WETLAND RESTORATION PLAN
CENTRAL HUDSON GAS & ELECTRIC CORPORATION
ELTING'S CORNERS - TOWN OF LLOYD
ULSTER COUNTY, NEW YORK
KLEINFELDER PROJECT #: 20155296.001A

DECEMBER 18, 2015

Prepared For:

284 South Avenue
Poughkeepsie, NY 12601

Prepared by:

Kleinfelder
300 Westage Business Center Drive
Suite 407
Fishkill, NY 12524

A Report Prepared for:

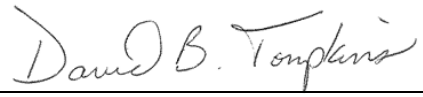
Mr. Christopher DeRoberts
Environmental Coordinator
Central Hudson Gas & Electric Corporation
284 South Avenue
Poughkeepsie, NY 12601

WETLAND RESTORATION PLAN
ELTING'S CORNERS
TOWN OF LLOYD
ULSTER COUNTY, NEW YORK

Prepared by:

Michael Newhouse, Biologist/Wetland Scientist

Reviewed by:



David B. Tompkins, CWB, PWS

KLEINFELDER
300 Westage Business Center Drive
Suite 407
Fishkill, New York, 12524
Phone: 845.231.2500
Fax: 845.897.2636

December 18, 2015
Kleinfelder Project No.: 20155296.001A

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

Kleinfelder has been retained by Central Hudson Gas & Electric Corporation (CHGE) to prepare this plan for the wetland restoration following removal of contaminated sediment identified within a small portion of New York State Department of Environmental Conservation (NYSDEC) Wetland CD-6, located near the corner of State Route 299 and South Street, Town of Lloyd, Ulster County, New York (Site). **Figures 1** and **2** show the location of the Site.

The area of contamination is located on the west side of South Street, adjacent to NYS Route 299. The CHGE maintenance facility has operated a vehicle and storage and repair facility on the east side of South Street since the 1950's. Both current and historic site activities at the maintenance facility included: storage of electrical equipment, transformer storage and repair, vehicle maintenance and storage, and administrative offices. Black Creek is located immediately adjacent to the eastern property boundary. The western portion of the facility on the west side of South Street is undeveloped and includes NYSDEC Wetland CD-6 and a dirt/gravel temporary materials staging area for CHGE. A storm water outfall, which drains the maintenance facility, is located on the west side of South Street (NYSDEC SPDES Permit #NY0148849).

This plan presents the recommended approach for the re-establishment of approximately 1.5 acres of emergent wetland at the Site that will be impacted/excavated as part of the remedial action proposed to remove contaminated sediment from wetland areas near the outfall. The Plan is designed to restore the impacted area to a wetland plant community that is similar to the existing wetland habitat.

300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

2 EXISTING CONDITIONS

2.1. Site Conditions

The Site is approximately 6.6 acres in size and is located in the Town of Lloyd, Ulster County, New York (**Figure 1**). Approximate center coordinates of the site are 41.736995°N; -74.037935°W. The Site consists of a large wetland complex and a dirt/gravel temporary materials staging area (**Figure 2**).

The restoration area is located within a large wetland complex that lies within the Upper Hudson, Rondout Watershed (HUC 02020007). This glaciated region is characterized by the Shawangunk Mountain Range to the west, rolling glaciated hilltops, dendritic drainage patterns, and extensive lakes, streams and wetlands. Elevation within the project area is flat ranging from 356 to 358 feet above msl. Soils within the site consist primarily of Canadaigua silt loam, along with Hoosic gravelly loam, and Chenango gravelly silt loam. The wetlands within the project area receive hydrology from the surrounding topography along with an offshoot from Black Creek discharges to the fire pond on the east side of the Facility. Water from Black Creek and stormwater that is collected from the Facility discharges into the project area at an outfall (under NYSDEC SPDES permit #NY0148849), and continues in a west/northwest direction through the project area before continuing northwest under S.R. 299.

2.2. Onsite Wetlands and Stream

A wetland delineation was originally performed in 2009 and updated in April 2015 by Kleinfelder. Approximately four acres were evaluated which included parcels owned by CHGE and adjacent property owners. The vegetative communities found within the project area consist mostly of herbaceous wetlands (dominated by invasive species) and a scrub-shrub wetland mix toward the western end of the project area. Dominant vegetation within the project area includes red osier dogwood (*Cornus sercea*), common reed (*Phragmites australis*), broadleaf cattail (*Typha latifolia*), reed canary grass (*Phalaris arundinacea*), jewelweed (*Impatiens capensis*), arrow-leaf tearthumb (*Polygonum sagittatum*) and purple loosestrife (*Lythrum salicaria*).

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

In addition to the wetland delineation data collected by KLF in 2009, and as part of the pending predesign investigation, the existing data set will be updated accordingly. The new delineation will include the entire proposed project area and be included in all final plans. Lastly, the on-site stream will also be recorded including length, width, and depth prior to final designs.

The onsite outfall contains flow input from Black Creek located to the east of the CHGE facility. The flow traverses from east to west under the CHGE maintenance facility through a culvert system, discharging from the regulated outfall, and continuing in a west/northwest direction through the project area before flowing northwest under S.R. 299. The flow continues through the remediation area and continues west/northwest and under U.S. Route 299 in the northwest corner of the project area. The tributary eventually connects with the Swarte Kill to the northwest of the project area.

The stream traverses approximately 960 linear feet through the project area. The stream is approximately three to four feet wide with banks ranging from less than 6 inches to approximately 12 inches high. Average stream depth varies seasonally and is approximately 12 inches with depths up to 24+ inches. The streambed substrate consists of muck to sand grain sediment size.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

3 WETLAND IMPACTS

3.1. Wetland and Stream Impacts

The objective of the project is to remove the identified contaminated soils and sediment from within the existing wetland and stream, following which to replace the removed substrate with clean soil and restore wetland vegetation with native herbaceous and shrub vegetation that already exist within the wetland complex. The excavation area is approximately 1.5 acres in size (**Figure 2**). Soil samples will be taken at locations along the perimeter and base of the excavation to ensure contaminant soils are excavated. Several other isolated areas having impacts located in the western part of the project area will be excavated by either mechanical means or by hand (depending on depth and accessibility). Approximately 550 linear feet of the existing stream is anticipated to be excavated and temporarily rerouted around the excavation zone.

Access to the excavation area will be from the proposed staging area south of the restoration area along South Street. Construction mats will be placed in the wetland in order for mechanical equipment to gain access to the site. Woody shrub vegetation, if present, may need to be hand cleared prior to placing the mats. Temporary impacts to vegetation are anticipated to occur with the placement of construction mats to reach the excavation areas.

A temporary stream channel bypass will be constructed from the outfall at South Street to the western end of the main excavation area. Temporary impacts (i.e. flow input) associated with the stream bypass will be restored upon completion of the excavation.

Details of the excavation portion of the project will be provided in the Corrective Measures Implementation Plan (CMIP).

A detailed erosion and sediment control plan for wetland restoration activities will be developed following development of the plan for remedial activities. Erosion and sediment control measures used during remediation may remain in place for restoration activities where practicable. Typical erosion and sediment control details have been provided on Sheet 5 of the Wetland Restoration Plan (**Appendix A**).

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

4 PROPOSED CONCEPTUAL PLAN

4.1. Restoration Plan Objectives

The primary overall objectives of this restoration plan will be to remove all contaminated soils (sediment and soil with PCB concentrations exceeding 0.1 ppm and Total PAH concentrations exceeding 4 ppm) in approximately 1.5 acres of emergent wetland and approximately 550 linear feet of stream, restore to pre-existing contours and replace in-kind with clean topsoil and native vegetative species already found within the wetland from accredited wetland plant nurseries. Details of the proposed excavation will be provided in the CMIP for approval by the NYSDEC.

4.2. Conceptual Design

The project will involve the restoration of the emergent wetland and stream (see site plans, **Appendix A**).

The work will involve the following tasks:

- Documenting existing soil conditions onsite;
- Determining appropriate grading regime to sustain favorable wetland conditions;
- Establishing the base elevation of the wetland once surface water elevation is determined (i.e. topographic survey);
- Conduct a water budget analysis of the site to determine approximate hydrologic regimen (see **Appendix C**);
- Selection of appropriate hydrophytic species for planting (see **Section 5**);
- Site preparations, including backfill of soil, grading, compaction, and soil stabilization;
- Placement of organic layer (2 to 4 inches);
- Replanting;
- Monitoring annually and providing a restoration report (Post Restoration Monitoring program will be implemented for a period of 5 years); and
- Adaptive management, as needed.

The current wetland restoration design is based upon the existing site conditions. The primary excavation will extend from the outfall at South Street and continue to the west approximately

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

550 feet. The work will be performed in stages and will be detailed in the CMIP. Several other spot excavations will be conducted west of the main excavation area. Approximately 1.5 acres of impacted wetland is currently anticipated to be restored (See **Figure 2**).

The wetland receives hydrology from several sources including groundwater, surrounding surface water, and the onsite tributary. A water budget has been developed that shows the approximate groundwater elevation for the site and is included in **Appendix C**. The water budget calculations show a net positive water balance for the Site, which is ideal for wetland restoration. Net positive water balances indicate suitably wet conditions to support the restoration of wetland plant communities.

A detailed topographic survey of the investigation area has been conducted and will be used during the design phase of the project to ensure that the Site is restored to pre-existing contours. Backfill of clean soil will be placed to pre-existing contours. Soils used to backfill the remediation zone will contain the same range of organic material as the soils removed during excavation. Following excavation and placement of suitable soil, the site will be regraded to final elevations that match the existing contours. Soils used to backfill the remediation will be of the same range of organic content as those removed during contaminant excavation.

