New York State Electric & Gas

2023 Restoration Monitoring Report

Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York
NYSDEC Site Number: 862009

December 2023

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Acronyms and Abbreviations

Arcadis	Arcadis of New York, Inc.
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
RD	Remedial Design Report
SAV	submerged aquatic vegetation
Site	Penn Yan Former Manufactured Gas Plant Site

1 Introduction

This Restoration Monitoring Report summarizes the 2023 Restoration Monitoring results for the restored upland, bank, and aquatic portions of the New York State Electric & Gas Penn Yan Former Manufactured Gas Plant (MGP) Site (Site). The Site is located on Water Street, between Liberty Street and Main Street and the Keuka Lake Outlet, in the Village of Penn Yan, Town of Milo, Yates County, New York (Figure 1).

The Restoration Plan (Remedial Design Report [RD] Appendix G [AECOM 2015]) requires post-construction monitoring and maintenance of the restored upland, bank, and submerged aquatic vegetation (SAV) beds to evaluate restoration performance and to identify proposed maintenance and/or corrective actions (if necessary) to remain compliant. This report summarizes corrective actions completed on September 6, 2023, and data collected during the third post-construction Restoration Monitoring event, which was conducted on September 20, 2023.

1.1 Background

The Site is approximately 0.815 acres, comprising a vacant masonry building, 2 feet of grass-covered soil (meeting restricted-residential use soil cleanup objectives [6 New York Codes, Rules, and Regulations Part 375-6.7(d)]), an asphalt driveway and parking area, and a riparian area along the Keuka Lake Outlet. The off-site project area, which is adjacent and downstream of the Site, comprises approximately 1.7 acres of submerged sediments beneath the Keuka Lake Outlet (Class C waterway) restored with a 6-inch-thick geoweb infilled with 1 inch of AquaGate® and overlain by 5 inches of Aquablok® and a minimum of 1 foot of clean soil (AECOM 2023).

AECOM completed the Site remedy between July 2015 and May 2020 in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved RD for the Site (AECOM 2015) and Design Modifications 001-004 (AECOM 2016 a, b and 2018 a, b).

The Restoration Plan (RD Appendix G [AECOM 2015]) requires post-construction monitoring, maintenance, and reporting of the restored upland (approximately 0.76 acres), restored bank (approximately 1,800 square feet along the Keuka Lake Outlet), and restored SAV and near-shore emergent vegetation beds, collectively known as aquatic vegetation (remediated sediment areas within the Keuka Lake Outlet; approximately 1.7 acres), shown on Figure 2. The Restoration Plan specified annual monitoring during each of the first five full growing seasons following Site restoration construction and annual reports to assess vegetative community recovery. AECOM completed upland, bank, and aquatic vegetation restoration per the Restoration Plan (RD Appendix G [AECOM 2015]) by July 2, 2020, with any deviations detailed in the Final Engineering Report (AECOM 2023).

Additionally, the Interim Site Management Plan (AECOM 2020) stated that a one-time, post-remediation inspection to assess biotic community reestablishment within the Keuka Lake Outlet remediated areas would be performed prior to the first Periodic Review Report. Biotic community reestablishment inspection results were presented in the 2022 Restoration Monitoring Report (Arcadis of New York, Inc. [Arcadis] 2023) and indicated successful benthic community re-establishment in the restored sediment areas.

1.2 Objectives

The objectives of this report are to:

- Summarize Site restoration;
- Summarize Site restoration evaluation methods;

- Summarize the restoration monitoring data collected and compare the data/observations to performance metrics;
- Evaluate the Keuka Lake Outlet restored bank stability; and
- Summarize completed and/or recommended corrective actions and proposed future restoration monitoring.

To document achieving the objectives, this report presents:

- Corrective actions completed during 2023 monitoring events;
- Site-wide data collected during the 2023 Restoration Monitoring event; and
- Conclusions and monitoring modification recommendations, as appropriate.

