately 20 ft inland from end of Zone B.

This is the location of D&B Piezometer #3</td><td>At the time of the site visit, surface water was not present in this zone but soils appeared moist to saturated. However, based on anecdotal evidence from D&B personnel, this area has been flooded with standing water sufficiently deep to require boat access. This zone was dominated by low shrub/herbaceous growth, with occasional taller shrub and trees. Overall percent cover for the canopy was estimated at 10%; for the shrub layer 5%; and for the herbaceous layer 95%.

Estimated relative percent cover by species, with wetland indicator status:

<table>
<tr><td><u>Canopy >15 ft height</u></td><td></td><td></td><td></td></tr>
<tr><td>Willow – Black or Crack</td><td>Salix nigra or Salix fragilis (Three trees, DBH 8 to 11 inches.)</td><td>100%</td><td>OBL or FAC</td></tr>
<tr><td><u>Shrubs >6 ft and <15ft</u></td><td></td><td></td><td></td></tr>
<tr><td>Button Bush</td><td>Cephalanthus occidentalis (One shrub, ~12 ft tall DBH 3.1 inches)</td><td>100%</td><td>OBL</td></tr>
<tr><td><u>Herbaceous</u></td><td></td><td></td><td></td></tr>
<tr><td>False Nettle</td><td>Boehmeria cylindrica</td><td>50%</td><td>OBL</td></tr>
<tr><td>Swamp Loosestrife</td><td>Decodon verticillatus</td><td>20%</td><td>OBL</td></tr>
<tr><td>Marsh fern</td><td>Thelypteris palustris</td><td>20%</td><td>FACW</td></tr>
<tr><td>Arrow Arum</td><td>Peltandra virginica</td><td>5%</td><td>OBL</td></tr>
<tr><td>Marsh St. John's Wort</td><td>Hypericum virginicum</td><td>3%</td><td>OBL</td></tr>
<tr><td>Cattail</td><td>Typha spp.</td><td>2%</td><td>OBL</td></tr>
</table>
</td></tr>
</table>

Remediation area wetland "A" vegetation description and summary, based on field observations by EcoLogic, LLC on September 17, 2013.

<table>
<tr><th>Zone</th><th>Location</th><th>Description with vegetation cover</th></tr>
<tr><td>Zone D</td><td>Extends approximately 50 ft inland from end of Zone C to the wetland delineation flags.

This is the location of D&B Piezometer #2</td><td>At the time of the site visit, there was no surface water in this area and soils did not appear moist. This zone was characterized by two types of plant cover –cattails surrounding an "island" of shrubs and low grasses. Overall percent cover of the tree canopy layer was zero percent. The shrub overall percent cover was estimated at 50%; for the herbaceous layer, 95%.

Estimated relative percent cover, with wetland indicator status:

<table>
<tr><td><u>Shrubs > 6 ft</u></td><td></td><td></td><td></td></tr>
<tr><td>Buckthorn</td><td>Rhamnus cathartica</td><td>33%</td><td>FAC</td></tr>
<tr><td>Staggerbush</td><td>Lyonia mariana</td><td>33%</td><td>FAC</td></tr>
<tr><td>Smooth Azalea</td><td>Rhododendron arborescens</td><td>33%</td><td>FAC</td></tr>
<tr><td><u>Herbaceous</u></td><td></td><td></td><td></td></tr>
<tr><td>Cattail</td><td>Typha spp.</td><td>50%</td><td>OBL</td></tr>
<tr><td>Smartweed/knotweed</td><td>Polygonum spp.</td><td>25%</td><td>FACW, FAC, or FACU</td></tr>
<tr><td>Sensitive Fern</td><td>Onoclea sensibilis</td><td>20%</td><td>FACW</td></tr>
<tr><td>Virginia Creeper</td><td>Parthenocissus quinquefolia</td><td>5%</td><td>FACU</td></tr>
<tr><td>Arrow Arum</td><td>Peltandra virginica</td><td><1%</td><td>OBL</td></tr>
</table>
</td></tr>
</table>