As illustrated in the topographic survey data, as well as the photographs presented in Appendix B, the area proposed for remediation is extremely flat, except for the stream channel centered in the middle of the proposed remediation area. Generally, topography across the entire site varies within one foot in elevation.

The existing wetland communities within the area proposed excavation areas consist primarily of herbaceous vegetation with sporadic wetland shrub species. Plant species suggested for the wetland area are provided in Tables 1 and 2 (see **Section 5.2**). All plant material will be purchased from regional wetland nurseries.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

5 PLANTING DESIGN AND SPECIFICATIONS

The objective of the planting plan is to establish species that can initiate the re-establishment of a diverse wetland. This will be achieved as follows:

1. Restoring site topography to pre-existing conditions so that hydrophytic plants are favored over upland plant species.
2. Planting with emergent plants (plugs) and over-seeding with a northeast wetland diversity seed mix.
3. Establishing small pockets of shrubs to provide habitat structure and diversity.

5.1. Emergent Wetlands

The restoration area will be planted with herbaceous wetland species spaced on 18”x18” grids. Small groupings (patches) of wetland woody shrub species will also be planted sporadically throughout the restoration area and along the reconstructed stream to provide some diversity of habitat structure. They will be primarily located in areas of higher micro-topography. Given these species are also more deeply rooted they should also help stabilize stream banks.

Selected species will be planted from bare root stocks (i.e. rushes) and a northeast wetland diversity seed mix containing species such as sedges, rushes and wetland wildflowers will be broadcast across the entire restoration area. Given the existing surrounding wetland community will likely provide natural recruitment in the restoration area, no maintenance of any specific percentage of species is anticipated. The restoration area will be allowed to develop species dominance naturally. Due to the high prevalence of invasive species in adjacent areas, no invasive species controls are proposed.

5.2. Planting Specifications

The Restoration Plan is based on the use of native “wet-cultured” plants grown especially for wetland conditions. Nurseries that specialize in native wetland species will be contacted. Proposed plant species to be used are shown in Table 1. Planting details for shrubs are discussed below. Shrubs will be purchased in 2-gallon size containers and planted in groups of 3, 5, and 7 of the same species.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

The location for the installation of various plants species will be shown on a detailed planting plan once a final grading plan is developed. Obligate emergent wetland species will be planted at the lowest elevation, where ponding is expected to occur the longest or soil saturation the longest throughout the year. Facultative wetland species will be distributed in wetter areas than facultative species.

TABLE 1

RECOMMENDED WETLAND SPECIES FOR PLANTING

Species Name	Common Name	Number*	Indicator Status
EMERGENTS			
Juncus effusus	soft rush	7,100 b.r.	FACW+
Schoenoplectus atrovirens	green bulrush	7,100 b.r.	OBL
Scirpus cyperinus	wool grass	7,100 b.r.	FACW+
Sparganium americanum	eastern bur-reed	7,100 b.r.	OBL
WOODY			
Clethra alnifolia	sweet pepperbush	200 gal.	FAC+
Cornus sericea	red-osier dogwood	200 gal.	FACW+

OBL=Obligate Wetland; FACW=Facultative Wetland; FAC=Facultative; (+) sign indicates a frequency towards the wetter end of the category (more frequently found in wetlands) *Plant material type: b.r. = bare root, gal. = 2-gallon containers

All disturbed areas will be overseeded with a northeast wetland native wildflower mix, designed to provide seed crop and cover plants. Details of this mix are provided in Table 2.

TABLE 2

RECOMMENDED NORTHEAST WETLAND NATIVE WILDFLOWER MIX,

RESTORATIVE SEEDING COMPONENTS

Species Name	Common Name	% of mix
Eupatorium perfoliatum	boneset	26.66
Verbena hastata	blue vervain	20.8
Panicum dichotomiflorum	smooth panic-grass	19.75
Solidago rugosa	wrinkled goldenrod	8.89
Eupatorium maculatum	joe pye weed	8.74
Euthamia graminifolia	grass leaf goldenrod	6.65
Polygonum pensylvanicum	Pennsylvania smartweed	4.59

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

TABLE 2 (CONTINUED)

RECOMMENDED NORTHEAST WETLAND NATIVE WILDFLOWER MIX,

RESTORATIVE SEEDING COMPONENTS

Species Name	Common Name	% of mix
Aster novae-angliae	New England aster	2.8
Bidens cernua	nodding beggar's tick	0.79
Asclepias incamata	swamp milkweed	0.21
Iris versicolor	blue flag	0.12

Rate: 1 pound will cover 11,000 sq. ft. @ 50 seeds per sq. ft.

This mix is designed to germinate during the early growing season draw down and saturated soil zones and provides a colorful mix of flowers at various times of the growing season, especially in late summer. The mix is produced using hand-collected seed from western New York and northwestern Pennsylvania. A seeding rate of one pound per 11,000 sq. ft. is specified as a supplement to plantings of bare root herbaceous and shrub species plantings. It is anticipated that four pounds of seed mix will be required for all areas of impact (including temporary impacts associated with construction mats and staging areas).

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

6 PROPOSED SCHEDULE

6.1. Planting Schedule

Based on the current schedule for remediation work, planting of emergent and shrub wetland species will occur between September 1st and October 1st. Propagules will be planted in the proportions determined above in this plan. If planting cannot be established in late summer, then the project area will be stabilized prior to winter and planting will commence during the following spring. Planting will not occur when the ground is frozen, snow-covered, or in an otherwise unsuitable condition for planting.

During actual planting, plants will be set plumb with ground surface and manually held in position until sufficient soil has been firmly placed around roots or ball. Plants are to be set at the same depth at which they were grown in the nursery or container. Plug and container species will be spaced apart according to nursery recommendations.

6.2. Watering

All plants will be watered by saturating the area within the same working day upon which they were planted. During and immediately after watering, all plants will be adjusted as necessary to ensure correct depth of planting, vertical alignment and/or natural profile. Additional soil will be added around each plant as required to compensate for settling.

During extended periods of dry weather (more than 2 consecutive weeks), a provision for watering will be included in the site maintenance program. Watering should occur at a frequency adequate to maintain hydrophytic vegetation.

6.3. Maintenance

The contractor will be required to guarantee healthy plants upon arrival and inspection of the plants will be conducted by a wetland biologist prior to installation. A 75 percent survival rate of plants, allowing for the inclusion of those species established through natural colonization, will be required after the first 2 years of monitoring. Should the rate drop below 75 percent, one additional planting of the area(s) below that threshold will occur to support and augment survival of the restored vegetation existing at that time.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

6.4. Herbivore Protection

To protect the shrubs from herbivore damage, guards will be placed around the base of the shrubs. If browsing becomes evident during monitoring events, temporary fence will be placed to surround the restoration site. After two growing seasons, the fence may be removed. If there is evidence of waterfowl within the restoration area, preventative measures will be implemented to deter feeding activities.

6.5. Invasive Species

Due to the prevalence of invasive species in the area, no formal invasive species control plan is proposed nor are any provisions for the use of selective herbicide proposed in this restoration plan. However, during any inspection or maintenance activities, any obvious invasive species will be manually removed to help diminish the potential for the area to be overrun with invasives.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

7 MONITORING

7.1. Goals of the Monitoring Program

The monitoring program will be conducted to document the success of the restoration plan. Monitoring will be documented over a period of 5 years, starting from the completion of the first planting within the restoration area.

Monitoring will be conducted during each year of the monitoring period. Progress reports will document the status of wetland site conditions using the following monitoring methodology. The monitoring report will provide a summary of monitoring data trends and compare current wetland status with compensatory wetland goals. The frequency of the monitoring will include inspections twice a year and annual reports for five consecutive years following full implementation of the restoration plan.

7.2. Monitoring Program Components

7.2.1 Photographs

The restored wetland will be documented through fixed point photographs with range poles or objects for scaling and reference. The location and number of photographs will be sufficient to cover the entire restoration area. These stations will be staked for subsequent relocation. Photographs will be taken from the same point and in the same direction during each sampling period. Significant changes in the wetland structure, including events such as storm damage, will be documented by these photos.

7.2.2 Precipitation

National Weather Service records of daily rainfall will be collected and analyzed to evaluate watershed precipitation and determine if seasonal/annual variations in precipitation are occurring.

7.2.3 Surface and Groundwater Monitoring

Kleinfelder does not propose to install groundwater piezometers at this time since the site is an established wetland with multiple sources of hydrology and the proposed topsoil fill will be graded to pre-existing contours. Based on the water budget

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

calculations, the restoration area should receive sufficient hydrology (See **Appendix C** for detailed budget calculations). Visual observation of hydrology will be recorded throughout the duration of the monitoring program and data summaries provided in the annual reports. If plants appear to be stressed from lack of water, small soil bores will be taken to observe depth to groundwater and soil saturation levels.

7.2.4 Base Map

A base map or plan view will be provided illustrating the location of photo points, piezometers (if required), and sampling areas.

7.2.5 Vegetation Assessment

Vegetation is generally indicative of the structure and health of wetlands. The composition of each wetland vegetation community will be adequately characterized. The following general methods will be followed with an allowance for site or minor modifications. Sampling will be conducted during the late spring/early summer period of each monitoring year to best identify dominant plant species and assess seasonal biomass.

Emergent vegetation – Emergent vegetation areas that are to be dominated by herbaceous plant species are to be sampled qualitatively. The percent cover and average height of individuals of each taxa within the major height strata will be recorded. Each major herbaceous plant zone will be sampled. Five 1-meter by 1-meter quadrants are recommended for this qualitative evaluation for each.

Shrub vegetation – All shrub clusters will be GPS located at time of planting. All planted shrub species will be recorded each year to identify percent mortality. Height of individuals of will also be recorded. Recruitment species will also be noted with a general quantitative number of species and individuals observed.