2 Site Restoration

In general, the RD (AECOM 2015) required post-remediation vegetative cover material installation to reestablish the upland, bank, and aquatic Site areas shown on Figure 2. The remediation contractor restored the upland on August 21, 2019, and the bank on September 19-20, 2019, by placing a clean soil layer and applying a riparian seed mix to establish a native vegetation cover. In addition to the riparian seed mix, the bank restoration included planting the following within the approximately 1,800-square-foot area:

- Five shrub species (gray dogwood [*Cornus racemosa*], red-osier dogwood [*Cornus stolonifera*], pussy willow [*Salix discolor*], speckled alder [*Alnus rugosa*], and elderberry [*Sambucus canadensis*]) for a total of 25 shrubs, which were installed on December 13, 2019; and
- Three trees (two black walnut [*Juglans nigra*] and one silver maple [*Acer saccharinum*]), which were installed on July 2, 2020.

The remediation contractor planted SAV and near-shore emergent vegetation beds from June 21 through July 12, 2017, and May 27 to 28, 2020, within six near-shore areas covering approximately 1.7 acres (AECOM 2023). More than 18,000 individual plant plugs, comprising five aquatic plant species, were installed between 2017 and 2020 and included white water-lily (*Nymphaea odorata*), long-leaved pondweed (*Potamogeton nodosus*), common arrowhead (*Sagittaria latifolia*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), and wild celery (*Valisneria americana*). SAV restoration area limits are shown on Figure 2.

3 Completed Corrective Actions

The following corrective actions were completed in 2023 to meet the desired performance standards detailed in the Restoration Plan (RD Appendix G [AECOM 2015]):

- Arcadis planted 13 replacement shrubs on September 6, 2023, to account for shrub mortality observed during the 2022 Restoration Monitoring event. Five red-osier dogwood shrubs, five elderberry shrubs, and three pussy willow shrubs were planted to achieve 25 total shrubs planted and alive and meet the 100% survival performance standard requirement in the RD (AECOM 2015).
- Arcadis overseeded bare and/or sparsely vegetated portions of the upland area with a native grass seed mix and cover seed on September 6, 2023. Figure 3 shows where seed was dispersed, and Photograph 1 in Appendix A provides a representative view of the reseeded area. The seed mix specified for this upland area included a native mix of warm and cool season grasses suitable for this region. The mix was obtained from Ernst Conservation Seeds and contained 35% big bluestem (*Andropogon gerardii*), 30% Indiangrass (*Sorghastrum nutans*), 20% switchgrass (*Panicum virgatum*), and 15% Virginia wildrye (*Elymus virginicus*). This native grass mix was applied at approximately 28 pounds per acre to overseed, and a cover seed of grain rye (*Secale cereale*) was applied at approximately 60 pounds per acre. The seeded area was approximately 1,160 square feet, and natural straw was applied for protection.
- Maintenance visits were completed on September 14, September 20, and November 13, 2023, to ensure adequate watering was applied and the plantings and seeded cover was healthy.

4 Restoration Monitoring and Sampling

Arcadis conducted Site upland, bank, and aquatic restoration monitoring, which included the following:

- A quantitative total percent vegetation cover evaluation within the upland, bank, and restored SAV and near-shore emergent vegetation beds;
- A tree and shrub survival evaluation;
- A restored bank stability qualitative assessment; and
- Wildlife observations.

4.1 Assessment Methods

Arcadis conducted vegetative cover quantitative assessments by placing a 1-square-meter quadrat at three random locations within both the seeded upland and bank Site areas and five quadrats along a representative transect within each SAV and near-shore emergent vegetation bed planting area (Figure 3) to assess:

- Overall vegetative cover;
- Percent coverage by species;
- Predominant species observed;
- Invasive species observations; and
- Signs of stress or herbivory impacts.

Individual shrub and tree counts were performed to assess survivability. The restored bank was evaluated for evidence of significant erosion, excessive settlement, and/or drainage issues that may impact the bank stability. Direct habitat and wildlife observations were made to assess the general wildlife community and the restored habitat's ability to support aquatic life and other wildlife.

4.2 Performance Criteria

The performance criteria specified in the Restoration Plan (RD Appendix G [AECOM 2015]) for the third year of monitoring (i.e., 2023) are as follows:

- 95% minimum vegetative cover;
- 100% tree and shrub survival;
- No invasive plant species currently listed as prohibited on the list of New York State Prohibited and Regulated Invasive Plants (NYSDEC 2014); and
- Less than 5% of any other invasive plant species not identified as prohibited.

