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Central Hudson Gas & Electric Corporation

INVASIVE SPECIES ADAPTIVE MANAGEMENT PLAN

Elting's Corner Facility

Lloyd, New York

February 2019

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Elting's Corner Facility, Lloyd, New York

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1 INTRODUCTION

This Invasive Species Adaptive Management Plan (Plan) has been prepared by Arcadis of New York, Inc. (Arcadis) on behalf of Central Hudson Gas & Electric Corporation (CHGE). This Plan is specific to CHGE's Elting's Corner Facility in Lloyd, New York (site) and the approved wetland remediation project. The Plan is intended to support an adaptive management program throughout the New York State Department of Environmental Conservation (NYSDEC) required post-remediation five-year compliance monitoring period. It has been developed through both published literature pertaining to the control of invasive species, as well as Arcadis' best professional judgment based upon decades of implementing vegetation management programs throughout North America.

Arcadis recognizes that multiple adaptive strategies exist for each of the invasive plant species identified as a concern within this Plan. The objective of this Plan is to outline the "toolbox" of potential adaptive strategies and develop the most appropriate management tools based upon site conditions. This Plan will guide the selected contractor responsible for compliance monitoring and adaptive management at the site. As agreed upon by NYSDEC and CHGE, approval of this Plan is required prior to implementing any adaptive management as it pertains to invasive species control at the site.

2 REGULATORY BACKGROUND

The Bureau of Pesticides Management is responsible for the administration of the Aquatic Pesticide Permit Program in New York, under the authority granted by Article 15-0313(4) of the Environmental Conservation Law (ECL) and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Parts 327, 328 and 329. ECL Article 15 states that an Aquatic Pesticide Permit is required for the direct application of an aquatic pesticide to surface waters of the State of an acre or more in size. While not anticipated based upon previous communications with NYSDEC, invasive control could require a permit under Part 327 Use of Chemicals to Control or Elimination of Aquatic Vegetation if activities were to occur in open water areas.

In the fall of 2017, CHGE and Arcadis sought approval from NYSDEC to preemptively treat common reed (*Phragmites australis*) within the restoration boundaries of the site. NYSDEC provided a notice of non-jurisdiction based upon the request to only treat terrestrial areas (i.e., no standing water) (**Appendix A**). Many of the invasive species of concern identified in this report are expected to only occur within terrestrial areas, and therefore would not require a formal permit approval from NYSDEC under Article 15. However, any direct application of an aquatic pesticide to surface waters of the State of an acre or more in size would require an Aquatic Pesticide Permit through NYSDEC.

3 SITE BACKGROUND

The site is a 33.7-acre area located near the corner of State Route 299 and South Street, within the Town of Lloyd, Ulster County, New York. This Plan focuses on the western portion of the CHGE facility that is the focus of approved wetland remediation activities and covers an area of approximately 4.8 acres that includes waters, wetlands and wetland adjacent areas. The approximate center coordinates for this

project area are 41.736995 °N and -74.037935 °W. A site location map and pre-construction conditions map are included as **Figures 1 and 2**, respectively.

A further description of site conditions and approved remedial actions can be referenced in the Remedial Action Work Plan (RAWP) (Arcadis 2018a), as well as the Restoration and Monitoring Plan (Arcadis 2018b).

3.1 Existing Site Conditions (Pre-Remediation)

The vegetative communities found within the site, as well as adjacent to the remedial limits of disturbance, consist mostly of emergent wetlands which are dominated by invasive species, with a transition to palustrine scrub-shrub wetland mix toward the western end of the site. Dominant vegetation within the project area includes red osier dogwood (*Cornus sericea*), common reed*, broadleaf cattail (*Typha latifolia*), reed canary grass (*Phalaris arundinacea*), jewelweed (*Impatiens capensis*), arrow-leaf tearthumb (*Polygonum sagittatum*) and purple loosestrife* (*Lythrum salicaria*). Invasive species are noted above with an asterisk based upon species listed in New York State Prohibited and Regulated Invasive Plants (NYSDEC 2014).

The dominant emergent wetland community is consistent with the Ditch/Artificial Intermittent Stream plant community where water levels fluctuate in response to artificial controls as described in *Ecological Communities of New York* (Edinger et al. 2014). Non-native species are common and are primarily dominated by purple loosestrife, common reed, reed canary grass, and broadleaf cattail. In fact, it is noted that reed canary grass was historically frequently planted along ditches for erosion control purposes. Cattails are primarily found in deeper water conditions that other dominant species are less tolerant of.

Scattered clumps of trees occur within the site. An original tree survey was completed in December 2015. Dominant tree species included green ash (*Fraxinus pennsylvanica*) and red maple (*Acer rubrum*). At the time of the tree survey, and later confirmed by Arcadis, many trees identified were observed to be dead.

3.2 Restored Site Conditions (Post-Remediation)

A combination of ball and burlap trees, containerized trees and shrubs, herbaceous plugs, and a native seed mixture will be used to promote the development of a complex mosaic of native plant communities. Plant species selected for proposed planting communities were based on the species identified on site, representative of reference marshes in region, as well as documented in the *Ecological Communities of New York State* (Edinger et al. 2014). Each target plant community is described below. Design drawings with respect to site restoration are included in **Appendix B**. The following provides a summary of the targeted plant communities.

3.2.1 Shallow Emergent Wetland

This is the dominant plant community present within the project boundaries, representative of historic land uses, and regional hydrology. While the current condition is dominated by non-native species as described above, the restoration plan targets an emergent wetland community dominated by native forbs and graminoids, with scattered native shrubs throughout the habitat. In addition, micro-topographic

depressions will be restored within this marsh surface to promote habitat complexity. This habitat type will be restored by application of a native seed mix and plantings of broadleaf cat-tail.

3.2.2 Deep Emergent wetland

It is recognized that low lying areas along the channel as well as larger areas in the western half of the site are inundated for large periods of the growing season. Based upon water depths and surrounding plant communities, the existing dominant species is broad leaf cattail. Consistent with NYSDEC input, the restoration plan targets restoration of a cattail dominated community. Native species to be planted in these areas are broadleaf cattail, as well as bur-reeds (*Sparganium americanum, S. eurycarpum*).

3.2.3 Palustrine Scrub-Shrub Wetland

This community that is present in the western half of the project area will primarily be restored along the channel banks and will be buffered by adjacent palustrine forest. Selected species are able to survive water inundation for extended intervals, as expected in the western portion of the project area proximate to the restored channel. This habitat type will be initially seeded with a native seed mix and then planted with black willow (*Salix nigra*), red-osier and silky dogwood (*Cornus sericea, C. amomum*), speckled alder (*Alnus incana*), and arrowwood (*Viburnum dentatum*).

3.2.4 Palustrine Forested Wetland

Palustrine forested wetlands currently exist within the project boundaries but are primarily located and are dominant in the western half of the site. These existing habitats are dominated by green ash and red maple. As noted above, significant mortality of these mature trees has been documented over the past three years. Location of this habitat will generally reflect pre-existing conditions.

This habitat type will be initially seeded with a native seed mix that includes a diversity of native graminoids and select forbs. Dominant tree species to be planted include red maple, cottonwood (*Populus deltoides*), box elder (*Acer negundo*), sycamore (*Platanus occidentalis*), pin oak and swamp white oak (*Q. palustris, Quercus bicolor*), and hackberry (*Celtis occidentialis*). Native shrubs to be planted include silky dogwood, speckled alder, high-bush blueberry (*Vaccinium dentatum*), winterberry (*Ilex verticillata*), and arrowwood.

3.2.5 Upland Transitional Grassland

The existing community is dominated by non-native herbaceous species as described above. The restoration plan targets a native grassland community with strategic target pollinator species. This habitat type will primarily be restored by application of a native seed mix.

4 INVASIVE PLANT SPECIES OF CONCERN

Based upon Arcadis' understanding for current site conditions, as well as regional experience implementing and managing similar wetland restoration projects, the following invasive plant species of concern are included in this Plan (plants found onsite or adjacent to the site are indicated with an asterisk):

- Common reed *
- Purple loosestrife *
- Japanese honeysuckle (*Lonicera japonica*) *
- Multiflora rose (*Rosa multiflora*) *
- Mile-a-minute (*Persicaria perfoliata*)

A summary of management tools for each species is included as **Table 1**.

This Plan will be revised to include additional species as the need arises. The following sections provide an outline of potential control strategies specific to each species followed by recommended management tools. For the most part, many of these species have been researched for decades by universities, state and federal agencies, and land management groups. This Plan attempts to synthesize the findings and conclusions of these efforts to develop an effective and efficient approach to controlling invasive species on the site.

4.1 Common Reed

Collective research indicates that the most effective approaches available for land managers involves creating stresses through a regime of multiple treatment methods including chemical (i.e., application of herbicides approved for aquatic use) and mechanical (i.e., hand cutting or trimming) (Michigan Department of Environmental Quality [MIDEQ] 2014, Natural Resource Conservation Service [NRCS] 2010, New York Invasive Species Information [NYISI] 2018). This section provides the various methods of control and their applicability to the project area (i.e., toolbox), and then recommends a management approach based upon site conditions. Biological control, flooding or prescribed burning are not discussed in detail below for the following reasons: none exist (biological control), or the strategy would adversely impact the restored plant community (flooding and burning).

4.1.1 Mechanical Control

NYISI (http://nyis.info/invasive_species/common-reed/) identifies hand pulling as not a feasible long-term control strategy due to the expansive and tough rhizome network, and any rhizome fragments left in the soil can create new plants expanding the infestation (i.e., 1 plant becomes 2 or 3 plants). NYISI does identify repeated mowing as producing “short-term” results. However, mowing does not provide an effective long-term control strategy for this species. In addition, specific to an early successional restoration site, mowing is extremely difficult when the stands of common reed are not expansive monocultures. As pointed out by MIDEQ (2014),

> *“Mechanical methods must always be used carefully to avoid stimulating growth of Phragmites. Mowing alone leaves the plants’ rhizomes behind, and regeneration from those rhizomes may cause an increase in stand density. Improper use of mechanical methods, such as cutting during the wrong time of year, cutting too frequently, too short, or where native plants are present, can disrupt wildlife and destroy existing native plants.”*

Literature does identify that limited hand cutting or trimming after an initial herbicide treatment can help provide multiple stresses on the plants. However, a number of timing restrictions are required that include:

- Post-herbicide mowing should not occur until at least two weeks after herbicide application.
- Cut the treated plants once from fall until March 1st. For best results, mechanically cut stems when ground is frozen to minimize soil disturbance.

4.1.2 Chemical Control

NYISI identifies that new colonies, with smaller root and rhizome systems, are easier to control with herbicides. Multiple publications have demonstrated spot application (e.g., backpack sprayer, direct wipe) of a glyphosate-based herbicide approved for aquatic use to be an effective treatment on sites with smaller infestations or scattered individuals, with minimal impact to non-target plants or aquatic life (MIDEQ 2014, NRCS 2010; Vermont Invasives 2018; Marks et al. 1994). Taking into consideration several factors as it relates to timing and consistency of herbicide application, Arcadis has found this approach to be the most effective for suppression and maintenance of common reed. In fact, this approach has been critical on sites that must meet federal or state required performance criteria.

The key factors for effective chemical control using glyphosate-based herbicides include:

- Begin program immediately following completion of planting activities. Newly established plants are the easiest to effectively control. It also allows for spot application of herbicides, which minimizes overall application within the project area.
- Timing treatment to target plants immediately after flowering to limit seed production while maximizing the effect of the herbicide's mode of action.
- If possible, control of surrounding seed source populations.
- Diligence with monitoring and follow-up treatments to kill the existing root stock and exhaust the seed bank. It is anticipated that annual control will be required given surrounding populations.
- Enhancement seeding with native species to minimize the potential for recolonization in herbicide treated areas.

4.1.3 Management Tools

It should be noted that the implemented restoration plan provides the first line of defense in terms of "prevention"; by planting and seeding species that will quickly establish the project aims to limit the colonization of common reed within the restoration site. However, surrounding populations do pose a risk and some colonization of common reed within the restoration site is to be expected during the compliance monitoring interval. The following management tools for the control of common reed in the project area were developed based on recommendations presented in the current literature, product labels, best professional judgment, and consideration to project area-specific conditions:

- Spot application of a glyphosate-based herbicide solution labeled for use at aquatic sites (e.g., AquaNeat) mixed with a non-ionic surfactant to individual fronds and or stands in late-summer after plants are in full bloom. To minimize off-target drift foliar applications will be conducted using the following techniques based on on-site conditions at the time of application.
    - Dense patches: backpack sprayers set to administer a large droplet size of a ¾% solution
    - Areas of sparse coverage: individual fronds will be treated by "hand wipe" application of a 33% solution
- Nozzles will also be equipped with drift shields.

- Standing vegetation will be cut by hand or with weed trimmers at least 2 weeks or later following herbicide application.
- The need for treatments during subsequent growing seasons will be evaluated during routine monitoring events (i.e., spring and/or summer site visits).

4.2 Purple Loosestrife

The existing literature as it relates to control of purple loosestrife identifies three possible approaches for controlling this highly invasive species:

- Mechanical (i.e., hand-pulling)
- Chemical (i.e., application of herbicides approved for aquatic use)
- Biological (i.e., release of insects)

There is no “one-size fits all” approach and the selection of any control method must be based on site-specific considerations including the size of the project area, extent and stage of infestation, overall management objectives, and expertise of those conducting the control activities. The literature commonly identifies the combination of multiple approaches to successfully control and limit spread of purple loosestrife on a site. Similar to the discussion of common reed, flooding or prescribed burning are not discussed in detail below as the strategy would adversely impact the restored plant community.