7.2.6 Stream Assessment

The stream will be monitored to ensure stream bank integrity and establishment of a natural streambed. Signs of erosion or stability issues will be noted and corrective measures will be provided within the report.

7.2.7 Habitat Utilization

Observational data will be collected on wildlife observed during seasonal vegetation assessments in the restored wetland area. This will include evidence of nesting, foraging, or other activities. Notes will also be kept on the grazing or predation of wetland vegetation.

7.3. Identification of Problems and Recommendations

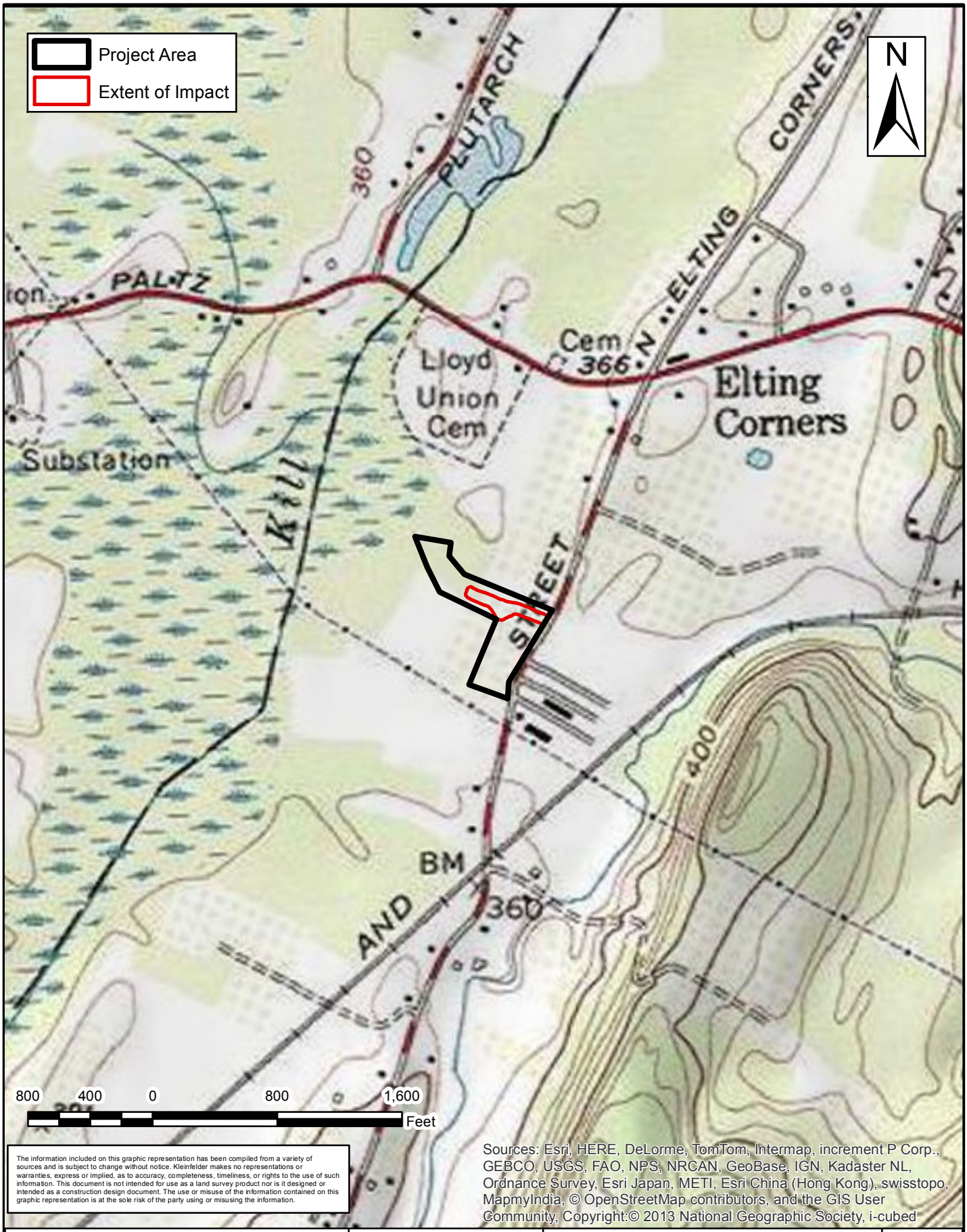
As indicated though the monitoring program or otherwise noted by monitoring and facility staff, problems arising during the monitoring period will be communicated by the applicant to the overseeing regulatory agency. Recommendations will be developed to compensate for problems or otherwise direct site management toward the goals of the wetland restoration plan.

7.4. Maintenance of Dominant Wetland Vegetation

The restoration plan goals are the establishment and limited maintenance of wetland plant communities. The restoration plan specifications have been developed to enhance the establishment of such communities as quickly as possible. The persistence of these wetland communities may not depend upon a consistency of wetland community species composition as initially established on the site. Rather, wetlands are among the most dynamic of landscape features and their plant community assemblages reflect such temporal change. The influence of climatic variation, the natural colonization by native plants, and the natural development of site wetland hydrology and nutrient regimes may likely lead to a wetland that differs in community structure, but adequately meets program goals. Maintenance and management of the site will be directed towards establishing a natural wetland community over time and not maintaining a specific species to species ratio. It is anticipated that the wetland will receive an abundance of recruitment species from the surrounding wetland vegetation and may eventually revert back to an area dominated by invasive species.

KLEINFELDER 300 Westage Business Center, Suite 407 Fishkill, NY 12524 **p |** 845.231.2500 **f |** 845.897.2636

FIGURES



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	20155296.001A
DRAWN:	06 APR 15
DRAWN BY:	GOsborn
CHECKED BY:	SFinch
FILE NAME:	Eltings_Fig1.mxd

Topographic Map

Central Hudson Gas & Electric Corp.
Eltings Corners Property
South Street
Town of Lloyd, Ulster County, New York

FIGURE
1

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

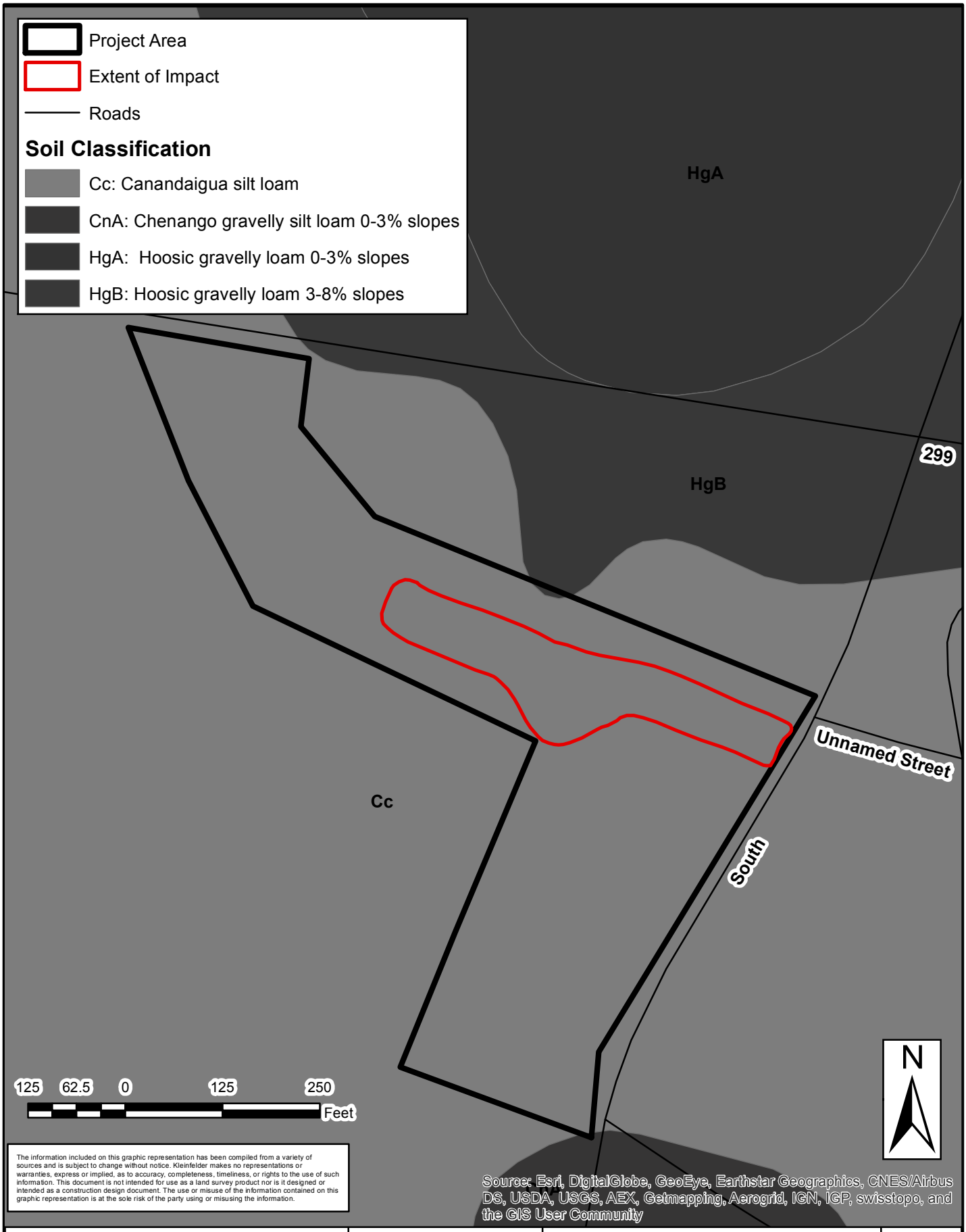
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	20155296.001A
DRAWN:	10 APR 15
DRAWN BY:	GOsborn
CHECKED BY:	SFinch
FILE NAME:	Eltings_Fig2.mxd