4.3 Monitoring Activities and Results

Arcadis field personnel conducted the 2023 post-restoration monitoring and bank stability observation on September 20, 2023. Monitoring activities and results are summarized in the following subsections.

4.3.1 Vegetation Monitoring

Arcadis performed an herbaceous ground cover, tree vegetative cover, and aquatic SAV cover quantitative assessment at the Site during the restoration monitoring event. Vegetation assessment observations and results are discussed in the following subsections.

4.3.1.1 Herbaceous Ground Cover

Arcadis field personnel conducted restored upland and bank area herbaceous ground cover monitoring at three randomly placed 1-square-meter quadrat locations in each area (Figure 3 – UP-1 through UP-3 and BK-1 through BK-3). Individual observed species were counted to provide the overall species richness (i.e., total number of species present within the vegetated habitat) and assigned an individual species cover. Total percent cover was visually estimated, using a cover class system (Table 1) based on the Daubenmire system (Barbour et al 1999), for each species identified in each quadrat. This revised cover class system provides a refined percent cover estimation by adding two cover classes and modifying the cover percentage range into seven classes. The percent cover type was also visually estimated for each quadrat by assigning an absolute percent cover value (ranging from 0% to 100%), as viewed from above, that does not account for overlapping cover types. The observed cover type categories included vegetation, bare soil, woody debris, and boulders/rock. This data was used to calculate the target species percent cover (i.e., native species), invasive species percent cover, and total vegetation cover in the herbaceous layer.

Quadrat photographs and general Site condition photographs are included in Appendix A (see Photos 2 through 10). Summarized vegetation monitoring data by quadrat plot for the upland and bank restoration areas are provided in Table 2a and Table 2b, respectively.

Upland area quadrat results (UP-1, UP-2, and UP-3) indicate that overall vegetative cover was approximately 90%. The relative target species percent cover (i.e., native species) was approximately 70%, with the remaining 30% accounting for naturalized or introduced species. Invasive species observed within the quadrats included spotted knapweed (*Centaurea stoebe*), which accounted for approximately 0.8% of the relative percent cover. The species richness ranged from eight to ten herbaceous species observed. Birds-foot trefoil (*Lotus corniculatus*) and Kentucky bluegrass (*Poa pratensis*) were the two dominant herbaceous plant species observed within the quadrats.

Bank area quadrat results (BK-1, BK-2, and BK-3) indicate that overall vegetative cover was approximately 94%. The relative target species percent cover was approximately 72%, with the remaining 28% accounting for naturalized or introduced species. Invasive species observed within the quadrats included Canadian thistle (*Cirsium arvense*), which accounted for approximately 18%. The species richness ranged from five to ten herbaceous species observed. Riverbank rye (*Elymus riparius*), Canadian thistle, and Birds-foot trefoil were the three dominant herbaceous plant species observed within the quadrats.

4.3.1.2 Shrubs

Field personnel conducted a planted stock and natural recruit meander survey in the bank area during the Restoration Monitoring event. From the initial 25 shrubs planted by AECOM in 2019, four pussy willow shrubs and four elderberry shrubs were alive and remained in the restored bank area, but no speckled alder or grey dogwood shrub plantings were observed, despite being planted during Site restoration activities. Three additional naturally

recruited shrubs were observed in the bank and included one eastern cottonwood (*Populus deltoides*), one black willow (*Salix nigra*), and one unidentified willow species (*Salix spp*).

During the Restoration Monitoring event, the 13 replacement shrubs planted on September 6, 2023, were observed to be in good condition. Photographs 11 to 13 in Appendix A provide a representative picture for each species of the replacement shrubs installed.

The 13 replacement shrubs combined with 8 surviving shrubs from the Site restoration and 3 natural recruits amount to a total of 24 shrubs planted and alive.

The bank area condition was slightly improved when compared to 2022 observations. However, shrub survival could potentially be impacted by human, dog, and other wildlife activity due to the proximity of this area to a public access trail and a canoe and kayak rental business.

4.3.1.3 Trees

During the Restoration Monitoring event, Arcadis personnel observed two black walnut trees and one silver maple tree (i.e., consistent with the tree types that AECOM planted in 2019) in the bank area. The trees appeared to be in good health, fully leaved, and exhibited no signs of stress or herbivory.