4.2.1 Mechanical Control

Mechanical removal by hand-pulling or digging is typically only effective for seedlings with small roots, and over small areas (NRCS 2006, NYISI 2018, Lym and Travnicek 2015, PADCNR 2018). Larger plants should not be mechanically removed due to plants ability to sprout vegetatively from root and stem fragments. Similarly, mowing or cutting is not an effective approach and can add to the spread of purple loosestrife due to the plant’s ability to sprout vegetatively from fragments.

If caught during the early stages of colonization (i.e., likely through seed), mechanical control can be one tool that can be used in combination with other approaches to successfully control and limit the spread of purple loosestrife within the project. Based upon knowledge of surrounding plant communities, seed spread into the restoration site is expected to be continual throughout the required monitoring interval. Given a project site of this size, it may not be possible to mechanically remove all seedlings. But mechanical control could prove to be a useful tool, in combination with other approaches, in controlling purple loosestrife.

4.2.2 Chemical Control

Current literature indicates that properly timed herbicide treatment using surgical spot application of a glyphosate-based herbicide approved for aquatic use is effective for treating infestations in sites similar to the project area, with minimal impact to non-target plants or aquatic life (NRCS 2006, Lym and Travnicek 2015, PADCNR 2018, Vermont Invasives 2018, Cygan 2004, Adirondack Park Invasive Plant Program 2018, MNDNR 2018, New Jersey Invasive Species Strake Team 2018). This approach, in combination with biological control and strategic mechanical control, can be effective for minimizing and controlling

spread of purple loosestrife. Key factors for effective chemical control using glyphosate-based herbicides include:

- Begin program immediately following completion of planting activities. Newly established plants are the easiest to effectively control. It also allows for spot application of herbicides, which minimizes overall application within the project area.
- Timing treatment to target mature plants immediately after flowering to limit seed production while maximizing the effect of the herbicide's mode of action.
- If possible, control of surrounding seed source populations.
- Diligence with monitoring and follow-up treatments to exhaust the seed bank.
- Enhancement seeding with native species to minimize the potential for recolonization in treated areas.

4.2.3 Biological Control

Biological control through the release of leaf eating beetles (i.e., *Galerucella calmariensis* and *Galerucella pusilla*) and two weevils (i.e., *Hylobius transversovittatus, Nanophyes marmoratus*) has had a measure of success in controlling purple loosestrife, and most specifically on reducing the severity of larger stands of purple loosestrife (MNDNR 2018, Cygan 2004, Gundlach 2007, NYISI 2018). The leaf-feeding beetles defoliate and attack apical buds as both adults and larvae and can slow growth and diminish seed production. The weevil *Hylobius transversovittatus* feeds on seeds and flower buds, and *Hylobius transversovittatus* attacks both roots (as larvae) and foliage (as adults).

Unfortunately, biological control agents require a certain population size of purple loosestrife to survive and succeed. In addition, biological agents acting alone do not eradicate purple loosestrife but only act to reduce the severity of the population (Pennsylvania Department of Conservation and Natural Resources [PADCNR] 2018, MNDNR 2018, Cygan 2004). Specific to this restoration project that must meet stipulated performance criteria, biological control is one tool that could be used in combination with other approaches to successfully control and limit the spread of purple loosestrife within the project area. It should be noted that NYSDEC Division of Fish, Wildlife and Marine Resources requires formal approval prior to releasing biological control beetles or weevils.

4.2.4 Management Tools

The following management tools for the control of purple loosestrife in the project area were developed based on recommendations presented in the current literature, product labels, best professional judgment, and consideration to project area-specific conditions:

- Early summer visits to qualitatively evaluate colonization of purple loosestrife, and to strategically hand remove or dig out seedlings. All vegetated materials will be bagged and properly disposed of off-site.
- Introduction of biological control agents to surrounding wetlands not impacted by the project, but which represent a potential seed source.
- As required, a summer (i.e., July) visit focused on surgical foliar spot application of a 1- 1 ½ % glyphosate-based herbicide solution labeled for use at aquatic sites (e.g., AquaNeat) mixed with a

non-ionic surfactant to mature plants immediately after flowering. This will kill mature plants and limit seed production within the project area.
    - To minimize off-target drift, applications will be conducted using backpack sprayers set to administer a large droplet size; foliar application will be applied to approximately 25-35% of the foliage on an individual plant and during application the nozzle will be held within approximately 6-inches of the foliage. Nozzles will also be equipped with drift shields.
- A subsequent treatment in late-August through September may be required to target individual plants missed during the previous application.

4.3 Japanese Honeysuckle

Japanese honeysuckle is a common invader of disturbed soils, and early successional plant communities throughout the region. Based upon available literature, as well as best professional judgment, two approaches have been identified as possible options for this site:

- Mechanical (i.e., hand-pulling)
- Chemical (i.e., application of herbicides approved for aquatic use)

The approach will depend upon extent of colonization within the site, and ability to utilize mechanical control. Mechanical control will be deferred as the first approach in a long-term management tools but may require chemical control to support.

4.3.1 Mechanical Control

NYSDEC (2018) identifies hand pulling or digging out Japanese honeysuckle as a proven and effective approach, especially on smaller stands. However, NYSDEC recognizes that mowing or cutting is not an effective approach, as it does not kill the plant, and generally stimulates dense regrowth.

If caught during the early stages of colonization (i.e., likely through seed), mechanical control must be the first line of defense when controlling Japanese honeysuckle. However, this Plan recognizes that a project of this size may pose difficulties to effectively remove all seedlings.

4.3.2 Chemical Control

Because Japanese honeysuckle retains leaves through all or most of the winter, chemical control can be applied in a manner that minimizes risk to native species. Spot application with glyphosate-based herbicide for aquatic use shortly after the first frost appears to be the most effective treatment (NYSDEC 2018, Missouri Department of Conservation 2018, Delaware Invasives 2018). This approach, in combination with mechanical control, can be effective for minimizing and controlling spread of Japanese honeysuckle. Key factors for effective chemical control using glyphosate-based herbicides include:

- Begin program immediately following completion of planting activities. Newly established plants are the easiest to effectively control.
- Timing treatment to target mature plants after first frost to minimize impacts to adjacent native species.
- If possible, control of surrounding seed source populations.
- Diligence with monitoring and follow-up treatments.

4.3.3 Management Tools

The following management tools for the control of Japanese honeysuckle in the project area were developed based on recommendations presented in the current literature, product labels, best professional judgment, and consideration to project area-specific conditions:

- Early summer visits to qualitatively evaluate colonization of Japanese honeysuckle, and to strategically hand remove or dig out seedlings. All vegetated materials will be bagged and properly disposed of off-site. Alternatively, vegetated material can be stockpiled in a dry location away from the restoration area and monitored closely for re-sprouting.
- As required, a fall visit (September or October) focused on surgical foliar spot application of a 1- 1 ½ % glyphosate-based herbicide solution labeled for use at aquatic sites (e.g., AquaNeat) mixed with a non-ionic surfactant to mature plants immediately after flowering. This will kill mature plants.
    - To minimize off-target drift, applications will be conducted using backpack sprayers set to administer a large droplet size; foliar application will be applied to approximately 25-35% of the foliage on an individual plant and during application the nozzle will be held within approximately 6-inches of the foliage. Nozzles will also be equipped with drift shields.

It should be noted that similar management tools also could apply to Morrow's (*Lonicera morrowii*), Titarian (*L. tatarica*), Amur (L. maackii) and Bell's honeysuckle (*L. x bella*).

4.4 Multiflora Rose

Multiflora rose is a common invader of disturbed soils, and early successional plant communities throughout the region. Based upon available literature, as well as best professional judgment, two approaches have been identified as possible options for this site:

- Mechanical (i.e., hand-pulling)
- Chemical (i.e., application of herbicides approved for aquatic use)

The approach will depend upon extent of colonization within the site, and ability to utilize mechanical control. Mechanical control will be deferred as the first approach in a long-term management strategy.

4.4.1 Mechanical Control

NYISI (2018) identifies that hand pulling of seedlings can be an effective strategy. Larger plants are more difficult, and care must be taken to remove all roots. Frequent and repeated cutting or mowing (i.e., 3-6 times per year) has been shown to be effective, but such a frequency is not practical on a restoration site of this size.

If caught during the early stages of colonization (i.e., likely through seed), mechanical control must be the first line of defense when controlling multiflora rose. However, this Plan recognizes that a project of this size may pose difficulties to effectively remove all seedlings.

4.4.2 Chemical Control

Spot application with a glyphosate-based herbicide for aquatic use to either cut stump or to vegetative material conducted late in the growing season, or early in the spring, has proven successful (NYISI 2018, NRCS 2018, Ahrens 1979). However, due to long lived seeds in the soil profile, multiple efforts may be required over the monitoring interval.

4.4.3 Management Tools

The following management tools for the control of multiflora rose in the project area were developed based on recommendations presented in the current literature, product labels, best professional judgment, and consideration to project area-specific conditions:

- Early summer visits to qualitatively evaluate colonization of multiflora rose, and to strategically hand remove or dig out seedlings. All vegetated materials will be bagged and properly disposed of off-site. Alternatively, vegetated material can be stockpiled in a dry location away from the restoration area and monitored closely for re-sprouting.
- As required, a fall visit focused on surgical foliar spot application of a 1- 1 ½ % glyphosate-based herbicide solution labeled for use at aquatic sites (e.g., AquaNeat) mixed with a non-ionic surfactant to mature plants immediately after flowering. This will kill mature plants. Alternatively, glyphosate-based herbicide solution could be applied to cut stems.
    - To minimize off-target drift, applications will be conducted using backpack sprayers set to administer a large droplet size; foliar application will be applied to approximately 25-35% of the foliage on an individual plant and during application the nozzle will be held within approximately 6-inches of the foliage. Nozzles will also be equipped with drift shields.

4.5 Mile-A-Minute

Mile-a-minute is a common invader of disturbed soils, and early successional plant communities throughout the region. Based upon available literature, as well as best professional judgment, three approaches have been identified as possible options for this site:

- Mechanical (i.e., hand-pulling)
- Chemical (i.e., application of herbicides approved for aquatic use)
- Biological (i.e., weevil release)

The approach will depend upon extent of colonization within the site, and ability to utilize mechanical control. Biological control could be implemented in surrounding wetland areas as needed. Mechanical control will be deferred to as the first approach within the project area.

4.5.1 Mechanical Control

NYISI (2018) identifies that hand pulling of seedlings can be an effective strategy. Hand pulling should be done as early in season as possible. If hand pulling is done later in season, extreme caution must be taken so as the fruit is not knocked off the vine and spread through the site.

Low growing populations of mile-a-minute weed can have their resources exhausted through repeated mowing or cutting. However, this would require dense stands and would lead to similar adverse impacts to any associated native plant species.

4.5.2 Chemical Control

Spot application with glyphosate-based herbicide for aquatic use to vegetative growth can be conducted in moderate doses with success (NYISI 2018). The problem is mile-a-minute is often found growing over desirable vegetation, and herbicide application adversely impacts both. Chemical control should only be employed when infestation is widespread enough to be adversely impacting establishment of native plants and achievement of performance criteria.

4.5.3 Biological Control

The mile-a-minute weevil, *Rhinocominus latipes*, is a black weevil which is host-specific to mile-a-minute and has been successfully released in multiple locations in the U.S. Over time, mile-a-minute weevils have been shown to reduce spring seedling counts and could be a preventative measure in adjacent marshes if required.

Mile-a-minute weevil feeding damage can stunt plants by causing the loss of apical dominance and can delay seed production. In the presence of competing vegetation, mile-a-minute weed can be killed by the weevil (NYISI 2018).

4.5.4 Management Tools

The following management tools for the control of minute-a-mile in the project area were developed based on recommendations presented in the current literature, product labels, best professional judgment, and consideration to project area-specific conditions:

- Early summer visits to qualitatively evaluate colonization of mile-a-minute, and to strategically hand remove or dig out seedlings. All vegetated materials will be bagged and properly disposed of off-site. Alternatively, vegetated material can be piled in an upland location where plant material can be dried and closely monitored.
- Evaluation of need for biological control in adjacent marsh.
- In situations where the native plant community is adversely impacted and performance criteria are not being met due to spread of mile-a-minute, conduct a fall visit focused on surgical foliar spot application of a 1- 1 ½ % glyphosate-based herbicide solution labeled for use at aquatic sites (e.g., AquaNeat) mixed with a non-ionic surfactant to mature plants immediately after flowering. This will kill mature plants or can be applied to cut stems.
    - To minimize off-target drift, applications will be conducted using backpack sprayers set to administer a large droplet size; foliar application will be applied to approximately 25-35% of the foliage on an individual plant and during application the nozzle will be held within approximately 6-inches of the foliage. Nozzles will also be equipped with drift shields.
- Native seeding in fall or spring following herbicide application to directly address potential impacts to native species.

5 DISPOSAL AND SANITATION PROCEDURES

Recognizing mechanical control is likely required for the majority of species included in this plan, proper collection, bagging, disposal, as well as clean-up procedures is required to avoid the further spread of invasive species.

Prior to mobilization to the site, clothing, boots, and any equipment will be cleaned and inspected to prevent spread of invasive species from off-site areas to the site.

Vegetative material derived from hand pulling or digging of purple loosestrife, common reed (seedlings), Japanese honeysuckle, mile-a-minute, and fruit bearing multiflora rose will be bagged on site as close to the point of removal as practicable. Bags will be heavy duty black contractor bags (i.e., 3 mil or thicker). All bags will be securely tied or sealed. Bags will be disposed of in an approved landfill.