Aerial Map

Central Hudson Gas & Electric Corp.
Eltings Corners Property
South Street
Town of Lloyd, Ulster County, New York

FIGURE
2



KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	20155296.001A
DRAWN:	06 APR 15
DRAWN BY:	GOsborn
CHECKED BY:	SFinch
FILE NAME:	Eltings_Fig3.mxd

Soils

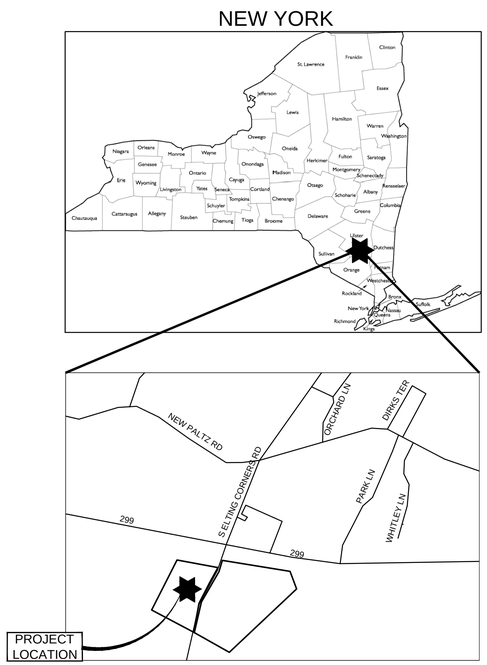
Central Hudson Gas & Electric Corp.
Eltings Corners Property
South Street
Town of Lloyd, Ulster County, New York

FIGURE
3

APPENDIX A
WETLAND RESTORATION PLANS

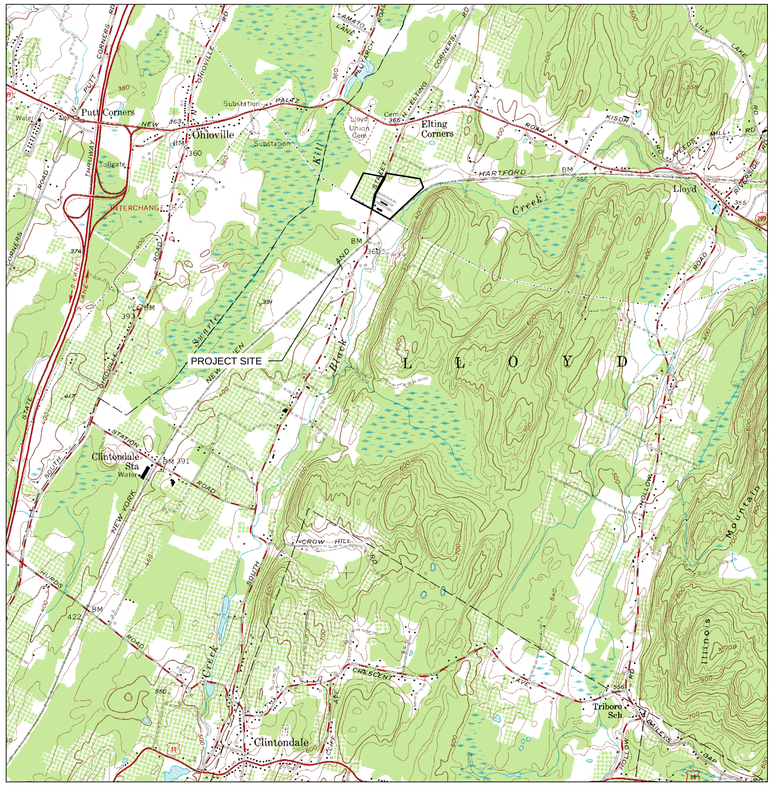
CENTRAL HUDSON GAS & ELECTRIC
WETLAND RESTORATION PLAN
ELTINGS CORNERS FACILITY, TOWN OF LLOYD, NEW YORK

DECEMBER 2015



VICINITY MAP

NTS



LOCATION MAP

NOT TO SCALE

LIST OF DRAWINGS

DIRECTIONS TO PROJECT

FROM I-87 MERGE ONTO NY-299E. TRAVEL APPROXIMATELY 1.3 MI ON NY-299E. TURN RIGHT ON TO SOUTH STREET AND THE PROJECT SITE WILL BE LOCATED WEST OF SOUTH STREET.

EXISTING INFORMATION SOURCES

BASE QUADRANGLE MAP OBTAINED FROM U.S. GEOLOGICAL SURVEY.
BASE AERIAL OBTAINED FROM ESRI WORLD IMAGERY MAP SERVICES.

KLEINFELDER
Bright People. Right Solutions.

CAD FILE: \\newburgh.kleinfelder.com\NEWBURGH-DATA\USERS\Company\Lodfiles\Projects\Central Hudson\Eltings Corners\2015 Remediation\CADD\Production Drawings\Existing Conditions.dwg LAYOUT: Existing Conditions PLOTTED: 12/17/2015 9:24 AM BY: kurt violette

KLEINFELDER
Bright People. Right Solutions.
300 Westage Business Center
Suite 407
Fishkill, NY 12524
Phone: 845-231-2500
www.kleinfelder.com

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 22 x 34

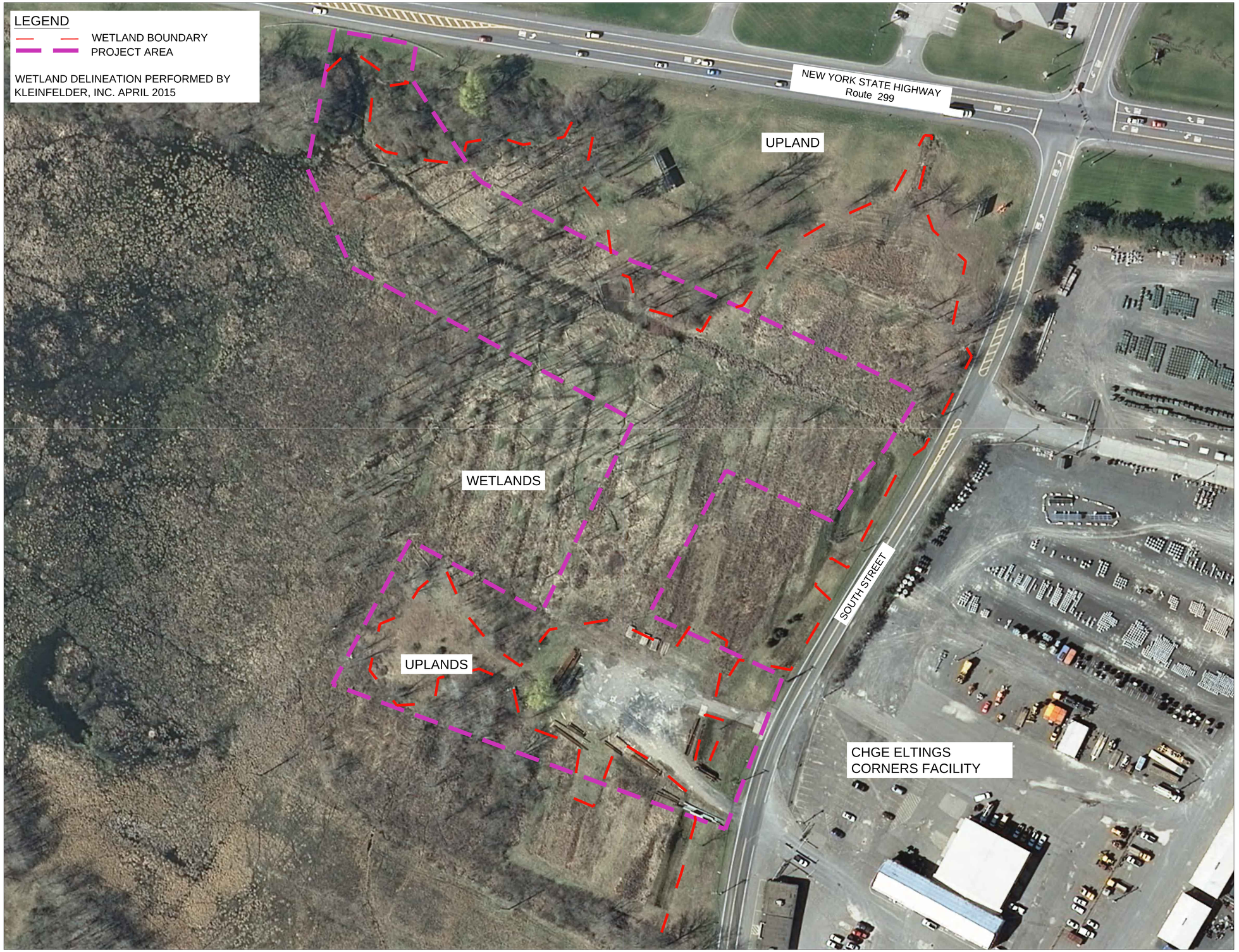
Existing Conditions

CHGE ELTINGS CORNERS
WETLAND RESTORATION PLAN
ELTINGS CORNER FACILITY

PROJECT NO.	20155296
ISSUE DATE	
CURRENT REVISION	
DESIGNED BY	SVL
DRAWN BY	SVL
CHECKED BY	NVK
APPROVED BY	NVK

EX-1

SHEET 1 of 5



PLAN: 1" = 60'

0 60 120
SCALE: 1" = 60 SCALE IN FEET

KLEINFELDER
Bright People. Right Solutions.