4.3.1.4 Aquatic Vegetation

Arcadis field staff established one representative transect in each aquatic vegetation bed planting area. As shown on Figure 3, five individual quadrats were assessed along each transect to estimate the planted and naturally occurring aquatic plant species vegetative cover and to evaluate the substrate. In addition, field personnel measured and recorded water depth and photographed each location. Tables 3a through 3f summarize the observed SAV and emergent vegetation species within the six established Keuka Lake Outlet planting areas. Photographs 14 to 19 in Appendix A provide a representative quadrat picture from each planting area.

4.3.1.4.1 Aquatic Vegetation Area 1

Area 1 quadrat results (Table 3a) indicate that the overall vegetative cover was approximately 58%. The relative target species percent cover was approximately 93%. Eurasian watermilfoil (*Myriophyllum spicatum*) was the only invasive species observed within the quadrats and accounted for approximately 7% of the relative cover. The species richness ranged from two to eight species observed within each quadrat. Thirteen distinct species were observed across the Area 1 transect. Coontail (*Ceratophyllum demersum*), wild celery, and water star grass (*Heteranthera dubia*) were the three dominant herbaceous plant species observed.

4.3.1.4.2 Aquatic Vegetation Area 2

Area 2 quadrat results (Table 3b) indicate that the overall vegetative cover was approximately 81%. The relative target species percent cover was approximately 95%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 5% of the relative cover. The species richness ranged from three to eight species found within each quadrat. Eleven distinct species were observed across the Area 2 transect. White water-lily and coontail where the two dominant herbaceous plant species observed.

4.3.1.4.3 Aquatic Vegetation Area 3

Area 3 quadrat results (Table 3c) indicate that the overall vegetative cover was approximately 77%. The relative target species percent cover was approximately 87%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 13% of the relative cover. The species richness ranged from five to eight species observed within each quadrat. Eleven distinct species were observed across the Area 3 transect. Long-leaved pondweed, filamentous green algae (*Spyrogyra and Cladophora spp.*), and white water-lily were the three dominant herbaceous plant species observed.

4.3.1.4.4 Aquatic Vegetation Area 4

Area 4 quadrat results (Table 3d) indicate that the overall vegetative cover was approximately 48%. The relative target species percent cover was approximately 99%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 1% of the relative cover. The species richness ranged from three to five species found within each quadrat. Ten distinct species were observed across the Area 4 transect. Coontail and white water-lily were the two dominant herbaceous plant species observed.

4.3.1.4.5 Aquatic Vegetation Area 5

Area 5 quadrat results (Table 3e) indicate that the overall vegetative cover was approximately 40%. The relative target species percent cover was approximately 95%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 5% of the relative cover. The species richness ranged from three to five species found within each quadrat. Ten distinct species were observed across the Area 5 transect. Water star grass and wild celery were the two dominant herbaceous plant species observed.

4.3.1.4.6 Aquatic Vegetation Area 6

Area 6 quadrat results (Table 3f) indicate that the overall vegetative cover was approximately 46%. The relative target species percent cover was approximately 96%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 4% of the relative cover. The species richness ranged from three to five species found within each quadrat. Ten distinct species were observed across the Area 6 transect. Wild celery, water star grass, long-leaved pondweed, and filamentous green algae were the four dominant herbaceous plant species observed.

4.3.1.4.7 Aquatic Vegetation Summary

Aquatic vegetation results indicate:

- Ten distinct submerged plant species, including one invasive species (Eurasian watermilfoil), eight emergent plant species, and one floating aquatic plant species duckweed (*Lemna spp*), were observed in the SAV planting areas.
- Each of the five planted SAV species were observed along the planting area transects.
- The existing SAV vegetative cover in the planting areas ranged from 40% to 81%.
- Eurasian watermilfoil was observed across each planting area at relative covers ranging from 1% to 13%. These coverages were slightly lower than those observed in 2022 (3% to 25%). The proposed remediation areas pre-dredging baseline assessment identified a coverage dominance of Eurasian watermilfoil, indicating that this species previously inhabited the areas and is not a result of remediation (AECOM 2015).

4.3.2 Restored Bank Qualitative Assessment

The restored bank qualitative assessment indicated that the overall vegetative cover spatial distribution was high throughout the restored bank area. Native shrub natural recruitment was observed, and herbaceous ground cover was diverse and in good vigor for those species that were still in bloom or actively growing. Field personnel did not observe significant soil erosion or upland drainage issues within the restored bank area. The near-shore emergent vegetation and riparian vegetation communities were observed to be healthy and well-established.