Harvested common reed and multiflora rose that does not include seed heads or fruits may be composted on-site in an upland area or disposed of at an approved landfill with other vegetative material.

Sanitation and clean-up procedures following control activities on site will occur to avoid further spread of invasive species. All clothing, boots, and any equipment used on site will be properly cleaned to remove seeds or propagules. Vegetative material that is removed during cleaning will be bagged, securely sealed, and disposed of in an approved landfill. In addition, work boots will be washed on-site to avoid removal of soil and in turn seeds or propagules.

6 SCHEDULE

While this Plan attempts to be dynamic in nature to effectively address site conditions as they arise, a 'typical' schedule is outlined in **Table 2** for timing of site visits and overview of potential treatment methods. The timing of each outlined site visit will depend upon annual weather patterns, and observed site conditions in the region and specifically within the site. The size of maintenance team and number of days to complete each site visit will be based upon site conditions and extent of invasive species within the restoration area. CHGE will consult with NYSDEC as necessary if mechanical controls alone become impracticable based upon developing site conditions.

7 CONCLUSIONS

This plan discusses several approaches for the management of invasive species (**Table 1**) and anticipated schedule and approach for 2019 control activities (**Table 2**). Proposed control activities will occur within the remedial areas, as well as in an approximate 100-foot buffer around this area as deemed necessary. The protective treatment buffer is intended to limit seed dispersal or vegetative recruitment within the restoration area. Herbicide treated areas will be seeded, and mulched as necessary, with a native seed mix equal or similar to that approved as part of the project's restoration plan (Arcadis 2018b). Seeding will occur in the fall or subsequent spring following control activities to promote native species establishment and diminish likelihood for recruitment of invasive species.

8 REFERENCES

Adirondack Park Invasive Plant Program. 2018. Species of Concern, Common Reed Grass. http://adkinvasives.com/species_of_concern/common-reed-grass/

Adirondack Park Invasive Plant Program. 2018b. Species of Concern, Purple Loosestrife. http://adkinvasives.com/species_of_concern/purple-loosestrife/

Ahrens, J.F. 1979. Chemical Control of Multiflora Rose. Proceedings NE Weed Science Society.

Arcadis 2018a. Remedial Action Work Plan. Central Hudson Gas & Electric Elting's Corners Facility, South Street, Town of Lloyd, Ulster County, New York.

Arcadis 2018b. Restoration and Monitoring Plan. Central Hudson Gas & Electric Elting's Corners Facility, South Street, Town of Lloyd, Ulster County, New York.

Cygan, D. 2004. Biological Control of Purple Loosestrife, 2003 Annual Report. New Hampshire Department of Agriculture, Markets & Food Plant Industry Division and New Hampshire Department of Transportation Bureau of Environment. January 2004.

Delaware Invasives. 2018. Japanese Honeysuckle. http://delawareinvasives.net/yahoo_site_admin/assets/docs/japanese_honeysuckle.307113731.pdf

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Gundlach, A.M. 2007. Invasive Species Guidebook for Department of Defense Installations in the Chesapeake Bay Watershed: Identification, Control and Restoration. Wildlife Habitat Council. Silver Spring, Maryland. Prepared for the Department of Defense Legacy Resource Management Program, Project 06-328.

Lym, R., A.J. Travnicek. 2015. Identification and Control of Invasive and Troublesome Weeds in North Dakota. North Dakota Agricultural Experiment Station. May, 2015.

Marks, M. B. Lapin, and J. Randall. 1994. Element Stewardship Abstract for *Phragmites australis*. The Nature Conservancy.

Michigan Department of Environmental Quality. 2014. A Guide to the Control and Management of Invasive Phragmites, 3rd Edition.

Missouri Department of Conservation. 2018. Japanese Honeysuckle Control. https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/japanese-honeysuckle-control

Natural Resources Conservation Service. 2006. Herbaceous Weed Control - Invasive Plant Control, Conservation Practice Job Sheet VT-315.

New Hampshire Department of Environmental Services. Environmental Fact Sheet, WD-BB-45, Purple Loosestrife: An Exotic Menace. 2010.

New Jersey Invasive Species Council. 2009. New Jersey Strategic Management Plan for Invasive Species. Trenton, NJ.

New Jersey Invasive Species Strike Team. 2018. Invasive Species Fact Sheets, Purple Loosestrife. http://www.njisst.org/fact-sheets.htm

New York State Department of Environmental Conservation. 2014. New York State Prohibited and Regulated Invasive Plants. September 10, 2014.

New York Invasive Species Information. 2018a. New York State's integrated invasive species database. http://nyis.info/?action=invasive_detail&id=42

New York State Department of Environmental Conservation. 2018b. Control Methods for Select Invasive Plant Species. https://www.dec.ny.gov/docs/lands_forests_pdf/sfinvasivecontrol.pdf

Pennsylvania Department of Conservation and Natural Resources. 2018a. Invasive Plants in Pennsylvania, Common Reed.

Pennsylvania Department of Conservation and Natural Resources. 2018b. Invasive Plants in Pennsylvania, Purple Loosestrife. 2018.

Vermont Invasives. 2018. https://www.vtinvasives.org/

TABLES

Table 1. Summary of Management Tools

Invasive Species Adaptive Management Plan
Central Hudson Gas & Electric Corporation
Elting's Corners Facility
Lloyd, New York

Common Name	Scientific Name	Control Approach			Recommended Management Tools
		Biological	Mechanical	Chemical	
Common reed	*Phragmites australis*	None	Hand pulling only a short term strategy. Repeated mowing only a short-term strategy.	Effective use of spot application of glyphosate-based herbicide for aquatic use (i.e. AquaNeat).	1. Late summer (August and September) spot application of a glyphosate-based herbicide solution mixed with a non-ionic surfactant to individual fronds and or stands in late-summer after plants are in full bloom. 2. Standing vegetation will be cut by hand or with weed trimmers at least 2 weeks following herbicide application.
Purple loosestrife	*Lythrum salicaria*	Biological control through the release of leaf eating beetles (i.e., *Galerucella calmariensis* and *Galerucella pusilla*) and two weevils (i.e., *Hylobius transversovittatus*, *Nanophyes marmoratus*) has had a measure of success in controlling purple loosestrife, and most specifically on reducing the severity of larger stands of purple loosestrife	Mechanical removal by hand-pulling or digging is typically only effective for seedlings with small roots, and over small areas. Larger plants should not be mechanically removed due to plants ability to sprout vegetatively from root and stem fragments. Similarly, mowing or cutting is not an effective approach.	Effective use of spot application of glyphosate-based herbicide for aquatic use (i.e. AquaNeat).	1. Early summer (May or June) visits to qualitatively evaluate colonization, and to strategically hand remove or dig out seedlings. 2. In 2019, summer (i.e., July) visit focused on foliar spot application of a 1- 1 ½ % glyphosate-based herbicide. Herbicide application in subsequent years will be based upon site conditions and continued coordination with NYSDEC. 3. In 2019, a subsequent treatment (August or September) may be required to target individual plants missed during the previous application. 4. As needed, introduction of biological control agents to surrounding wetlands not impacted by the project.
Japanese honeysuckle	*Lonicera japonica*	None	Hand pulling or digging out plants has proven an effective approach on smaller stands. However, mowing or cutting is not an effective approach as it does not kill the plant and generally stimulates dense growth.	Effective use of spot application of glyphosate-based herbicide for aquatic use (i.e. AquaNeat).	1. Early summer visits to qualitatively evaluate colonization, and to strategically hand remove or dig out seedlings. 2. As required and approved by NYSDEC, fall (i.e., September or October) visit focused on surgical foliar spot application of a 1- 1½% glyphosate-based herbicide.
Multiflora rose	*Rosa multiflora*	None	Hand pulling or digging out plants has proven an effective approach on smaller stands. However Frequent or repeated cutting or mowing has been shown to be effective, but such frequency is not practical on a restoration site this size.	Effective use of spot application of glyphosate-based herbicide for aquatic use (i.e. AquaNeat).	1. Early summer visits to qualitatively evaluate colonization, and to strategically hand remove or dig out seedlings. 2. As required and approved by NYSDEC, fall (i.e., September or October) visit focused on surgical foliar spot application of a 1- 1½% glyphosate-based herbicide.
Mile-a-minute	*Persicaria perfoliata*	The mile-a-minute weevil, *Rhinocominus latipes,* is a black weevil that is host-specific to mile-a-minute and has been successfully released in multiple locations in the U.S. Over time, mile-a-minute weevils have been shown to reduce spring seedling counts and could be a preventative measure in adjacent marshes if required.	Hand pulling of seedlings can be an effective strategy. Hand pulling should be done as early in season as possible. If hand pulling is done later in season, extreme caution must be taken so as the fruit is not knocked off the vine and spread through the site.	Spot application with glyphosate-based herbicide for aquatic use to vegetative growth can be conducted in moderate doses with success. The problem is mile-a-minute is often growing over desirable vegetation, and herbicide application adversely impacts both. Chemical control should only be employed when infestation is widespread enough to be adversely impacting establishment of native plants and achievement of performance criteria.	1. Early summer visits to qualitatively evaluate colonization and to strategically hand remove or dig out seedlings. 2. As required and approved by NYSDEC, late summer (i.e., August and September) visit focused on foliar spot application of a 1- 1 ½ % glyphosate-based herbicide. 3. As needed, introduction of biological control agents to surrounding wetlands not impacted by the project.

Table 2. Schedule of Typical Annual Management Activities

Invasive Species Adaptive Management Plan
Central Hudson Gas & Electric Corporation
Elting's Corners Facility
Lloyd, New York

Timing of Site Visit	Target Invasive Species	Anticipated Management Activities
Spring (April to early May)	Qualitative observations of all species listed herein, but not limited to.	Strategic mechanical control of seedlings and/or cutting of standing dead biomass of treated individuals from previous fall. Enhancement seeding and mulching as necessary for areas treated with herbicides in previous year.
Summer (June to late July)	Purple loosestrife	Herbicide application to purple loosestrife prior to development of mature fruits (2019). Hand wicking foliar application. Mechanical cutting of standing above ground biomass of isolated individuals of purple loosestrife (post-2019). Mechanical removal of smaller individuals of listed species herein (with exception of common reed).
Late Summer (August to September)	Common reed	Herbicide application to common reed. Hand wicking foliar application as determined feasible in the field. Continued mechanical control of other target species as needed. Enhancement seeding as deemed necessary for areas treated with herbicide during summer site visit. Depending upon timing of summer visit, seeding may be deferred to the following spring.

FIGURES

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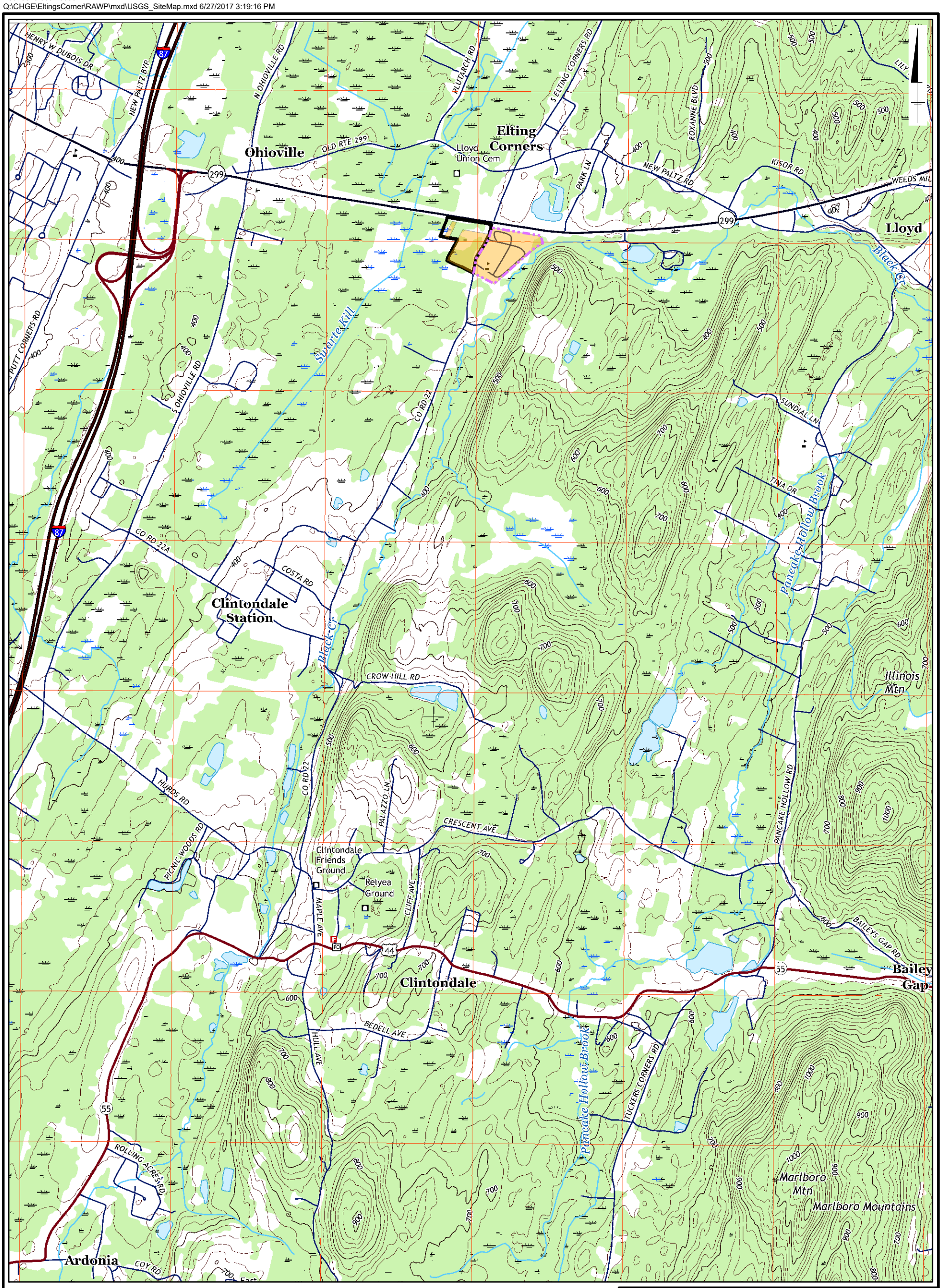