300 Westage Business Center
Suite 407
Fishkill, NY 12524
Phone: 845-231-2500
www.kleinfelder.com

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

N

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 22 x 34

Site Plan

CHGE ELTINGS CORNERS
WETLAND RESTORATION PLAN
ELTINGS CORNER FACILITY

PROJECT NO.	20155296
ISSUE DATE	
CURRENT REVISION	
DESIGNED BY	SVL
DRAWN BY	SVL
CHECKED BY	NVK
APPROVED BY	NVK

C-1

SHEET 2 of 5

CAD FILE: \\newburgh.kleinfelder.com\NEWBURGH-DATA\USERS\Company\Jobfiles\Projects\Central Hudson\Eltng Corners\2015 Remediation\CADD\Production Drawings\Site Plan.dwg LAYOUT: Site Plan PLOTTED: 12/10/2015 5:07 PM BY: kurt violette

TABLE 1 - PLANT LIST FOR WETLAND RESTORATION AREA

SPECIES NAME	COMMON NAME	QUANITITY	SIZE	SPACING
EMERGENTS				
JUNCUS EFFUSUS	SOFT RUSH	7,100	2" PLUG	18 INCHES
SCHOENOPLECUTS ATROVIRENS	GREEN BULRUSH	7,100	2" PLUG	18 INCHES
SCIRPUS CYPERINUS	WOOL GRASS	7,100	2" PLUG	18 INCHES
SPARGANIUM AMERICANUM	EASTERN BUR-REED	7,100	2" PLUG	18 INCHES
SHRUBS				
CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	200	1-GALLON	CLUSTERS 3,5,7 & ALONG NEW STREAMBANK
CORNUS SERICEA	RED-OSIER DOGWOOD	200	1-GALLON	CLUSTERS 3,5,7 & ALONG NEW STREAMBANK

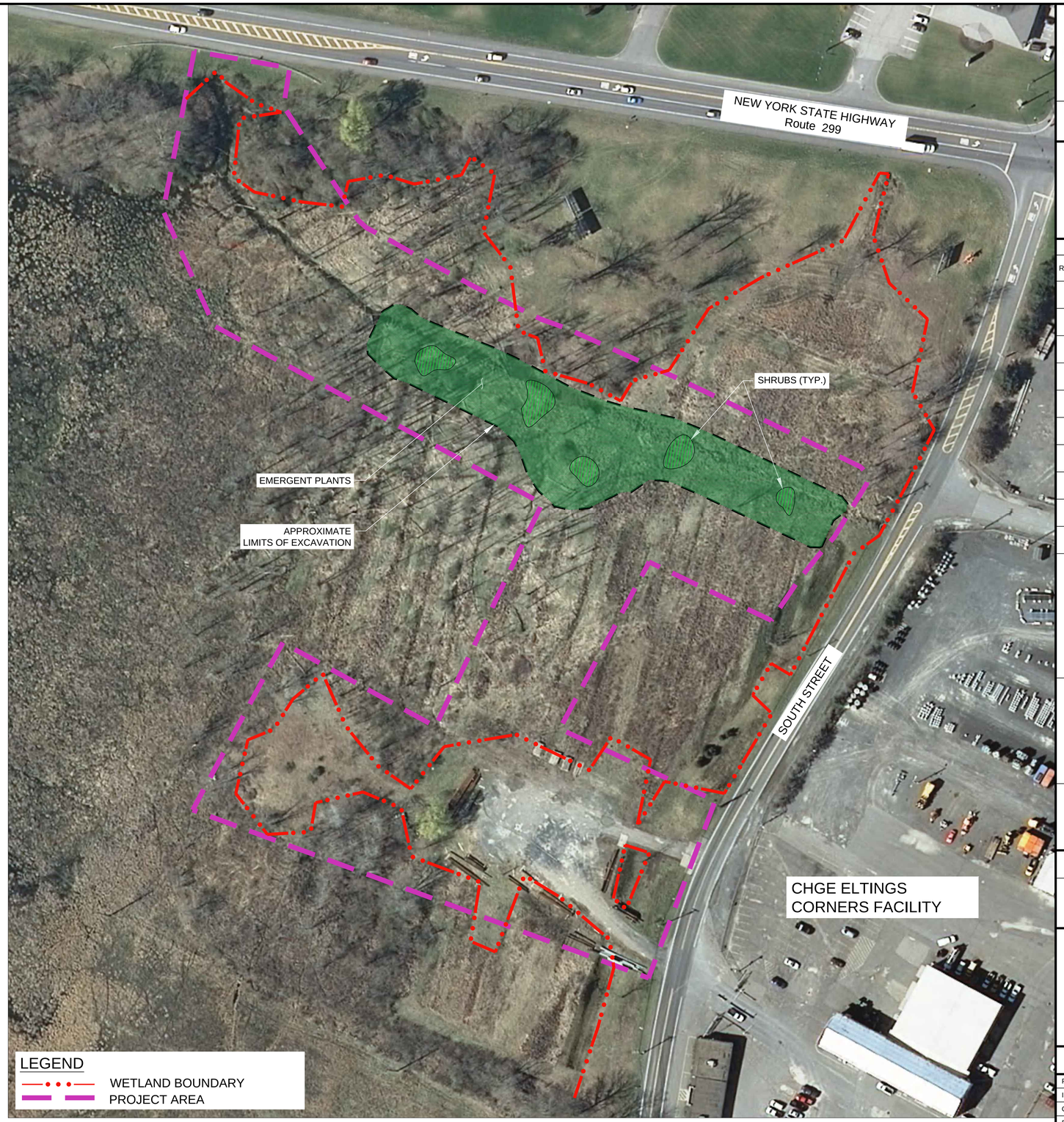
*BASED ON 2 ACRES PLANTING WITH 18" SPACING

TABLE 2 - NORTHEAST WETLAND NATIVE WILDFLOWER MIX, RESTORATIVE SEEDING COMPONENTS

SPECIES NAME	COMMON NAME	% OF MIX
EUPATORIUM PERFOLIATUM	BONESET	26.66
VERBENA HASTATA	BLUE VERVAIN	20.8
PANICUM DICHOTOMIFLORUM	SMOOTH PANIC-GRASS	19.75
SOLIDAGO RUGOSA	WRINKLED GOLDENROD	8.89
EUPATORIUM MACULATUM	JOE PYE WEED	8.74
EUTHAMIA GRAMINIFOLIA	GRASS LEAF GOLDENROD	6.65
POLYGONUM PENSYLVANICUM	PENNSYLVANIA SMARTWEED	4.59
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	2.8
BIDENS CERNUA	NODDING BEGGAR'S TICK	0.79
ASCLEPIAS INCAMATA	SWAMP MILKWEED	0.21
IRIS VERSICOLOR	BLUE FLAG	0.12

RATE: 1 POUND WILL COVER 11,000 SQ. FT. @ 50 SEEDS PER SQ. FT.

*NOTE- SHRUBS WILL BE PLANTED IN CLUSTERS ON HIGHER MICROTOPOGRAPHY BASED ON CMIP
- MINERAL SOILS WILL BE USED FOR TOPSOIL. TEXTURE OF SOIL TO BE DETERMINED.
- TOPOGRAPHY WILL BE PROVIDED ON FINAL PLANTING PLANS.
- REGRADING PLAN TO BE PROVIDED IN FINAL WETLAND RESTORATION PLAN



KLEINFELDER
Bright People. Right Solutions.
300 Westage Business Center
Suite 407
Fishkill, NY 12524
Phone: 845-231-2500
www.kleinfelder.com

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 22 x 34

Planting Plan

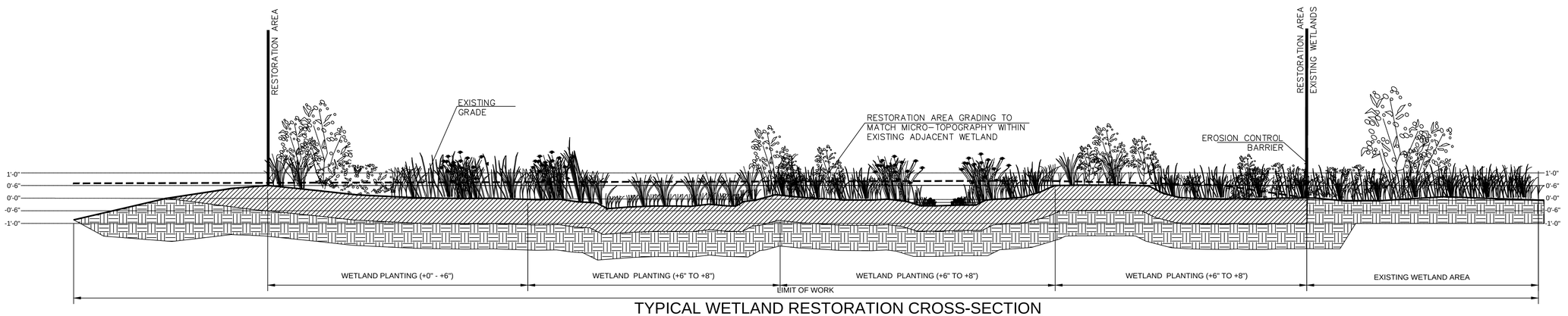
CHGE ELTINGS CORNERS
WETLAND RESTORATION PLAN
ELTINGS CORNER FACILITY

PROJECT NO.	20155296
ISSUE DATE	
CURRENT REVISION	
DESIGNED BY	SVL
DRAWN BY	SVL
CHECKED BY	NVK
APPROVED BY	NVK

C-2

SHEET 3 of 5

CAD FILE: \\newburgh\NEWBURGH-DATA\USERS\Company Jobfiles\Projects\Central Hudson\Elting Corners\2015 Remediation\CADD\Production Drawings\Restoration Plans.dwg LAYOUT: Planting Plan
PLOTTED: 9/12/2015 12:13 PM BY: Kurt violette