4.3.3 Aquatic Wildlife Observations

Similar to 2022 wildlife observations, several sunfish species (i.e., bluegill [*Lepomis macrochirus*] and pumpkinseed [*Lepomis gibbosus*]), along with larger macroinvertebrates (i.e., crayfish [*Decapoda*]), were observed within the near-shore SAV areas during the Restoration Monitoring event. Mallards (*Anas platyrhynchos*) and Canadian geese (*Branta canadensis*) were also observed during the monitoring event. Based on the existing near-shore habitat and aquatic vegetation present, additional wildlife species, such as passerine birds (*Passeriformes*), common migratory birds, amphibians, and other fish species may utilize these restored habitats. Pioneering aquatic plant species and those planted during Site restoration work are performing well to provide a diverse aquatic habitat for fish cover and wildlife.

5 Recommended Corrective Actions

The following corrective actions are recommended to meet the desired performance standards detailed in the Restoration Plan (RD Appendix G [AECOM 2015]):

- Spotted knapweed and Canadian thistle, both New York State-regulated invasive plant species (NYSDEC 2014), were observed throughout the restored areas.
  - Spotted knapweed was observed in the upland restoration area within one of the random quadrats and was less prevalent when compared to 2022 observations.
  - Canadian thistle was observed in the bank restoration area throughout the three random quadrats and was not observed during the 2022 Restoration Monitoring event.

  Canadian thistle may require maintenance and control during future visits, as its presence is greater than 5%. Arcadis recommends conducting a site visit in late spring 2024 to monitor spotted knapweed and Canadian thistle prevalence. Based on observations from that site visit, if corrective actions are recommended (assumed to be manual plant removal or potential foliar herbicide application), the NYSDEC will be consulted on the appropriate corrective action to target each species, prior to taking action.
- A shrub survival evaluation within the bank area during the Restoration Monitoring event indicated a total of 24 shrubs were observed to be alive. The meander survey was thorough, but there is a chance that a shrub was missed within the restored bank area. During the recommended late spring 2024 site visit, the number of shrubs will be assessed to verify the current alive count is 25 or greater to meet the performance criteria.

6 Conclusions

Overall, the 2023 Restoration Monitoring results indicate satisfactory vegetative cover that supports achieving the restoration objectives identified in the Restoration Plan (RD Appendix G [AECOM 2015]). Specific recommendations to meet the desired performance standards detailed in the Restoration Plan metrics (number of planted species alive, etc.) are provided in Section 5.

The restored upland area was stable, with no observed erosion, and exhibited a high vegetative cover spatial distribution. Site usage for boat rental customer parking was observed within the lower portion of the restored upland area, which may cause stress to vegetation and potentially reduce overall herbaceous cover. The restored bank area was stable and exhibited a diverse seeded species mix, along with some remaining planted shrubs within the understory. Three trees planted along the bank were healthy and did not exhibit signs of stress.

Similar to the baseline assessment, SAV beds within the Keuka Lake Outlet indicated a diverse native and non-native species community. A higher filamentous green algae occurrence within the SAV beds was observed during the 2023 Restoration Monitoring event, which may indicate that excessive nutrient loading (e.g., typically nitrogen and phosphorus) is occurring within the Keuka Lake Outlet. Invasive Eurasian watermilfoil was observed in the restored SAVs but at a lower frequency/coverage relative to the baseline assessment, where it was observed to be a dominant species in most areas identified for remediation. Biological drift from upstream plants within the Keuka Lake Outlet would make it difficult to meet the desired performance standard for invasive Eurasian watermilfoil. Additionally, invasive starry stonewort (*Nitellopsis obtusa*) may also become established in the restored subaquatic areas as it has been observed in Keuka Lake. Manual pulling or chemical treatments could be used to reduce the invasive plant species presence; however, this is not recommended at this time due to the risk of continued re-invasion from Keuka Lake, and in the case of Eurasian watermilfoil, the frequency/coverage is less than coverages observed during the baseline assessment.

Site restoration monitoring will continue in 2024, constituting the fourth-year post-remediation monitoring event.