LEGEND
- SITE BOUNDARY
- CHGE ELTING'S CORNER FACILTY
- CHGE OWNED PROPERTY

0 2,000 4,000 Feet
GRAPHIC SCALE

NOTE:
1. 2016 USGS 7.5 MINUTE TOPOGRAPHIC MAP DOWNLOADED FROM NATIONALMAP.COV

C.H.G.E CORP.
ELTINGS CORNERS PROPERTY
SOUTH STREET, TOWN OF LLOYD, ULSTER COUNTY, NEW YORK

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

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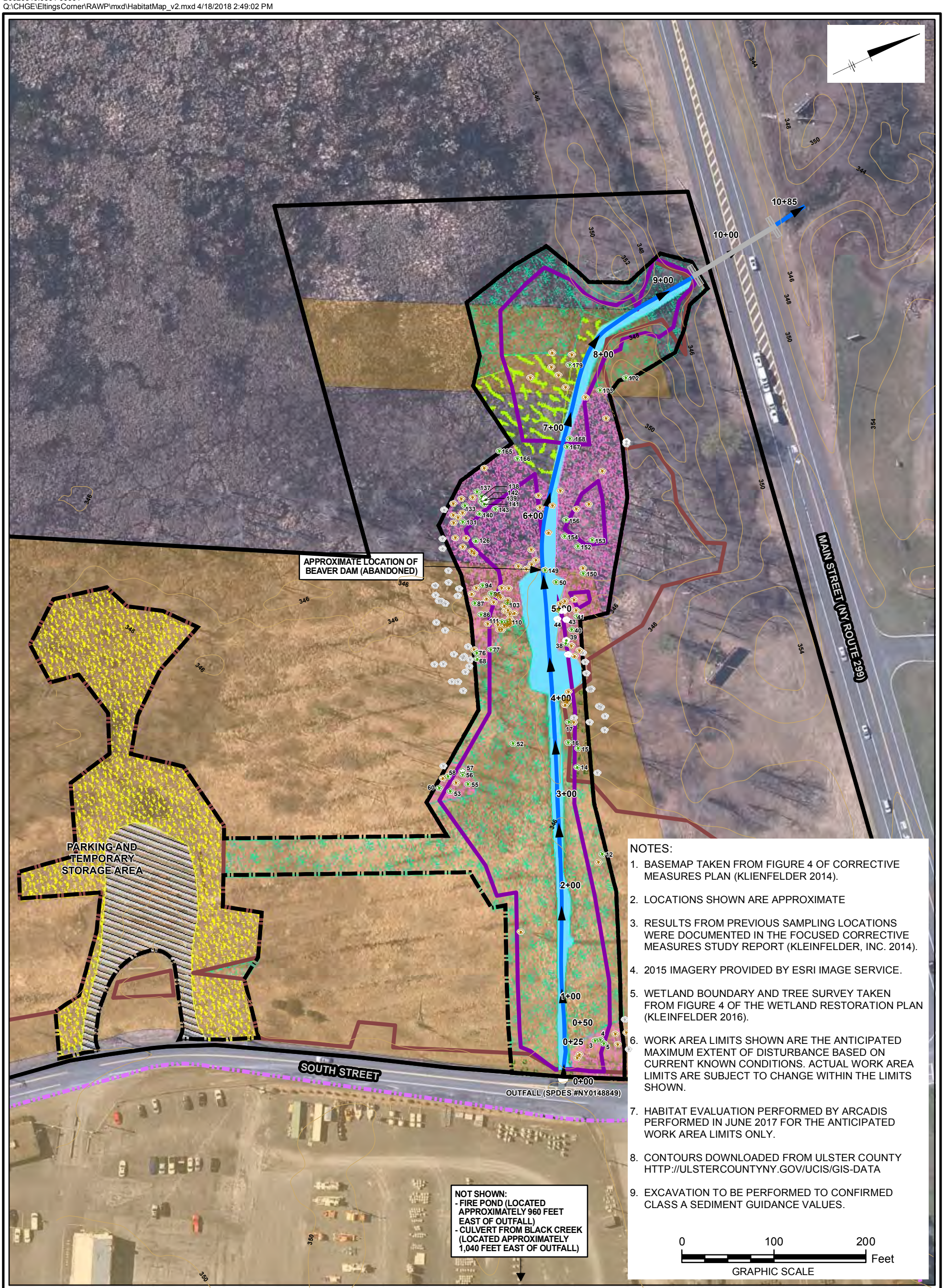


NOTES:

1. BASEMAP TAKEN FROM FIGURE 4 OF CORRECTIVE MEASURES PLAN (KLIENFELDER 2014).
2. LOCATIONS SHOWN ARE APPROXIMATE
3. RESULTS FROM PREVIOUS SAMPLING LOCATIONS WERE DOCUMENTED IN THE FOCUSED CORRECTIVE MEASURES STUDY REPORT (KLEINFELDER, INC. 2014).
4. 2015 IMAGERY PROVIDED BY ESRI IMAGE SERVICE.
5. WETLAND BOUNDARY AND TREE SURVEY TAKEN FROM FIGURE 4 OF THE WETLAND RESTORATION PLAN (KLEINFELDER 2016).
6. WORK AREA LIMITS SHOWN ARE THE ANTICIPATED MAXIMUM EXTENT OF DISTURBANCE BASED ON CURRENT KNOWN CONDITIONS. ACTUAL WORK AREA LIMITS ARE SUBJECT TO CHANGE WITHIN THE LIMITS SHOWN.
7. HABITAT EVALUATION PERFORMED BY ARCADIS PERFORMED IN JUNE 2017 FOR THE ANTICIPATED WORK AREA LIMITS ONLY.
8. CONTOURS DOWNLOADED FROM ULSTER COUNTY HTTP://ULSTERCOUNTYNY.GOV/UCIS/GIS-DATA
9. EXCAVATION TO BE PERFORMED TO CONFIRMED CLASS A SEDIMENT GUIDANCE VALUES.

0 100 200 Feet
GRAPHIC SCALE

LEGEND

- TREE - LIVING IN WORK AREA
- TREE - DEAD IN WORK AREA
- TREE - OUTSIDE WORK AREA
- 2 FOOT CONTOUR
- CHANNEL CENTERLINE
- MAXIMUM EXCAVATION LIMITS (SEE NOTE 9)
- SITE BOUNDARY
- CHGE ELTING'S CORNER FACILTY
- CHGE OWNED PROPERTY
- WORK AREA LIMITS
- OPEN WATER
- EMERGENT MARSH (INVASIVE)
- PALUSTRINE FOREST (GREEN ASH)
- PALUSTRINE SCRUB SHRUB (DOGWOOD)
- ROAD/LAYDOWN AREA
- UPLAND FOREST (GREEN ASH)
- UPLAND RUDERAL

C.H.G.E CORP.
ELTINGS CORNERS PROPERTY
SOUTH STREET, TOWN OF LLOYD, ULSTER COUNTY, NEW YORK

PRE-CONSTRUCTION CONDITIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

APPENDIX A

Notice of Non-Jurisdiction for Permit to Use a Pesticide

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Materials Management, Bureau of Pest Management, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3097 | F: (845) 255-3414
www.dec.ny.gov

October 10, 2017

CENTRAL HUDSON GAS & ELECTRIC (via email @ cderoberts@cenhud.com)
CHRIS DEROBERTS
284 SOUTH AVENUE
POUGHKEEPSIE NY 12601

Re: Notice of Non-Jurisdiction for Permit to Use a Pesticide for the Control of an Aquatic Pest, T/Lloyd, Ulster County

Dear Mr. DeRoberts:

The New York State Department of Environmental Conservation has determined that, due to the request to treat only terrestrial areas for the control of phragmites at the above referenced location, no Article 15 (Permit to Use a Pesticide for the Control of an Aquatic Pest) is required.

All applicable NYS Environmental Laws, and Rules and Regulations must be adhered to regarding any application of pesticides at this location.

If you have any questions, you may contact us at 845-256-3097.

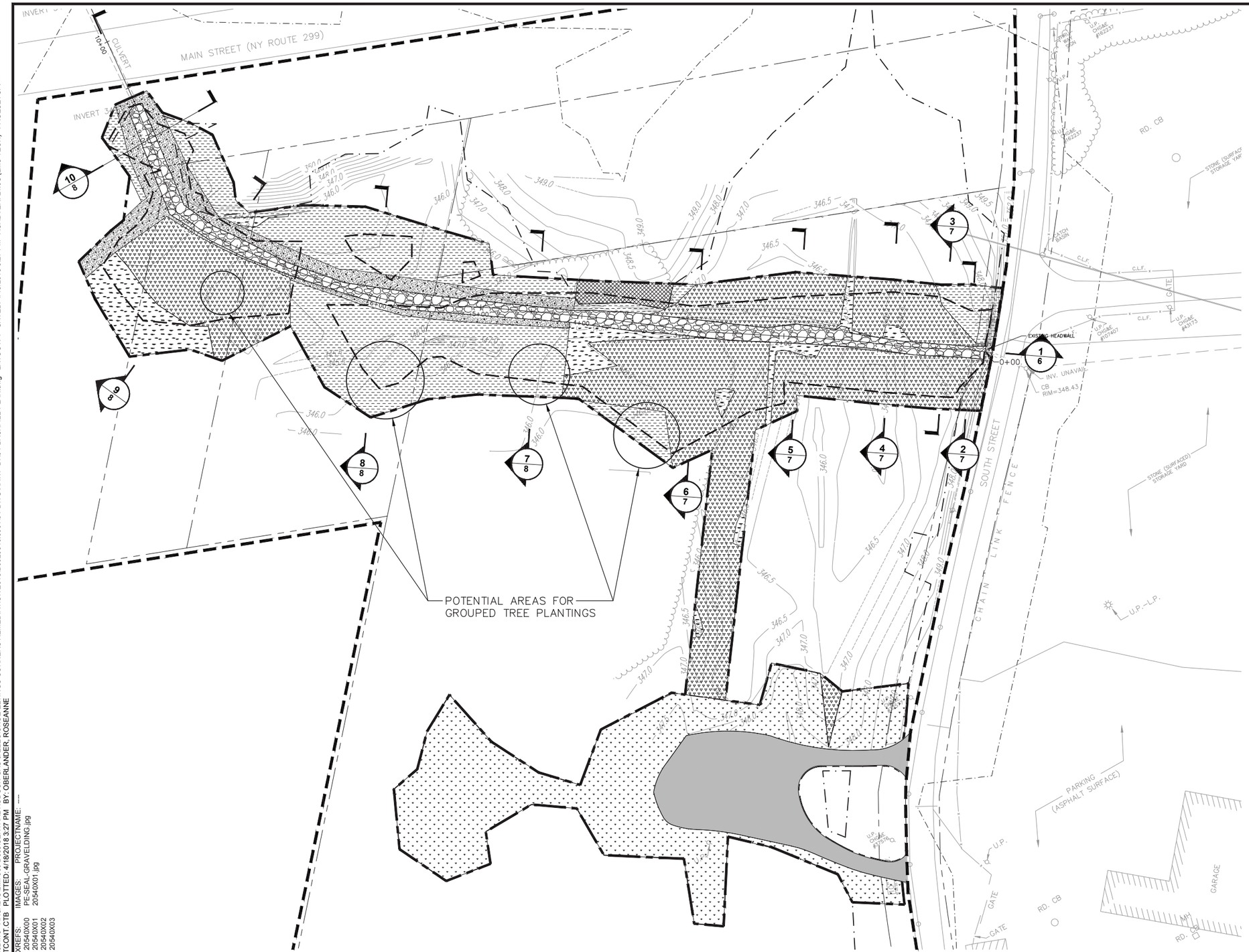
Sincerely,

Colleen Darcy
Pesticide Control Specialist 1
Region 3

Cc: Gary Markiewicz gary.markiewicz@arcadis.com
Jennifer Dawson jennifer.dawson@dec.ny.gov
Catherine Ahlers catherine.ahlers@dec.ny.gov

APPENDIX B

Restoration Design Drawings



LEGEND:

- SHALLOW EMERGENT WETLAND
- DEEP EMERGENT WETLAND
- FORESTED WETLAND
- UPLAND FOREST
- SCRUB SHRUB WETLAND
- GRAVEL ROAD/LAYDOWN AREA
- UPLAND
- CHANNEL (SEE NOTE 4)
- SEDIMENT REMOVAL AREA (MAXIMUM, SEE NOTE 2)
- PROPERTY BOUNDARY (APPROXIMATE)
- DELINEATED WETLAND BOUNDARY
- 100-FT WETLAND BUFFER
- 347.5 — 2015 TOPOGRAPHIC/PROPOSED FINAL CONTOUR (0.5 FT. INTERVAL)
- SITE BOUNDARY (APPROXIMATE)
- WORK AREA (LIMITS OF POTENTIAL DISTURBANCE)

NOTES:

1. REFER TO EXISTING CONDITIONS DRAWING FOR BASE MAP NOTES AND GENERAL CONDITIONS.
2. RESTORATION LIMITS SUBJECT TO CHANGE BASED ON ACTUAL LIMITS OF DISTURBANCE (E.G., EXCAVATION LIMITS, SUPPORT AREA LIMITS). EXTENT SHOWN HERE IS MAXIMUM ANTICIPATED RESTORATION EXTENT.
3. CONTRACTOR SHALL PERFORM BACKFILL IN THE DRY. ⚠
4. CHANNEL SHALL BE RESTORED AS SHOWN IN DRAWINGS 6 THROUGH 9. CHANNEL BANKS SHALL TIE INTO ADJACENT WETLANDS RESTORED AS CLOSE TO ORIGINAL GRADE AS PRACTICABLE.
5. MICRODEPRESSIONS WILL BE CONSTRUCTED WITHIN THE SHALLOW EMERGENT, FORESTED WETLAND, AND SCRUB-SHRUB WETLAND PLANT COMMUNITIES AT DIRECTION OF WETLAND SCIENTIST. DEPRESSIONS WILL BE ASSOCIATED WITH DEPICTED MOUNDS AS APPROPRIATE. A MINIMUM OF 15 MICRODEPRESSIONS WILL BE CONSTRUCTED.
6. COARSE WOOD (I.E., CUT NATIVE TREES) WILL BE PLACED RANDOMLY THROUGHOUT RESTORED FLOODPLAIN AT DIRECTION OF WETLAND SCIENTIST. A MINIMUM OF 30 LOGS WILL BE LOCATED WITHIN THE RESTORED FLOODPLAIN.
7. AREAS OF POTENTIAL GROUPED TREE PLANTS REFLECT CONDITIONS DOCUMENTED IN THE EXISTING TREE SURVEY. GIVEN RESTORATION OF PONDED AREA, TREE PLANTINGS MAY BE GROUPED AT DISCRETION OF WETLAND SCIENTIST WITHIN THE OVERALL DEFINED PLANTING POLYGON FOR PALUSTRINE WETLANDS TO ADDRESS EXISTING AND/OR ANTICIPATED HYDROLOGIC CONDITIONS. ⚠

TABLE 1. MITIGATION SUMMARY

Habitat Type	Pre-Restoration Condition Area (Acres)	Post-Restoration Condition Area (Acres)
Palustrine Forest Wetland	0.85	1.04
Palustrine Scrub-Shrub Wetland	0.24	0.29
Emergent Wetland (Shallow and Deep)	1.89	1.70 ⚠
Upland Forest	0.07	0.05
Road/Laydown Area	0.39	0.39
Open Water/Channel	0.34	0.31
Upland Transitional Grassland	0.00	1.03 ⚠
Upland Ruderal Herbaceous	1.03	0.00

TABLE 2. EXCAVATION/BACKFILL SUMMARY

HABITAT CLASSIFICATION	WORK AREA (ACRES)	MAXIMUM EXCAVATION AREA (ACRES)	MAXIMUM EXCAVATION / BACKFILL VOLUME (CUBIC YARDS) ⚠
WETLANDS/WATERS	3.32	1.87	6040
UPLAND	1.49	0.03	60
TOTAL	4.81	1.90	6100

Notes:

1. Quantities shown are estimated and subject to change based on results of additional pre-construction sampling performed.
2. Work area includes excavation areas and support areas (e.g., staging/laydown areas, access routes). Detailed breakdown of habitat type in work area is provided in Table 1.

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SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	4/2018	INCORPORATED DEC COMMENTS AND ADD UPLAND TO AVAILABLE SUPPORT AREA	AMK	LSK

Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985
State: NY | Date Signed: 4/23/2018 | Project Mgr.: SP
Designed by: AMK | Drawn by: GS | Checked by: LSK

ARCADIS Design & Consultancy for natural and built assets
ARCADIS OF NEW YORK, INC.

CHGE ELTING'S CORNERS FACILITY • LLOYD, NEW YORK
REMEDIAL ACTION WORK PLAN

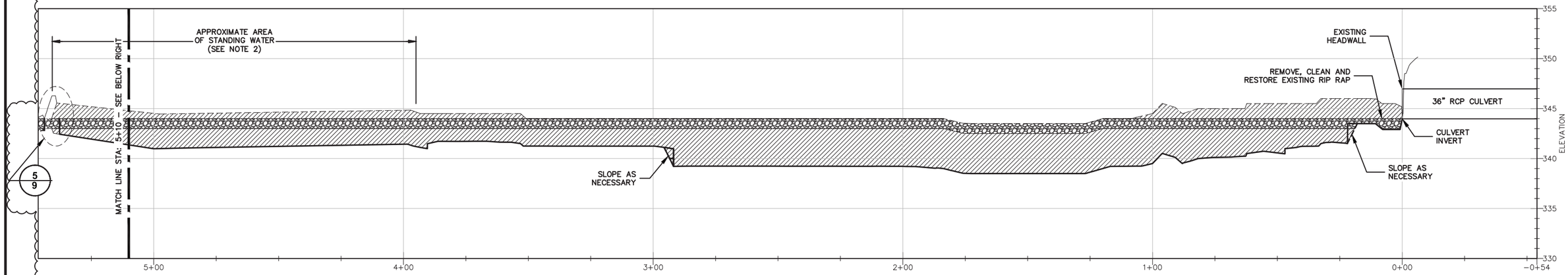
WETLAND BACKFILL AND RESTORATION PLAN

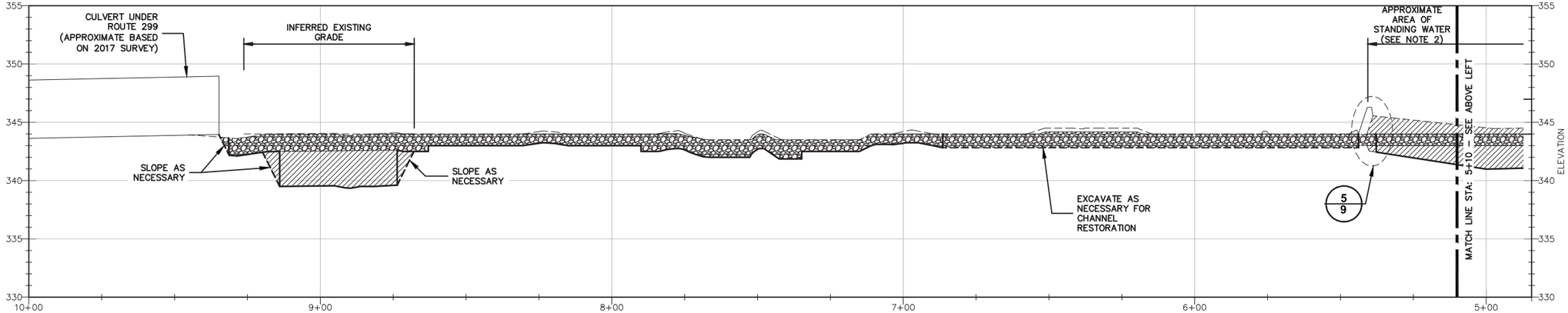
ARCADIS Project No.
B0020540.0001.00005

Date
DECEMBER 2017

ARCADIS
One Lincoln Center
110 West Fayette St., Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

4





PROFILE 1

LEGEND:

- EXISTING GRADE
- TOPSOIL
- CHANNEL FILL
- GENERAL FILL
- EXCAVATION SURFACE

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED, EXISTING GRADE BASED ON 2015 TOPOGRAPHIC SURVEY BY CONTROL POINT ASSOCIATES.
2. STANDING WATER ENCOUNTERED UPGRADIENT OF BEAVER DAM IN 2015 TOPOGRAPHIC SURVEY AND LIMITED SURVEY COLLECTED DUE TO HEALTH AND SAFETY CONSIDERATIONS. EXISTING GRADE SHOWN IN THIS AREA IS APPROXIMATED BASED ON FIELD MEASUREMENT OF WATER DEPTH COLLECTED IN FEBRUARY 2017.
3. CONTRACTOR SHALL PERFORM PRE–CONSTRUCTION SURVEY TO DOCUMENT EXISTING CONDITIONS PRIOR TO START OF EXCAVATION AND SHALL RESTORE GRADE TO AS CLOSE TO PRE–CONSTRUCTION ELEVATION, AS PRACTICABLE.
4. CONTRACTOR SHALL SLOPE EXCAVATIONS AS NECESSARY BETWEEN REMOVAL CELLS. SLOPES SHOWN ARE ASSUMED AT 2:1 FOR DIFFERENCE IN EXCAVATIONS DEPTHS OF 1 FOOT OR GREATER.

PROFILE SCALES

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Cko
1	4/2018	Revise Based on 2/2017 Field Data and DEC Comments	AMK	LSK

Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985
State: NY | Date Signed: 4/23/2018 | Project Mgr.: SP
Designed by: AMK | Drawn by: GS | Checked by: LSK

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ARCADIS OF NEW YORK, INC.

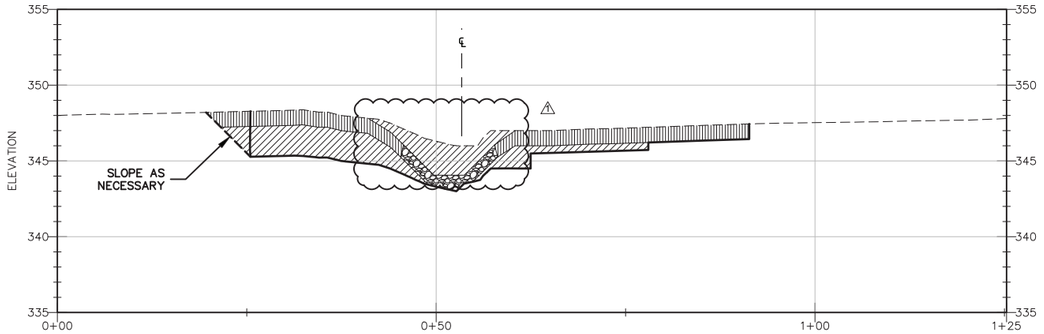
CHGE ELTING'S CORNERS FACILITY • LLOYD, NEW YORK
REMEDIAL ACTION WORK PLAN

SEDIMENT REMOVAL AND BACKFILL PROFILE

ARCADIS Project No.: B0020540.0001.00005
Date: DECEMBER 2017

ARCADIS
One Lincoln Center
110 West Fayette St., Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

6



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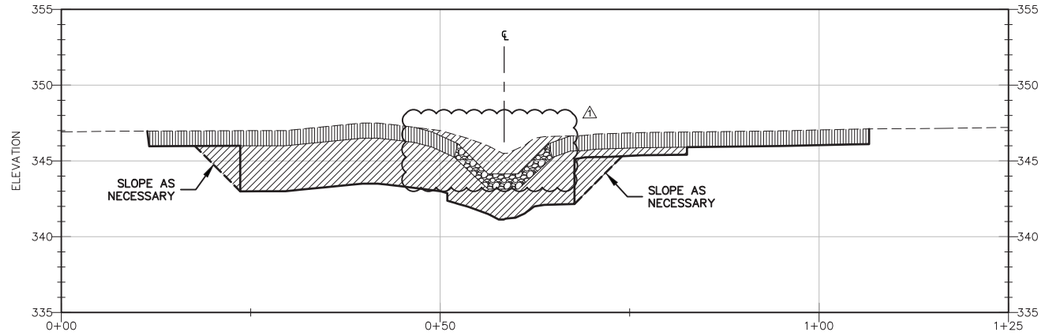

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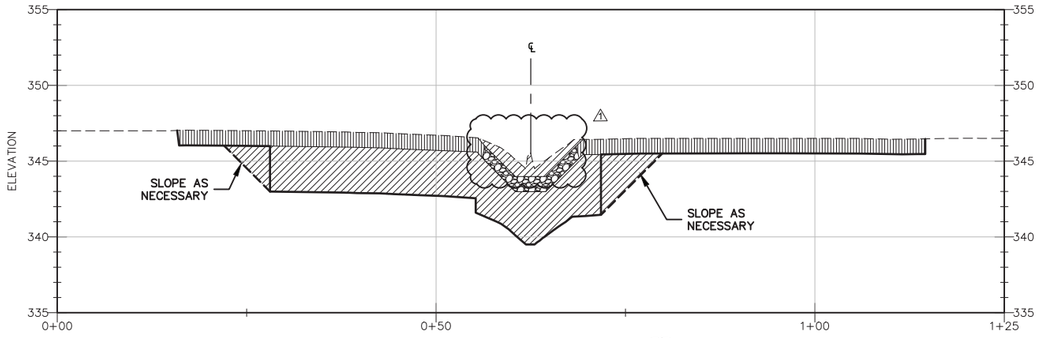

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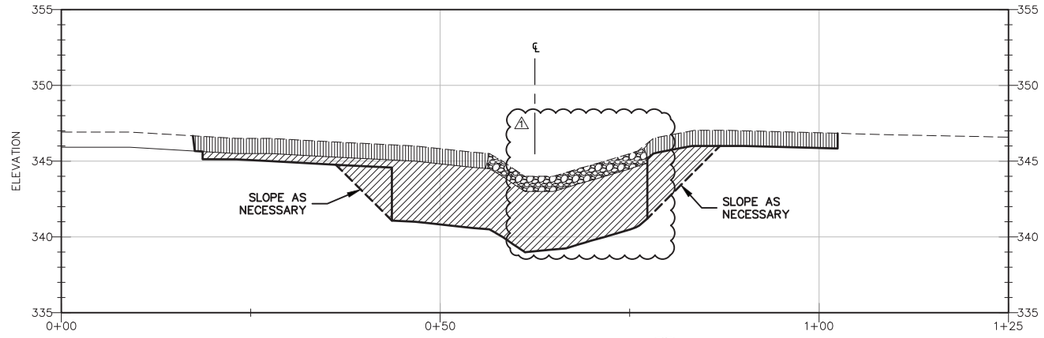