TYPICAL WETLAND RESTORATION CROSS-SECTION

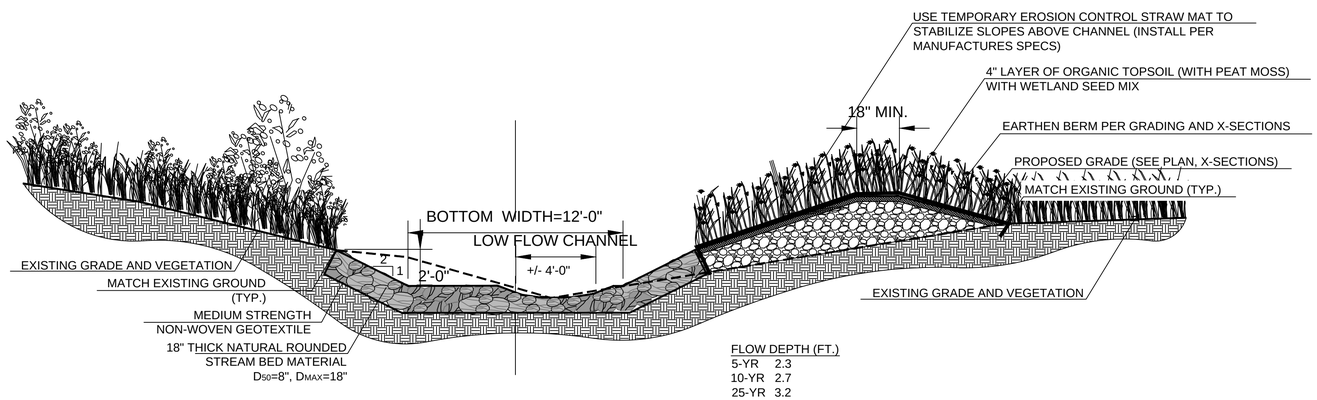
NOT TO SCALE

GENERAL NOTES:

1. THE AREA OF EXCAVATION WILL BE STAKED AND MARK LIMIT OF WORK AND CLEARING. EXISTING VEGETATION WITHIN THE LIMIT OF WORK TO BE REMOVED.
2. ENVIRONMENTAL MONITOR TO BE ON SITE DURING ALL CONSTRUCTION WITHIN THE RESOURCE AREAS TO ASSURE PROPER PLACEMENT OF STRUCTURES, AND MONITOR ALL EROSION CONTROL MEASURES.
3. WETLAND SCIENTIST TO APPROVE ALL MATERIALS PRIOR TO INSTALLATION. WETLAND SCIENTIST TO APPROVE ALL ROUGH GRADES PRIOR TO THE PLACEMENT OF SOIL.
4. UPON COMPLETION OF PROJECT ALL ACCESS ROADS AND AREAS DISTURBED DURING CONSTRUCTION TO BE REBUILT AND REGRADED TO THE EXISTING CONDITION AND SEEDED AND COVERED WITH EROSION CONTROL BLANKET OR WEED FREE STRAW.
5. NO WORK WILL BEGIN UNTIL APPLICABLE LOCAL, STATE AND FEDERAL ENVIRONMENTAL PERMITS HAVE BEEN OBTAINED. THE CONTRACTOR IS EXPECTED TO BE AWARE OF AND COMPLY WITH ALL PERMITS AND PERMIT CONDITIONS.
6. TO MINIMIZE SEDIMENTATION AND MAXIMIZE CONSTRUCTION EFFICIENCY, WORK SHALL BE CONDUCTED DURING PERIODS OF LITTLE TO NO FLOW(IF POSSIBLE).
7. THE EROSION CONTROL MEASURES SHOWN ON THE PLAN AND DETAIL SHEETS AND AS OUTLINED BELOW ARE CONSIDERED THE MINIMUM REQUIRED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL ADDITIONAL MEASURES AS NECESSARY DURING CONSTRUCTION TO CONTROL EROSION AND SEDIMENTATION.
8. EROSION CONTROL MEASURES SHALL BE PERIODICALLY INSPECTED DURING THE LIFE OF THE PROJECT AND AFTER EACH STORM EVENT. SEDIMENT SHALL BE REMOVED AND REPAIRS MADE AS NEEDED OR DIRECTED. SEDIMENT SHALL BE DISPOSED OF IN A SECURE LOCATION TO PREVENT SILTATION OF WETLANDS AND WATERWAYS.
9. PERMISSION FOR ANY ACCESS AREA SHALL BE OBTAINED PRIOR TO CONSTRUCTION. ALL ACCESS AREAS ARE TO BE REBUILT / RESTORED IMMEDIATELY FOLLOWING CONSTRUCTION. DISTURBED ACCESS AREAS SHALL BE REPLANTED AND/OR BE SEEDED AND MULCHED AS NEEDED.

RESTORATION NOTES:

1. CONSTRUCTION OF THE RESTORATION AREA SHALL BE DONE UNDER THE GUIDANCE OF A WETLAND SCIENTIST AND/ OR ENVIRONMENTAL MONITOR. A WETLAND SCIENTIST SHALL BE ON SITE MARKING TREES FOR PRESERVATION AND CHECKING GRADES DURING EXCAVATION OF THE REPLICATION AREAS. EXISTING TREES TO REMAIN SHALL BE SURROUNDED IN ORANGE CONSTRUCTION FENCE AT EDGE OF "DRIP LINE". EXISTING TREES TO BE REINSTALLED AS SNAGS WITHIN THE BVW WILL BE MARKED WITH BLUE FLAGGING.
2. THE OBJECTIVE OF THIS PLAN IS THE RESTORATION OF EXISTING WETLAND, TO MITIGATE FOR THE PERMANENT REPLACEMENT OF CONTAMINATED SOIL.
3. RESTORATION GOALS
   3.a. AT A MINIMUM, 75% COVER WITH WETLAND SPECIES WITHIN FIVE YEARS OF INSTALLATION.
   3.b. LONG TERM: PERSISTENT EMERGENT/ SHRUB WETLAND.
4. PRIOR TO CONSTRUCTION, SILT FENCE WILL BE INSTALLED AT THE LIMIT OF WORK.
5. PRIOR TO TRANSLOCATION OF TOPSOIL TO THE WETLAND RESTORATION AREAS, TOPSOIL SOURCE SHALL BE INSPECTED BY AND APPROVED BY THE PROJECT WETLAND SCIENTIST. TOPSOIL USED FOR THE WETLAND RESTORATION AREAS SHALL HAVE A TEXTURE OF SANDY CLAY LOAM, HAVE A RELATIVELY HIGH ORGANIC MATTER CONTENT, AND IF FROM AN ON-SITE SOURCE MUST CURRENTLY SUPPORT A FACULTATIVE PLANT COMMUNITY WITH NO INVASIVE SPECIES.
6. THE RESTORATION AREAS SHALL BE EXCAVATED TO THE LEVELS NEEDED IN THE CMIP, AND THEN FILLED WITH THE SELECTED SOIL WITH HIGH ORGANIC CONTENT. IF SIGNIFICANTLY COMPACTED BY EQUIPMENT, THIS SOIL MUST BE ROTOTILLED TO ACHIEVE FRIABLE CONSISTENCY.
7. PLANTING OF HERBACECOUS PLANTS AND SHRUBS WILL PREFERABLY TAKE PLACE IN THE SPRING OR LATE SUMMER/EARLY FALL.
8. PLANT SUBSTITUTIONS DUE TO COMMERCIAL AVAILABILITY OR HYDROLOGICAL CONDITIONS MUST BE APPROVED BY THE PROJECT WETLAND SCIENTIST.
9. RESTORATION AREAS SHALL BE MONITORED FOR INVASIVE SPECIES FOR A PERIOD OF FIVE YEARS FOLLOWING CONSTRUCTION OF THE REPLICATION AREAS. IF FOUND DURING THAT PERIOD, INVASIVE SPECIES SHALL BE REMOVED BY HAND. RESTORATION AREAS SHALL BE PLANTED AS QUICKLY AS POSSIBLE TO PREVENT INVASIVE SPECIES ESTABLISHMENT.
10. THE EROSION CONTROL BARRIER BETWEEN THE EXISTING WETLANDS AND RESTORATION AREAS SHALL BE REMOVED UPON STABILIZATION OF THE RESTORATION AREAS. ALL STAKES AND TWINE SHALL BE REMOVED.



FLOW DEPTH (FT.)

5-YR	2.3
10-YR	2.7
25-YR	3.2

TYPICAL CHANNEL RESTORATION SECTION

NOT TO SCALE

KLEINFELDER
Bright People. Right Solutions.

300 Westage Business Center
Suite 407
Fishkill, NY 12524
Phone: 845-231-2500
www.kleinfelder.com

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 — 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 22 x 34

Wetlands Restoration Details

CHGE ELTINGS CORNERS
WETLAND RESTORATION PLAN
ELTINGS CORNER FACILITY

PROJECT NO.	20155296
ISSUE DATE	
CURRENT REVISION	
DESIGNED BY	SVL
DRAWN BY	SVL
CHECKED BY	NVK
APPROVED BY	NVK

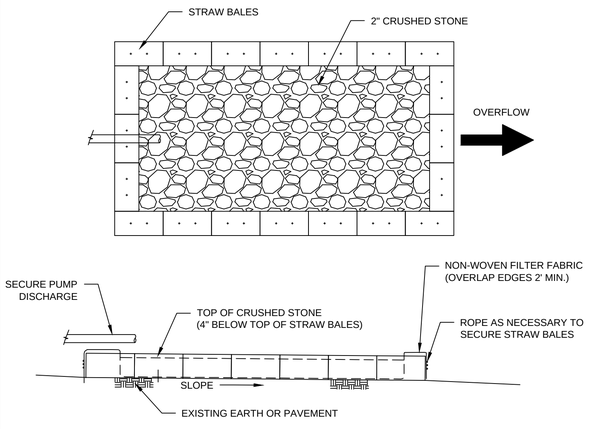
C-3

SHEET 4 of 5

CAD FILE \\newburgh\NEWBURGH-DATA\USERS\Company\Jobfiles\Projects\Central Hudson\Eltings Corners\2015 Remediation\CADD\Production Drawings\Restoration Cross Sections.dwg LAYOUT: Excavation_Restoration Cross Sections PLOTTED: 8/10/2015 4:25 PM BY: jonathan moser