7 References

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Tables

Table 1
Cover Class System

2023 Restoration Monitoring Report
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Percent Cover Classes		
Range of Cover (%)	**Cover Class Midpoint**	**Class**
<1%	0.5	0
1-5%	3.0	1
6-15%	10.5	2
16-25%	20.5	3
26-50%	38.0	4
51-75%	63.0	5
76-95%	85.5	6
>95%	98.0	7

Note:
1. Based on the Daubenmire cover class system (Barbour et al 1999).

Reference:
Barbour, M.G., J.H. Burk, and W.D. Pitts. 1999. Terrestrial plant ecology. 3rd edition. Benjamin/Cummings Publishing Company, Menlo Park, California.

Table 2a
Upland Vegetation Monitoring Quadrat Data

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Upland Quadrat I.D. / Scientific Name	Common Name	Growth Form	Indicator Status	Target Species (Y/N)	Invasive (Y/N)	Canopy Cover (%)	Species Composition (%)	Canopy Cover Class Quadrat UP-1	Canopy Cover Class Quadrat UP-2	Canopy Cover Class Quadrat UP-3
Lotus corniculatus	Birds-foot trefoil	herbaceous	FACU	N	N	38.0	29.2	4	4	4
Poa pratensis	Kentucky bluegrass	herbaceous	FACU	Y	N	38.0	29.2	4	4	4
Lolium spp	Ryegrass species	herbaceous	FACU	Y	N	19.5	15.0	3	4	
Trifolium pratense	Red clover	herbaceous	FACU	Y	N	13.8	10.6	2	2	3
Taraxacum officinale	Common dandelion	herbaceous	FACU	Y	N	5.5	4.2	1	1	2
Trifolium repens	White clover	herbaceous	FACU	Y	N	3.5	2.7	2	--	--
Cichorium intybus	Chicory	herbaceous	FACU	Y	N	2.0	1.5	--	1	1
Plantago lanceolata	English plantain	herbaceous	FACU	Y	N	2.0	1.5	1	--	1
Plantago major	Common plantain	herbaceous	FACU	Y	N	2.0	1.5	1	1	--
Veronica persica	Persian speedwell	herbaceous	FACU	Y	N	2.0	1.5	--	1	1
Centaurea stoebe	Spotted knapweed	herbaceous	NI	N	Y	1.0	0.77	--	--	1
Daucus carota	Queen Anne's lace	herbaceous	UPL	Y	N	1.0	0.77	--	--	1
Setaria pumila	Yellow foxtail	graminoid	FAC	Y	N	1.0	0.77	--	--	1
Symphyotrichum pilosum	Frostweed aster	herbaceous	FACU	Y	N	1.0	0.77	--	1	--
Cover Type - % Cover										
							Vegetation (Cover Class)	7	6	6
							Vegetation (Raw Estimates)	98	100	100
Species Richness										
							Species Richness	8	9	10

(Cover Class) Total Vegetative Percent Cover (%)	90
Relative Percent Cover of Target Species (%)	70
Relative Percent Cover of Invasive Species (%)	0.8

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Acronyms and Abbreviations:
FAC = Facultative
FACU = Facultative Upland
NI = No Indicator Status
UPL = Upland