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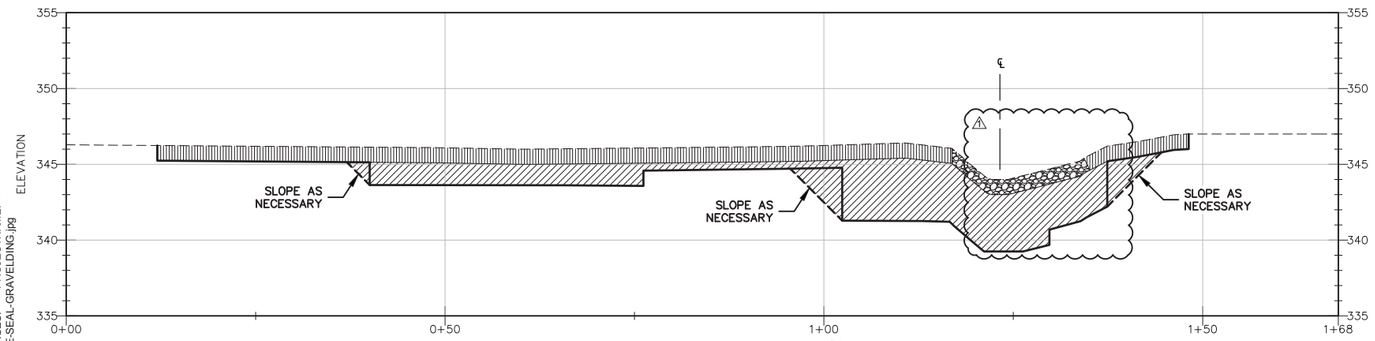

CROSS-SECTION 6

LEGEND:

- EXISTING GRADE
- TOPSOIL
- CHANNEL FILL
- GENERAL FILL (SEE NOTE 4)
- EXCAVATION SURFACE

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED, EXISTING GRADE BASED ON 2015 TOPOGRAPHIC SURVEY BY CONTROL POINT ASSOCIATES.
2. CONTRACTOR SHALL PERFORM PRE-CONSTRUCTION SURVEY TO DOCUMENT EXISTING CONDITIONS PRIOR TO START OF EXCAVATION AND SHALL RESTORE GRADE TO AS CLOSE TO PRE-CONSTRUCTION ELEVATION, AS PRACTICABLE.
3. CONTRACTOR SHALL SLOPE EXCAVATIONS AS NECESSARY BETWEEN REMOVAL CELLS. SLOPES SHOWN ARE ASSUMED AT 2:1 FOR DIFFERENCE IN EXCAVATIONS DEPTHS OF 1 FOOT OR GREATER. ⚠
4. GENERAL FILL WITHIN 2 FEET OF RESTORATION GRADE IN WETLANDS SHALL HAVE AN ORGANIC CONTENT OF 5%.

CROSS SECTION SCALES

HORIZONTAL SCALE: 1"=10'

VERTICAL SCALE: 1"=5'

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SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING:

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
⚠	4/2018	Revise Based on 2/2017 Field Data and DEC Comments	AMK	LSK

Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985

State	Date Signed	Project Mgr.
NY	4/23/2018	SP

Designed by	Drawn by	Checked by
AMK	GS	LSK

ARCADIS | Design & Consultancy for natural and built assets

ARCADIS OF NEW YORK, INC.

CHGE ELTING'S CORNERS FACILITY • LLOYD, NEW YORK

REMEDIAL ACTION WORK PLAN

SEDIMENT REMOVAL AND BACKFILL CROSS-SECTIONS

ARCADIS Project No.
B0020540.0001.00005

Date
DECEMBER 2017

ARCADIS
One Lincoln Center
110 West Fayette St., Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

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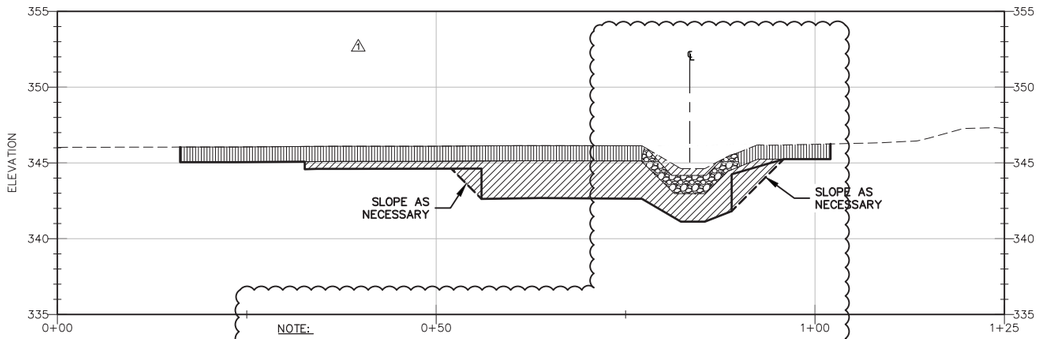
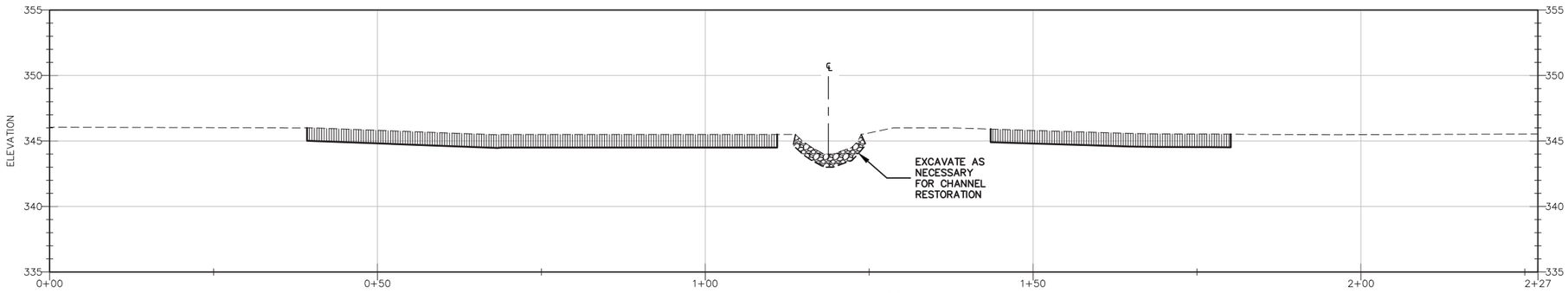


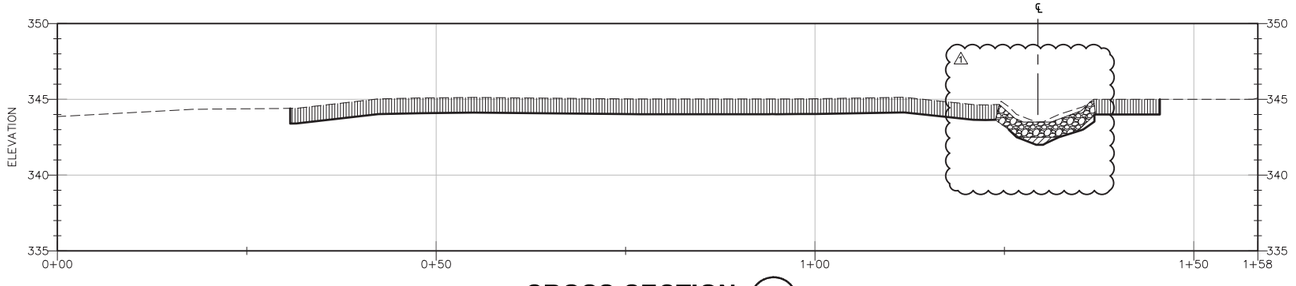
NOTE:

1. STANDING WATER ENCOUNTERED UPSTREAM OF BEAVER DAM IN 2015 TOPOGRAPHIC SURVEY AND LIMITED SURVEY COLLECTED DUE TO HEALTH AND SAFETY CONSIDERATIONS. EXISTING GRADE SHOWN IN THIS SECTION IS APPROXIMATED BASED ON FIELD MEASUREMENT OF WATER DEPTH COLLECTED IN FEBRUARY 2017 AND THE UPSTREAM CROSS-SECTION MORPHOLOGY (CROSS-SECTION 6).

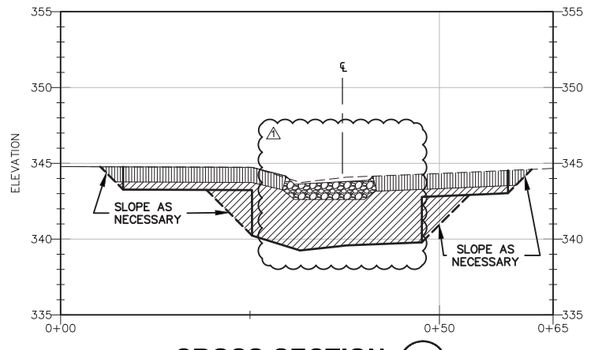
CROSS-SECTION 7



CROSS-SECTION 8



CROSS-SECTION 9



CROSS-SECTION 10

LEGEND:

- EXISTING GRADE
- TOPSOIL
- CHANNEL FILL
- GENERAL FILL (SEE NOTE 4)
- EXCAVATION SURFACE

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED, EXISTING GRADE BASED ON 2015 TOPOGRAPHIC SURVEY BY CONTROL POINT ASSOCIATES.
2. CONTRACTOR SHALL PERFORM PRE-CONSTRUCTION SURVEY TO DOCUMENT EXISTING CONDITIONS PRIOR TO START OF EXCAVATION AND SHALL RESTORE GRADE TO AS CLOSE TO PRE-CONSTRUCTION ELEVATION, AS PRACTICABLE.
3. CONTRACTOR SHALL SLOPE EXCAVATIONS AS NECESSARY BETWEEN REMOVAL CELLS. SLOPES SHOWN ARE ASSUMED AT 2:1 FOR DIFFERENCE IN EXCAVATIONS DEPTHS OF 1 FOOT OR GREATER. ⚠
4. GENERAL FILL WITHIN 2 FEET OF RESTORATION GRADE IN WETLANDS SHALL HAVE AN ORGANIC CONTENT OF 5%.

CROSS SECTION SCALES

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

NOTE:

1. EXISTING GRADE APPROXIMATED BASED ON 2017 SAMPLE ELEVATIONS.

CITY:SYRACUSE-NY DIV/GROUP:ENVCAD DB: LD: PIC: PM:AKOHLER TM: LYR:(OpTION+';OFF+*REF*
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SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
⚠1	4/2018	Revise Based on 2/2017 Field Data and DEC Comments	AMK	LSK

Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985

State	Date Signed	Project Mgr.
NY	4/23/2018	SP
Designed by: AMK	Drawn by: GS	Checked by: LSK

STATE OF NEW YORK · MARK OWEN GRAVELDING · 069985 · LICENSED PROFESSIONAL ENGINEER

ARCADIS Design & Consultancy for natural and built assets

ARCADIS OF NEW YORK, INC.

CHGE ELTING'S CORNERS FACILITY • LLOYD, NEW YORK
REMEDIAL ACTION WORK PLAN

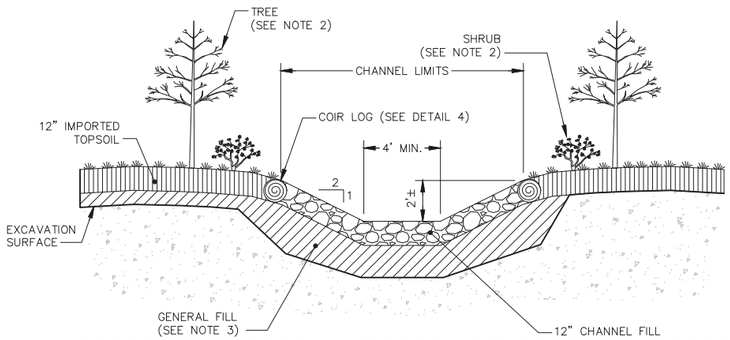
SEDIMENT REMOVAL AND BACKFILL CROSS-SECTIONS

ARCADIS Project No.
B0020540.0001.00005

Date
DECEMBER 2017

ARCADIS
One Lincoln Center
110 West Fayette St., Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

8

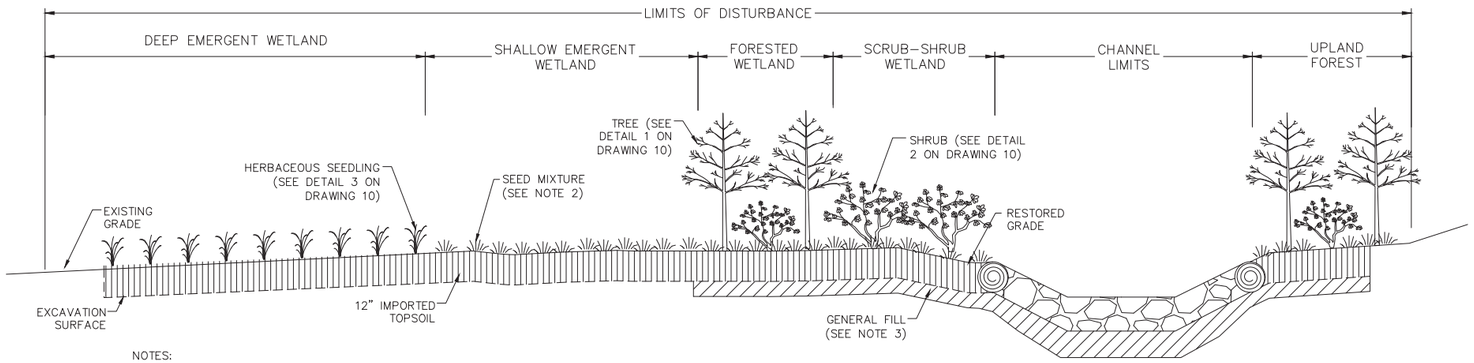


NOTES:

1. REFER TO DRAWING 4 FOR MAXIMUM EXTENT OF CHANNEL RESTORATION. ACTUAL LIMITS SUBJECT TO CHANGE BASED ON ACTUAL LIMITS OF DISTURBANCE. CHANNEL SHALL BE RESTORED SUCH THAT THE TOP OF CHANNEL FILL IS AT AN ELEVATION THAT CONNECTS THE OUTFALL AND DOWNSTREAM CULVERT (APPROXIMATELY EL. 344 FT.). RESTORATION OF ACCUMULATED SEDIMENT SURFACE ABOVE CULVERT INVERT ELEVATION DOWNSTREAM OF FACILITY OUTFALL AND UPSTREAM OF BEAVER DAM SHALL BE RESTORED CONSISTENT WITH DRAWINGS 6 THROUGH 8. CHANNEL BANKS SHALL TIE INTO ADJACENT WETLANDS RESTORED AS CLOSE TO ORIGINAL GRADE AS PRACTICABLE.
2. VEGETATION TO BE PLANTED IN ACCORDANCE WITH PLANTING PLAN DETAILS (DRAWING 10).
3. GENERAL FILL MAY BE USED IN TO RESTORE SUBGRADE AS NECESSARY IN DEEPER EXCAVATION AREAS.