EROSION CONTROL NOTES

1. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE CONSTRUCTED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NYSDEC EROSION AND SEDIMENT CONTROL GUIDELINES.
2. ALL CONTROL MEASURES SHALL BE INSTALLED AS SHOWN ON THE PLAN(S).
3. ALL CONTROL MEASURES SHALL BE MAINTAINED AND UPGRADED AS REQUIRED TO ACHIEVE PROPER SEDIMENT CONTROL THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS HAVE BEEN THOROUGHLY STABILIZED.
4. NO CONTROL MEASURES SHALL BE REMOVED WITHOUT APPROVAL FROM NYSDEC.
5. ADDITIONAL CONTROL MEASURES SHALL BE INSTALLED DURING THE CONSTRUCTION PERIOD IF DEEMED NECESSARY BY AN AUTHORIZED AGENT.
6. THE LIMITS OF CLEARING, GRADING AND DISTURBANCE, AS SHOWN ON THE PLAN(S), SHALL BE KEPT TO A MINIMUM WITHIN THE APPROVED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE THE LIMITS OF CLEARING SHALL REMAIN TOTALLY UNDISTURBED.
7. ANY CONTROL MEASURES RETAINING SEDIMENT OVER ½ THEIR HEIGHT SHALL HAVE THE SEDIMENT IMMEDIATELY REMOVED, AND ALL DAMAGED CONTROL MEASURES SHALL BE REMOVED AND REPLACED.
8. ALL SEDIMENT SHALL BE IMMEDIATELY REMOVED FROM NEW AND EXISTING DRAINAGE STRUCTURES AND PIPING IMPACTED BY THE PROPOSED CONSTRUCTION.
9. SEDIMENT REMOVED FROM CONTROL MEASURES AND DRAINAGE FACILITIES SHALL BE DISPOSED OF IN A MANNER THAT IS CONSISTENT WITH STATE AND LOCAL REGULATIONS.
10. THE PLANTING SEASONS FOR THE SPECIFIED SEED MIXTURE SHALL BE AS DEFINED, UNLESS DIRECTED OTHERWISE. OUTSIDE OF THESE SPECIFIED DATES, AREAS WILL BE STABILIZED WITH HAYBALE CHECK DAMS, FILTER FABRIC, OR WOODCHIP MULCH AS REQUIRED TO CONTROL EROSION.
11. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST AND WIND EROSION THROUGHOUT THE LIFE OF THE CONTRACT. THE CONTRACTOR SHALL CONTROL DUST TO PREVENT A HAZARD TO TRAFFIC ON ADJACENT ROADWAYS.
12. TEMPORARY STOCKPILING OF CONSTRUCTION MATERIALS SHALL ONLY BE ALLOWED IN THE LOCATIONS SHOWN ON THE PLAN(S). STOCKPILE AREAS SHALL BE FULLY ENCLOSED BY SILT FENCE.
13. IF NO STOCKPILE AREA IS SHOWN, THE CONTRACTOR SHALL REMOVE MATERIALS FROM SITE IMMEDIATELY UPON EXCAVATION.
14. ALL GROUNDWATER EXTRACTED DURING DEWATERING OF EXCAVATIONS SHALL BE DIRECTED TO A TEMPORARY SEDIMENTATION BASIN.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE EROSION AND SEDIMENTATION CONTROL PLAN. THIS INCLUDES THE INSTALLATION AND MAINTENANCE OF ALL CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN, AND NOTIFYING THE CITY OF ANY TRANSFER OF THIS RESPONSIBILITY.
16. THE SITE CONSTRUCTION FOREMAN SHALL BE DESIGNATED AS THE ON-SITE INDIVIDUAL WHO WILL BE RESPONSIBLE FOR THE DAILY MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS, AND SHALL IMPLEMENT ALL MEASURES NECESSARY TO CONTROL EROSION AND TO PREVENT SEDIMENT FROM LEAVING THE SITE.
17. THE ENVIRONMENTAL MONITOR SHALL BE DESIGNATED TO CONDUCT SITE INSPECTIONS DURING CONSTRUCTION. THESE INSPECTIONS SHALL REVIEW ALL SEDIMENT AND EROSION CONTROLS AND MAKE RECOMMENDATIONS FOR CORRECTIVE ACTIONS, IF NEEDED.
18. PRIOR TO ANY SITE GRADING OR SITE WORK, THE CONTRACTOR SHALL INSTALL ALL SPECIFIED SEDIMENT AND EROSION CONTROLS, WHICH WILL ALSO SERVE AS THE LIMIT OF CONSTRUCTION. THE SEDIMENT CONTROLS WILL BE A SILT FENCE WHICH HAS BEEN ENTRENCHED INTO THE GROUND.
19. CONSTRUCTION STAGING AREA TO BE LOCATED AWAY FROM TOP OF BANK AND SURROUNDED WITH AND EROSION CONTROL BARRIER. CONSTRUCTION DEBRIS AND SEDIMENT SHALL BE KEPT ON SITE AND SHALL NOT BE PERMITTED TO MIGRATE BEYOND THE PROJECT BOUNDARIES.
20. ONCE THE SITE IS STABLE AND APPROVED BY NYSDEC, EROSION CONTROLS WILL BE REMOVED.
21. ANY AREAS OF EXPOSED SOIL OR SOIL STOCKPILES THAT WILL REMAIN INACTIVE FOR 30 OR MORE DAYS WILL BE COVERED WITH A LAYER OF STRAW MULCH APPLIED AT A RATE OF 40 KILOGRAMS PER 100 SQUARE METERS (90 LBS. PER 1,000 SQUARE FEET). THE MULCH IS TO BE ANCHORED WITH A TACKING COAT APPLIED BY HYDRO-SEEDER OR ANCHORED WITH NETTING AFFIXED WITH WIRE STAPLES. A SEDIMENT BARRIER SHALL BE INSTALLED ENCOMPASSING THE SOIL STOCKPILE.

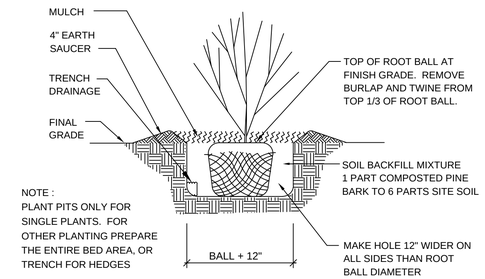


NOTES:

1. REMOVE TRAP WHEN SILT COVERS CRUSHED STONE AND DISPOSE OF IN A MANNER THAT IS CONSISTENT WITH STATE AND LOCAL REGULATIONS.
2. ANY DISTURBED AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION IN ACCORDANCE WITH THE SPECIFICATIONS.

TEMPORARY SEDIMENTATION TRAP

NOT TO SCALE

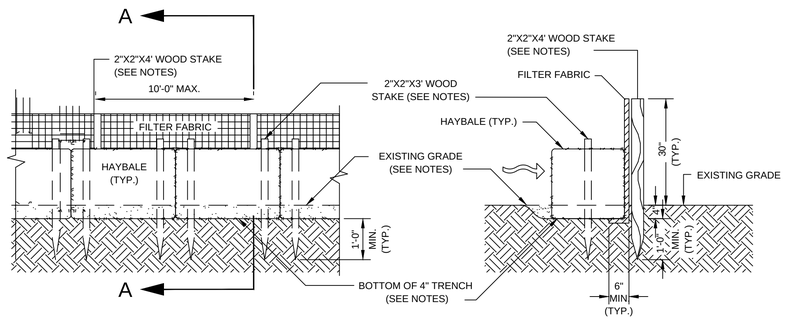


TYPICAL SHRUB PLANTING DETAIL

NOT TO SCALE

TYPICAL PLANTING SCHEDULE:

1. PLANTS WILL BE SPACED EITHER IN ROWS THAT ARE 10' FEET APART OR IN CLUSTERS.
2. PLACEMENT OF SPECIES WILL BE CHOSEN RANDOMLY.
3. ALL WOODY SPECIES TO BE HAND PLANTED.
4. RODENT GUARDS WILL BE INSTALLED AT THE BASE OF EACH PLANTING.



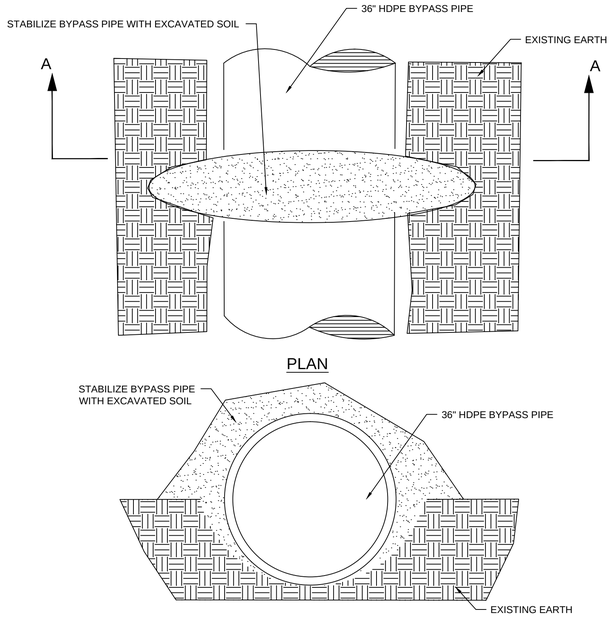
SECTION A-A

NOTES:

1. FABRIC TO BE UV RESISTANT POLYPROPYLENE WITH A MINIMUM WEIGHT OF 2.5 OZ./S.Y.
2. FABRIC TO BE ATTACHED TO STAKES WITH STAPLES.
3. USE SILT FENCE AND HAYBALES WHERE INDICATED OR AS DIRECTED BY THE ENGINEER.
4. WHERE HAYBALES ARE USED, TRENCH A MINIMUM OF 4" INTO EXISTING GRADE.
5. A MINIMUM OF (2) WOODEN OR METAL STAKES PER HAYBALE. DRIVE STAKES A MINIMUM OF 12" INTO GROUND.