Table 2b
Bank Vegetation Monitoring Quadrat Data

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Penn Yan, New York

Bank Quadrat I.D. / Scientific Name	Common Name	Growth Form	Indicator Status	Target Species (Y/N)	Invasive (Y/N)	Canopy Cover (%)	Species Composition (%)	Canopy Cover Class: Quadrat BK-1	Quadrat BK-2	Quadrat BK-3
Elymus riparius	Riverbank rye	graminoid	FACW	Y	N	32.2	28.8	4	3	4
Cirsium arvense	Canadian thistle	herbaceous	FACU	N	Y	19.7	17.6	2	4	2
Lotus corniculatus	Birds-foot trefoil	herbaceous	FACU	N	N	11.3	10.2	1	2	3
Verbena hastata	Blue vervain	herbaceous	FACW	Y	N	10.3	9.3	2	--	3
Symphyotrichum pilosum	Frostweed aster	herbaceous	FACU	Y	N	7.8	7.0	--	3	1
Eupatorium perfoliatum	Common boneset	herbaceous	FACW	Y	N	6.8	6.1	3	--	--
Juncus effusus	Common rush	herbaceous	OBL	Y	N	6.8	6.1	3	--	--
Daucus carota	Queen Anne's lace	herbaceous	UPL	Y	N	4.5	4.0	2	--	1
Symphyotrichum lateriflorum	Calico aster	herbaceous	FAC	Y	N	3.5	3.1	--	--	2
Monarda fistulosa	Wild bergamot	shrub	FACU	Y	N	3.5	3.1	--	--	2
Panicum sp.	Switchgrass species	graminoid	FAC	Y	N	1.0	0.90	1	--	--
Panicum capillare	Common witch grass	graminoid	FAC	Y	N	1.0	0.90	--	--	1
Leucanthemum vulgare	Oxeye daisy	herbaceous	UPL	Y	N	1.0	0.90	--	1	--
Trifolium pratense	Red clover	herbaceous	FACU	Y	N	1.0	0.90	1	--	--
Plantago lanceolata	English plantain	herbaceous	FACU	Y	N	1.0	0.90	--	--	1
Cover Type - % Cover										
							Vegetation (Cover Class)	6	7	7
							Vegetation (Raw Estimates)	95	100	100
Plant Height/Species Richness										
							Species Richness	9	5	10

(Cover Class) Total Vegetative Percent Cover (%)	94
Relative Percent Cover of Target Species (%)	72
Relative Percent Cover of Invasive Species (%)	18

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Acronyms and Abbreviations:
FAC = Facultative
FACU = Facultative Upland
FACW = Facultative Wetland
NI = No Indicator Status
OBL = Obligate
UPL = Upland

Table 3a
Submerged Aquatic Vegetation - Area 1

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D. / Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Canopy Cover Class				
						Quadrat 1-1	Quadrat 1-2	Quadrat 1-3	Quadrat 1-4	Quadrat 1-5
Ceratophyllum demersum	Coontail	Y	N	15.0	22.3	3	2	4	1	1
Vallisneria americana	Wild celery	Y	N	12.6	18.8	--	--	5	--	--
Heteranthera dubia	Water stargrass	Y	N	8.2	12.2	3	3	--	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	7.6	11.3	--	--	--	--	4
Sagittaria cuneata	Arrowhead	Y	N	7.6	11.3	--	--	--	4	--
Nymphaea odorata	White water-lily	Y	N	6.9	10.3	1	--	2	2	2
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	3.9	5.8	1	--	2	1	1
Elodea canadensis	Canada waterweed	Y	N	2.4	3.6	1	--	1	1	1
Sagittaria latifolia	Three-square bulrush	Y	N	0.60	0.89	--	--	--	--	1
Bidens connata	Purple-stemmed beggar ticks	Y	N	0.60	0.89	--	--	--	--	1
Lythrum salicaria	Purple loosestrife	N	Y	0.60	0.89	--	--	--	1	--
Lemna spp	Duckweed	Y	N	0.60	0.89	--	--	--	1	--
Veronica anagallis-aquatica	Water speedwell	Y	N	0.60	0.89	--	--	--	1	--
Cover Type - % Cover										
					Vegetation (Cover Class)	4	4	6	5	5
					Vegetation (Raw Estimates)	35	40	85	70	65
Species Richness										
					Species Richness	5	2	5	8	7
Location Characteristics										
					Water Depth (feet)	2.40	2.30	2.10	0.90	1.40

(Cover Class) Total Vegetative Percent Cover (%)	58
Relative Percent Cover of Target Species (%)	93
Relative Percent Cover of Invasive Species (%)	7

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Table 3b
Submerged Aquatic Vegetation - Area 2