TYPICAL CHANNEL RESTORATION 1

NOT TO SCALE

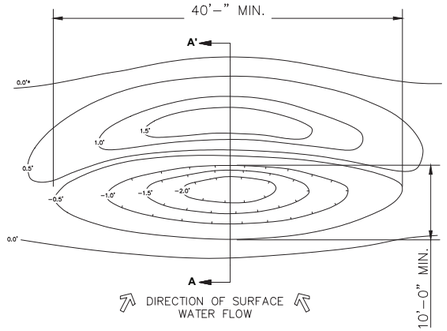


NOTES:

1. REFER TO DRAWING 4 FOR LOCATION AND MAXIMUM EXTENT OF EACH WETLAND RESTORATION AREA; ACTUAL LIMITS SUBJECT TO CHANGE BASED ON ACTUAL LIMITS DISTURBANCE. WETLANDS SHALL BE RESTORED AS CLOSE TO ORIGINAL GRADE AS PRACTICABLE. AREAS OUTSIDE EXCAVATION LIMITS WILL ONLY BE RESTORED IF DISTURBED AS PARTY OF CONSTRUCTION (E.G. ACCESS ROADS, WATER MANAGEMENT PIPING ALIGNMENT).
2. VEGETATION TO BE PLANTED IN ACCORDANCE WITH PLANTING PLAN DETAILS (DRAWING 10).
3. IF EXCAVATION IS GREATER THAN 1-FOOT IN THE WETLANDS, GENERAL FILL WILL BE INSTALLED TO CREATE SUBSURFACE AT 1-FOOT BELOW ORIGINAL GRADE. GENERAL FILL WITHIN 2 FEET OF RESTORATION GRADE IN WETLANDS SHALL HAVE AN ORGANIC CONTENT OF 5%.

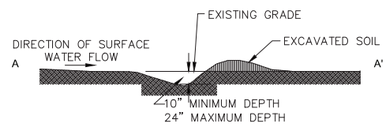
TYPICAL WETLAND RESTORATION TYPES 2

NOT TO SCALE



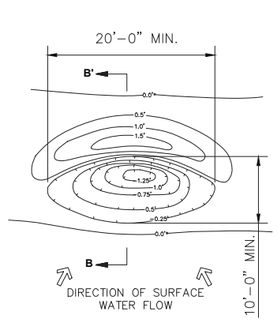
PLAN VIEW

*NOTE: 0.0' ELEVATION = FLOODPLAIN SURFACE



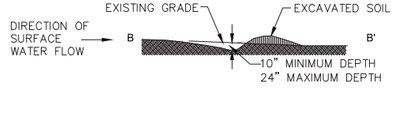
SECTION A-A'

LARGE MICRODEPRESSION



PLAN VIEW

*NOTE: 0.0' ELEVATION = FLOODPLAIN SURFACE

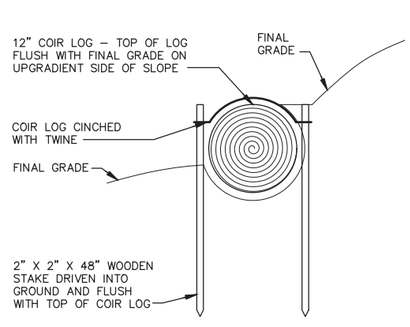


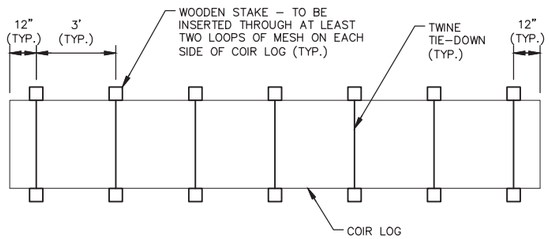
SECTION B-B'

SMALL MICRODEPRESSION

MICRODEPRESSION DETAILS 3

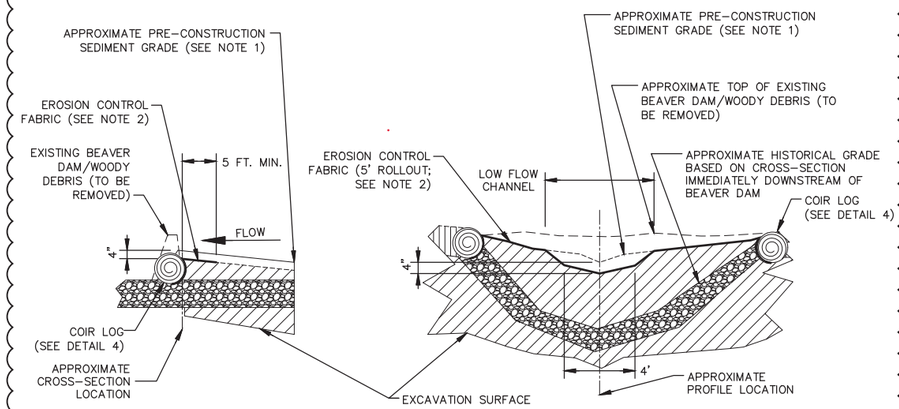
NOT TO SCALE





COIR LOG INSTALLATION DETAIL 4

NOT TO SCALE



PROFILE

NOT TO SCALE

CROSS-SECTION

NOT TO SCALE

NOTES:

1. RESTORATION GRADE TO BE RESTORED TO WITH +4/-4 INCHES OF PRE-CONSTRUCTION GRADE TO BE SURVEYED BY CONTRACTOR PRIOR TO START OF EXCAVATION.
2. EROSION CONTROL FABRIC SHALL BE 100% BIODEGRADABLE JUTE NET WITH STRAW FIBER MATRIX (NORTH AMERICAN GREEN S150BN OR SIMILAR) AND ANCHORED WITH BIODEGRADABLE OR WOODEN STAKES USING THE FREQUENCY AND PATTERN RECOMMENDED BY THE MANUFACTURER. EROSION CONTROL FABRIC SHALL BE INSTALLED IN AREAS WITH SLOPE OF 3H:1V OR STEEPER.

PONDED AREA BACKFILL 5

NOT TO SCALE

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No.	Date	Revisions	By	Ckd
1	4/2018	Revise Based on DEC Comments	AMK	LSK

Professional Engineer's Name: MARK O. GRAVELDING
Professional Engineer's No.: 069985
State: NY | Date Signed: 4/23/2018 | Project Mgr.: SP
Designed by: AMK | Drawn by: GS | Checked by: LSK

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REMEDIAL ACTION WORK PLAN

TYPICAL RESTORATION DETAILS

ARCADIS Project No.: B0020540.0001.00005
Date: DECEMBER 2017

ARCADIS
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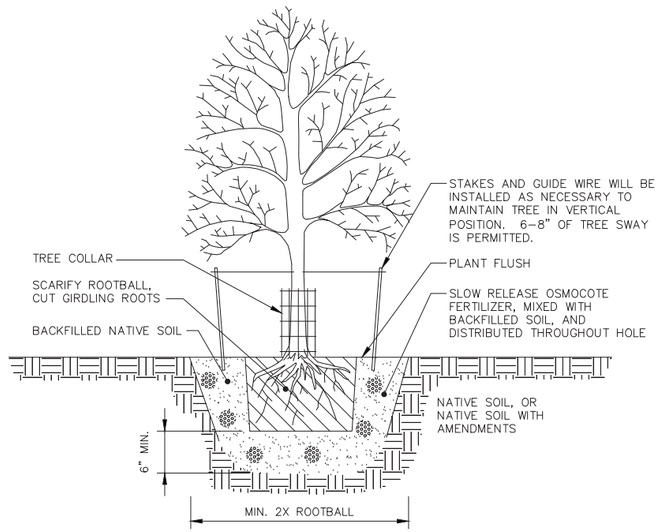
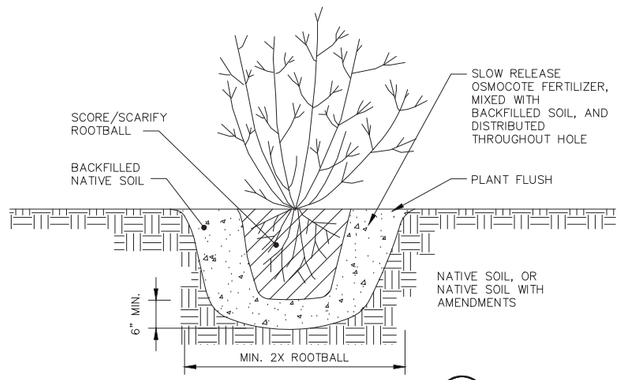


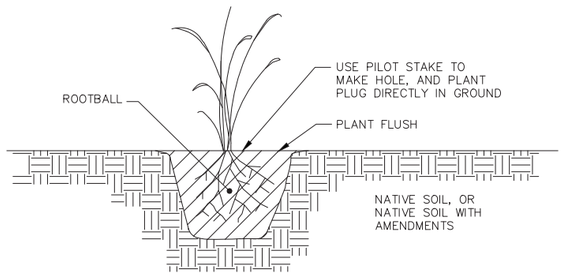
TREE PLANTING DETAIL 1

NOT TO SCALE



SHRUB PLANTING DETAIL 2

NOT TO SCALE



HERBACEOUS SEEDLING DETAIL 3

NOT TO SCALE

SEEDING AND PLANTING NOTES:

1. SCRUB–SHRUB WETLAND, SHALLOW EMERGENT WETLAND, FORESTED WETLAND AREAS, AND UPLAND AREAS WILL BE PERMANENTLY SEEDED AND STABILIZED WITH THE SPECIFIED SEEDING MIXTURES FOLLOWING PLANTING OF TREES AND SHRUBS. SEED MIX SHALL BE APPLIED AT OR ABOVE THE RATE INDICATED IN THE SEED MIX TABLES.
2. PRIOR TO PLANTING AND SEEDING, THE GROUND WILL BE SCARIFIED, HARROWED, RAKED AND BROOMED UNTIL THE SURFACE IS SMOOTH AND OF UNIFORMLY FINE TEXTURE. NO SEEDING SHALL BE DONE DURING WINDY WEATHER. SEEDING SHALL BE DONE IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER. SOW SEED EVENLY BY HAND OR WITH AN APPROVED MECHANICAL SEEDING DEVICE IN THE PROPORTIONS AND AT THE RATE PER UNIT AREA HERETOFORE SPECIFIED. HYDROSEEDING WILL BE ACCEPTABLE. THE SOWN SEED SHALL BE COVERED WITH A ¼" THIN LAYER OF TOPSOIL BY LIGHT RAKING OR OTHER APPROVED METHOD, ROLLED IN BOTH DIRECTIONS WITH A HAND ROLLER WEIGHING NO MORE THAN 100 POUNDS PER FOOT OR WIDTH, AND WATERED WITH A FINE SPRAY. CONTRACTOR SHALL EXERCISE THE NECESSARY PRECAUTIONS TO KEEP THE AREA UNDISTURBED UNTIL THE GRASS IS ESTABLISHED.
3. SPREAD WEED–FREE MULCH AS NEEDED TO LEAVE SEEDED SURFACE WITH MINIMUM AMOUNT OF DAMAGE.
4. TREES AND SHRUBS WILL BE PLANTED RANDOMLY WITHIN THE RESPECTIVE COMMUNITY AND PLANTED ACCORDING TO SPECIFICATIONS SHOWN ON THE PLANTING DETAILS. TOP SOIL WILL BE AMENDED WITH FERTILIZER, WATER ABSORBING GEL (TERRA–SORB™ OR SIMILAR), AND MYCORRHIZAL INOCULANT AS NECESSARY. TREES AND SHRUBS WILL BE MULCHED AS NEEDED.
5. THE CONTRACTOR SHALL PROVIDE ALL TREES AND PLANTS OF QUANTITY, SIZE, GENUS AND SPECIES AS PROVIDED IN THE RESTORATION AND MONITORING PLAN (ARCADIS 2017, REVISED 2018). THE CONTRACTOR SHALL PROVIDE HEALTHY, VIGOROUS STOCK FROM A RECOGNIZED REGIONAL NURSERY. ALL PLANTS SHALL BE FREE FROM DISEASE AND INFESTATION. AN ARCADIS ECOLOGIST RESERVES THE RIGHT TO REJECT ANY PLANT MATERIAL THAT IS DEEMED TO BE INFERIOR QUALITY OR THAT IS DAMAGED. SPECIES AND QUANTITIES ARE DEPENDANT UPON AVAILABILITY FROM NURSERY SUPPLIER AT THE TIME OF PLANTING.
6. THE CONTRACTOR SHALL DELIVER TREES AND SHRUBS AFTER PREPARATIONS FOR PLANTING HAVE BEEN COMPLETED AND PLANTING IMMEDIATELY IS PRACTICABLE. IF PLANTING IS NOT POSSIBLE WITHIN 12 HOURS AFTER DELIVERY, THE PLANTED STOCK SHALL BE MAINTAINED IN A DESIGNATED AREA ON SITE THAT PROVIDES SUITABLE SHADE, PROTECTION FROM WIND, WEATHER AND MECHANICAL DAMAGE. ROOTS SHOULD BE KEPT MOIST WHILE HELD IN THIS STAGING AREA.
7. LOCATIONS OF ALL TREES AND SHRUBS TO BE DETERMINED IN THE FIELD BY A WETLAND ECOLOGIST.
8. THE PLANTING PLAN IS IN ACCORDANCE WITH A RESTORATION AND MONITORING PLAN TO BE APPROVED BY THE NYSDEC PRIOR TO RESTORATION ACTIVITIES.
9. CONTAINERIZED TREES AND SHRUBS WILL BE PROTECTED FROM RODENT AND DEER DAMAGE BY INSTALLATION OF APPROPRIATE DEER FENCING OR RIGID PLASTIC MESH TREE BARK PROTECTOR OF APPROPRIATE HEIGHT. THE RIGID PLASTIC SHOULD HAVE A MESS SIZE OF 3/4"X 3/4". SIMILAR TO PRODUCT MANUFACTURED BY A.M. LEONARD OR COMPARABLE. THE CONTRACTOR WILL DETERMINE THE SELECTED APPROACH AND SUBMIT TO APPROVAL. THE CONTRACTOR 1 YEAR GUARANTEE INCLUDES PROTECTION FROM POTENTIAL HERBIVORY BY DEER, RODENTS, OR OTHER WILDLIFE.
10. HERBACEOUS SPECIES PLANTED WITHIN THE WETLAND WILL BE PROTECTED FROM GEESE USING APPROPRIATE MEASURES AS DETERMINED NECESSARY. THE CONTRACTOR WILL DETERMINE THE SELECTED APPROACH AND SUBMIT FOR APPROVAL. THE CONTRACTOR 1 YEAR GUARANTEE INCLUDES PROTECTION FROM POTENTIAL HERBIVORY BY GEESE.
11. ACCESS ROADS AREAS SHALL BE TILLED TO DEPTH OF 6–12" PRIOR TO SEEDING.

GENERAL RESTORATION NOTES:

1. THE PLANTING PLAN IS IN ACCORDANCE WITH THE RESTORATION AND MONITORING PLAN (ARCADIS 2017, REVISED 2018) TO BE APPROVED BY NYSDEC PRIOR TO ANY RESTORATION CONSTRUCTION ACTIVITIES. RESTORATION CONSTRUCTION SEQUENCE SHOULD BE REFERENCED IN THE RESTORATION AND MONITORING PLAN.
2. ALL SITE RESTORATION ACTIVITIES WILL BE PERFORMED BY A CONTRACTOR THAT SPECIALIZES IN ECOLOGICAL RESTORATION, WITH AN EMPHASIS ON WETLAND ECOSYSTEMS. THE CONTRACTOR WILL HAVE MORE THAN FIVE YEARS OF EXPERIENCE IMPLEMENTING SIMILAR PROJECTS THROUGHOUT NEW YORK, OR NORTHEASTERN UNITED STATES.
3. CONTRACTOR IS RESPONSIBLE FOR ACQUISITION OF ALL NECESSARY PLANT MATERIAL CONSISTENT WITH SPECIFICATIONS OF THE APPROVED RESTORATION AND MONITORING PLAN. ALL MATERIAL WILL BE REGIONALLY SOURCED (I.E., WITHIN 250 MILES OF SITE), AND REQUIRE APPROVAL UPON SUBMITTAL.
4. ALL PLANTING AND SEEDING ACTIVITIES WILL OCCUR BETWEEN OCTOBER AND MAY. COVER CROP WILL BE USED AS NEEDED TO ACCOUNT FOR THIS SCHEDULE.
5. PLANTING SHALL COMMENCE AT THE DISTAL POINT WITHIN THE RESTORATION SITE SO THAT PLANTED AREAS WILL NOT BE DISTURBED AFTER SUBSEQUENT PLANTING. ALL PLANTS WILL BE WATERED WITHIN 24 HOURS OF PLANTING.
6. GUARANTEE OF PLANT STOCK FOR 1 YEAR. CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY WATERING THROUGHOUT THIS FIRST YEAR, AS WELL AS PROTECTION FROM HERBIVORY.

CITY: SYRACUSE, NY DIV/GROUP: MD DB: K.DAVIS LD: K.DAVIS PIC: S.INSALACO PM: G.BRAUN TM: J.MURRAY LYR: ON=*;OFF=*REF*
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No.	Date	Revisions	By	Ckd

Professional Engineer's Name: **MARK O. GRAVELDING**
Professional Engineer's No.: 069985

State	Date Signed	Project Mgr.
NY	4/23/2018	SP
Designed by: AMK	Drawn by: GS	Checked by: LSK

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ARCADIS OF NEW YORK, INC.

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

CHGE ELTING'S CORNERS FACILITY • LLOYD, NEW YORK
REMEDIAL ACTION WORK PLAN

PLANTING PLAN DETAILS AND NOTES

ARCADIS Project No.: B0020540.0001.00005
Date: DECEMBER 2017

ARCADIS
One Lincoln Center
110 West Fayette St., Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

10

Shallow Emergent Wetland Seed Specification and Application Rate		
Proportion of Seed Mix (%)	**Scientific Name**	**Common Name**
25.00%	*Carex vulpinoidea*	Fox Sedge
13.00%	*Carex lurida*	Lurid (Shallow) Sedge
11.50%	*Elymus riparius*	Riverbank Wildrye
10.00%	*Carex lupulina*	Hop Sedge
10.00%	*Carex scoparia*	Blunt Broom Sedge
5.00%	*Verbena hastata*	Blue Vervain
5.00%	*Scirpus cyperinus*	Woolgrass
3.00%	*Cinna arundinacea*	Wood Reedgrass
2.50%	*Juncus effusus*	Soft Rush
2.00%	*Asclepias incarnata*	Swamp Milkweed
2.00%	*Glyceria canadensis*	Rattlesnake Grass
2.00%	*Onoclea sensibilis*	Sensitive Fern
2.00%	*Eupatorium fistulosum*	Joe Pye Weed
2.00%	*Mimulus ringens*	Square Stemmed Monkeyflower
1.00%	*Aster novae-angliae*	New England Aster
1.00%	*Helenium autumnale*	Common Sneezeweed
1.00%	*Eupatorium perfoliatum*	Boneset
0.50%	*Alisma subcordatum*	Mud Plantain (Water Plantain)
0.50%	*Aster puniceus*	Purplestem Aster
0.50%	*Aster umbellatus*	Flat Topped White Aster
0.50%	*Ludwigia alternifolia*	Seedbox
Note: Seeding Rate is 20 lbs per acre. Seeding timing is October to May.		

Deep Emergent Wetland Planting Specifications					
Scientific Name	**Common Name**	**Stratum**	**Area (acres)**	**Density (stems/acre)**	**Total to Plant**
Sparganium americanum	American bur-reed	Herbaceous	0.26	3000	780
Sparganium eurycarpum	Giant bur-reed	Herbaceous		3000	780
Typha latifolia	Cat-tail	Herbaceous		13000	3380
Note: Herbaceous species will be planted with 2" plugs.					

Microdepression Wetland Planting Specifications					
Scientific Name	**Common Name**	**Stratum**	**Area (acres)**	**Density (stems/acre)**	**Total to Plant**
Typha latifolia	Cat-tail	Herbaceous	0.10	7,000	700
Note: Herbaceous species will be planted with 2" plugs.					

Palustrine Scrub Shrub and Forested Wetland Seed Mix Specifications and Application Rate		
Proportion of Seed Mix (%)	**Scientific Name**	**Common Name**
25.00%	*Poa palustris*	Fowl Bluegrass
19.00%	*Elymus riparius*	Riverbank wildrye
17.00%	*Carex lurida*	Lurid (Shallow) Sedge
10.00%	*Carex vulpinoidea*	Fox Sedge
5.0%	*Cinna arundinacea*	Wood Reedgrass
4.00%	*Carex lupulina*	Hop Sedge
4.00%	*Carex scoparia*	Blunt Broom Sedge
4.00%	*Sparganium eurycarpum*	Giant Bur Reed
3.00%	*Scirpus polyphyllus*	Many Leaved Bulrush
2.50%	*Juncus effusus*	Soft Rush
2.00%	*Carex intumescens*	Bladder (Star) Sedge
2.00%	*Sparganium americanum*	Eastern Bur Reed
1.00%	*Carex crinita*	Fringed (Nodding) Sedge
1.0%	*Scirpus cyperinus*	Woolgrass
0.50%	*Juncus tenuis*	Path Rush
Note: Seeding Rate is 20 lbs per acre. Seeding timing is October to May.		

Palustrine Scrub Shrub Wetland Planting Specifications					
Scientific Name	**Common Name**	**Stratum**	**Area (acres)**	**Density (stems/acre)**	**Total to Plant**
Salix nigra	Black willow	Shrub	0.29	150	44
Cornus sericea	Red-osier dogwood	Shrub		150	44
Cornus amomun	Silky dogwood	Shrub		100	29
Alnus incana	Speckled alder	Shrub		100	29
Viburnum dentatum	Arrowwood	Shrub		100	29
Note: Shrubs will be planted with 1 to 3 gallon containerized nursery stock based upon availability.					

Palustrine and Upland Forest Planting Specifications						
Scientific Name	**Common Name**	**Stratum**	**Area (acres)**	**Size**	**Density (stems/acre)**	**Total to Plant**
Acer rubrum	Red maple	Tree	1.10	7 gallon	50	55
Acer rubrum	Red maple	Tree		2" B&B	25	28
Platanus occidentalis	Sycamore	Tree		7 gallon	50	55
Platanus occidentalis	Sycamore	Tree		2" B&B	30	33
Populus deltoides	Cottonwood	Tree		7 gallon	50	55
Acer negundo	Box elder	Tree		7 gallon	40	44
Quercus palustris	Pin oak	Tree		7 gallon	50	55
Quercus bicolor	Swamp white oak	Tree		7 gallon	50	55
Quercus bicolor	Swamp white oak	Tree		2" B&B	25	28
Celtis occidentialis	Hackberry	Tree		7 gallon	35	39
Cornus amomun	Silky dogwood	Shrub		1 - 3 gallon	50	55
Vaccinium corymbosum	High-bush blueberry	Shrub		1 - 3 gallon	50	55
Viburnum dentatum	Arrowwood	Shrub		1 - 3 gallon	50	55
Ilex verticillata	Winterberry	Shrub		1 - 3 gallon	50	55
Note: 7 gallon trees will be minimum height of 7-8' tall. Shrubs will be planted with 1 to 3 gallon containerized nursery stock based upon availability.						

Upland Transitional Grassland Seed Mix Specifications and Application Rate		
Proportion of Seed Mix (%)	**Scientific Name**	**Common Name**
18	*Elymus virginicus*	Virginia wildrye
17	*Schizachyrium scoparium*	Little bluestem
15	*Festuca rubra*	Creeping red fescue
15	*Andropogon gerardii*	Big bluestem
10	*Sorghastrum nutans*	Indian grass
6	*Chamaecrista fasciculata*	Partridge pea
6	*Panicum virgatum*	Switch grass
3	*Desmodium paniculatum*	Panicledleaf Tick Trefoil
3	*Verbena hastata*	Blue vervain
2.5	*Asclepias tuberosa*	Butterfly milkweed
1	*Rudbeckia hirta*	Black eyed susan
1	*Helenium autumnale*	Common sneezeweed
1	*Aster pilosus*	Heath aster
1	*Solidago juncea*	Early goldenrod
0.5	*Agrostis perennans*	Upland bentgrass

"Seed mix provided by New England Wetland Plants; species composition may change based upon market availability.

Note: Seeding Rate is 25 lbs per acre. Seeding timing is October to May. "

SCALE(S) AS INCHED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

Professional Engineer's Name: **MARK O. GRAVELDING**
Professional Engineer's No.: 069985

State	Date Signed	Project Mgr.
NY	4/23/2018	SP
Designed by: AMK	Drawn by: GS	Checked by: LSK

CHGE ELTING'S CORNERS FACILITY ● LLOYD, NEW YORK
REMEDIAL ACTION WORK PLAN

PLANTING TABLES

ARCADIS Project No.
B0020540.0001.00005

Date
DECEMBER 2017

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