SILT FENCE WITH HAYBALE

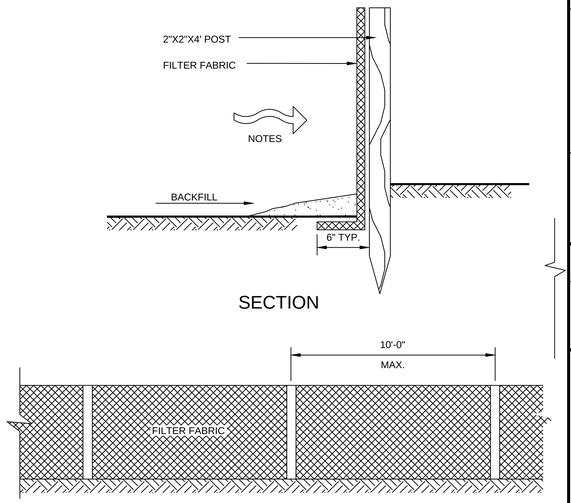
NOT TO SCALE



SECTION A-A

STREAM CHANNEL BYPASS PIPE

NOT TO SCALE



SECTION

ELEVATION

NOTES:

1. FABRIC TO BE ATTACHED TO STAKES WITH STAPLES.
2. FABRIC TO BE UV RESISTANT POLYPROPYLENE WITH A MINIMUM WEIGHT OF 2.5 OZ./S.Y.

SILT FENCE

NOT TO SCALE

KLEINFELDER
Bright People. Right Solutions.

300 Westage Business Center
Suite 407
Fishkill, NY 12524
Phone: 845-231-2500
www.kleinfelder.com

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 22 x 34

E & S Control Details

CHGE ELTINGS CORNERS
WETLAND RESTORATION PLAN
ELTINGS CORNER FACILITY

PROJECT NO.	20155296
ISSUE DATE	
CURRENT REVISION	
DESIGNED BY	SVL
DRAWN BY	SVL
CHECKED BY	NVK
APPROVED BY	NVK

D-1

SHEET 5 of 5

PLOTTED: 9/10/2015 4:25 PM BY: jonathan mosier
CAD FILE: \\newburgh\NEWBURGH1\DATA\USERS\Company Jobfiles\Projects\Central Hudson\Eltng Corners\2015 Remediation\CADD\Production Drawings\E&S Details.dwg LAYOUT: E & S Control Details

APPENDIX B
PHOTOGRAPHS

SITE PHOTOGRAPHS

Project Name: Eltings Corner Restoration Plan
Project Number: 20155296.001A
Project Location: Town of Lloyd, Ulster County, New York
August 12, 2015

PHOTO 1: View facing west from the outfall at South Street into the restoration area.

PHOTO 2: View facing south of the wetland from the outfall toward the staging areas.

Photo 3: View facing west on the south side of the stream of area of the remediation area.

Photo 4: View facing north of the wetland from the proposed staging area.

Photo 5: View facing south toward the staging area from the remediation area.

Photo 6: View facing south out the culvert inlet along State Route 299.

Photo 7: View facing west from the proposed staging area entrance off of South Street.

Photo 8: View facing east of the proposed staging areas toward South Street.

APPENDIX C

WATER BUDGET

CHGE Wetland Restoration Plan 4/8/2015
Water Budget Calculations

Storage = V total -V wetlands - V outfall

V total = Total volume of runoff
V wetlands = Runoff from wetlands area
V outfall = Runoff from outfall area

Month	V total (af)	V total (CF)	V outfall (af)	V outfall (CF)	V wetland (af)	V wetlands (CF)	Storage (CF)
Jan	6.336	275,996.16	6.075	264,627.00	0.231	10,062.36	1,307
Feb	5.045	219,760.20	4.838	210,743.28	0.18	7,840.80	1,176
Mar	7.89	343,688.40	7.565	329,531.40	0.295	12,850.20	1,307
Apr	8.569	373,265.64	8.215	357,845.40	0.323	14,069.88	1,350
May	10.639	463,434.84	10.199	444,268.44	0.409	17,816.04	1,350
Jun	10.706	466,353.36	10.263	447,056.28	0.412	17,946.72	1,350
July	11.439	498,282.84	10.965	477,635.40	0.443	19,297.08	1,350
Aug	9.944	433,160.64	9.533	415,257.48	0.38	16,552.80	1,350
Sep	10.208	444,660.48	9.786	426,278.16	0.391	17,031.96	1,350
Oct	10.839	472,146.84	10.39	452,588.40	0.417	18,164.52	1,394
Nov	7.57	329,749.20	7.258	316,158.48	0.282	12,283.92	1,307
Dec	7.762	338,112.72	7.442	324,173.52	0.29	12,632.40	1,307
Year		4,658,611.32		4,466,163.24		176,548.68	15,899

Assumptions:

Runoff values calculated using SCS TR-20 method in HydroCAD

Conclusions:

Based on these calculations a positive (net inflow) water balance for each month of the year was observed. Therefore we conclude that the water balance is adequate for the proposed wetland restoration project.

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.26"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=131.04 cfs 8.215 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.94"
Flow Length=800' Tc=8.3 min CN=83 Runoff=6.76 cfs 0.323 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.25"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=109.54 cfs 8.569 af

Total Runoff Area = 91.200 ac Runoff Volume = 17.107 af Average Runoff Depth = 2.25"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.62"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=151.08 cfs 9.533 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.28"
Flow Length=800' Tc=8.3 min CN=83 Runoff=7.90 cfs 0.380 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.62"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=126.48 cfs 9.944 af

Total Runoff Area = 91.200 ac Runoff Volume = 19.857 af Average Runoff Depth = 2.61"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.05"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=119.16 cfs 7.442 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.74"
Flow Length=800' Tc=8.3 min CN=83 Runoff=6.08 cfs 0.290 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.04"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=99.50 cfs 7.762 af

Total Runoff Area = 91.200 ac Runoff Volume = 15.493 af Average Runoff Depth = 2.04"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>1.33"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=78.44 cfs 4.838 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.08"
Flow Length=800' Tc=8.3 min CN=83 Runoff=3.82 cfs 0.180 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>1.33"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=65.06 cfs 5.045 af

Total Runoff Area = 91.200 ac Runoff Volume = 10.062 af Average Runoff Depth = 1.32"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>1.67"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=97.95 cfs 6.075 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.39"
Flow Length=800' Tc=8.3 min CN=83 Runoff=4.89 cfs 0.231 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>1.67"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=81.60 cfs 6.336 af

Total Runoff Area = 91.200 ac Runoff Volume = 12.642 af Average Runoff Depth = 1.66"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>3.02"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=172.62 cfs 10.965 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.66"
Flow Length=800' Tc=8.3 min CN=83 Runoff=9.13 cfs 0.443 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>3.01"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=144.70 cfs 11.439 af

Total Runoff Area = 91.200 ac Runoff Volume = 22.847 af Average Runoff Depth = 3.01"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.82"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=162.08 cfs 10.263 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.47"
Flow Length=800' Tc=8.3 min CN=83 Runoff=8.52 cfs 0.412 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.82"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=135.78 cfs 10.706 af

Total Runoff Area = 91.200 ac Runoff Volume = 21.380 af Average Runoff Depth = 2.81"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.08"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=121.06 cfs 7.565 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.77"
Flow Length=800' Tc=8.3 min CN=83 Runoff=6.19 cfs 0.295 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.08"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=101.11 cfs 7.890 af

Total Runoff Area = 91.200 ac Runoff Volume = 15.750 af Average Runoff Depth = 2.07"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.81"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=161.12 cfs 10.199 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.45"
Flow Length=800' Tc=8.3 min CN=83 Runoff=8.47 cfs 0.409 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.80"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=134.97 cfs 10.639 af

Total Runoff Area = 91.200 ac Runoff Volume = 21.247 af Average Runoff Depth = 2.80"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.00"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=116.32 cfs 7.258 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>1.69"
Flow Length=800' Tc=8.3 min CN=83 Runoff=5.92 cfs 0.282 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>1.99"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=97.10 cfs 7.570 af

Total Runoff Area = 91.200 ac Runoff Volume = 15.109 af Average Runoff Depth = 1.99"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.86"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=164.00 cfs 10.390 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.50"
Flow Length=800' Tc=8.3 min CN=83 Runoff=8.63 cfs 0.417 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.85"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=137.40 cfs 10.839 af

Total Runoff Area = 91.200 ac Runoff Volume = 21.646 af Average Runoff Depth = 2.85"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Outfall Runoff Area=43.600 ac 70.77% Impervious Runoff Depth>2.69"
Flow Length=2,080' Tc=16.0 min CN=87 Runoff=154.90 cfs 9.786 af

Subcatchment 2S: Wetlands Runoff Area=2.000 ac 0.00% Impervious Runoff Depth>2.35"
Flow Length=800' Tc=8.3 min CN=83 Runoff=8.11 cfs 0.391 af

Subcatchment 3S: Total Runoff Area=45.600 ac 67.66% Impervious Runoff Depth>2.69"
Flow Length=2,880' Tc=24.3 min CN=87 Runoff=129.71 cfs 10.208 af

Total Runoff Area = 91.200 ac Runoff Volume = 20.386 af Average Runoff Depth = 2.68"
32.34% Pervious = 29.490 ac 67.66% Impervious = 61.710 ac