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D.						Canopy Cover Class				
Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Quadrat 2-1	Quadrat 2-2	Quadrat 2-3	Quadrat 2-4	Quadrat 2-5
Nymphaea odorata	White water-lily	Y	N	35.5	40.1	2	5	5	1	4
Ceratophyllum demersum	Coontail	Y	N	25.5	28.8	--	--	1	4	--
Vallisneria americana	Wild celery	Y	N	8.2	9.3	--	--	--	1	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	6.8	7.7	1	2	--	3	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	4.7	5.3	4	4	4	2	1
Schoenoplectus pungens	Three-square bulrush	Y	N	2.7	3.1	--	--	--	1	3
Spyrogyra and Cladophora spp	Filamentous green algae	Y	N	2.1	2.4	--	2	1	--	--
Heteranthera dubia	Water stargrass	Y	N	1.2	1.4	2	--	--	--	--
Elodea canadensis	Canada waterweed	Y	N	0.60	0.68	--	--	--	1	--
Lemna spp	Duckweed	Y	N	0.60	0.68	1	--	--	--	--
Najas minor	Brittle waternymph	Y	N	0.60	0.68	--	--	1	1	--
Cover Type - % Cover										
					Vegetation (Cover Class)	6	7	7	6	4
					Vegetation (Raw Estimates)	80	100	100	85	45
Species Richness										
					Species Richness	5	4	5	8	3
Location Characteristics										
					Water Depth (feet)	2.00	1.60	1.25	1.30	2.40

(Cover Class) Total Vegetative Percent Cover (%)	81
Relative Percent Cover of Target Species (%)	95
Relative Percent Cover of Invasive Species (%)	5

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Table 3c
Submerged Aquatic Vegetation - Area 3

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D. / Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Canopy Cover Class				
						Quadrat 3-1	Quadrat 3-2	Quadrat 3-3	Quadrat 3-4	Quadrat 3-5
Potamogeton nodosus	Long-leaved pondweed	Y	N	22.3	20.5	2	4	5	--	--
Spyrogyra and Cladophora spp	Filamentous green algae	Y	N	17.9	16.5	1	5	3	1	--
Nymphaea odorata	White water-lily	Y	N	16.4	15.1	3	--	3	4	1
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	14.5	13.3	4	2	2	1	2
Ceratophyllum demersum	Coontail	Y	N	11.8	10.8	--	--	2	4	2
Sagittaria cuneata	Arrowhead	Y	N	11.7	10.8	--	4	3	--	--
Najas minor	Soft stemmed bulrush	Y	N	7.6	7.0	--	--	--	--	4
Lemna spp	Duckweed	Y	N	3.0	2.8	1	1	1	1	1
Elodea canadensis	Canada waterweed	Y	N	2.4	2.2	1	1	1	--	1
Typha latifolia	Broadleaf cat-tail	Y	N	0.60	0.55	--	1	--	--	--
Heteranthera dubia	Water stargrass	Y	N	0.60	0.55	--	--	--	--	1
Cover Type - % Cover										
					Vegetation (Cover Class)	5	6	6	5	6
					Vegetation (Raw Estimates)	70	85	90	70	95
Species Richness										
					Species Richness	6	7	8	5	7
Location Characteristics										
					Water Depth (feet)	1.20	0.75	0.60	1.10	0.75

(Cover Class) Total Vegetative Percent Cover (%)	77
Relative Percent Cover of Target Species (%)	87
Relative Percent Cover of Invasive Species (%)	13

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Table 3d
Submerged Aquatic Vegetation - Area 4

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D. / Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Canopy Cover Class				
						Quadrat 4-1	Quadrat 4-2	Quadrat 4-3	Quadrat 4-4	Quadrat 4-5
Ceratophyllum demersum	Coontail	Y	N	17.3	31.7	--	4	2	4	--
Nymphaea odorata	White water-lily	Y	N	12.4	22.8	1	4	--	2	2
Heteranthera dubia	Water stargrass	Y	N	10.0	18.3	1	1	4	1	1
Vallisneria americana	Wild celery	Y	N	6.2	11.4	3	--	2	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	4.1	7.5	--	--	--	--	3
Potamogeton richardsonii	Richardson's pondweed	Y	N	2.1	3.9	2	--	--	--	--
Sagittaria cuneata	Arrowhead	Y	N	0.60	1.1	1	--	--	--	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	0.60	1.1	--	--	--	--	1
Spyrogyra and Cladophora spp	Filamentous green algae	Y	N	0.60	1.1	--	--	--	--	1
Najas minor	Brittle waternymph	Y	N	0.60	1.1	--	--	--	1	--
Cover Type - % Cover										
					Vegetation (Cover Class)	4	5	4	5	4
					Vegetation (Raw Estimates)	50	75	50	65	45
Species Richness										
					Species Richness	5	3	3	4	5
Location Characteristics										
					Water Depth (feet)	1.15	1.90	2.60	3.60	1.60

(Cover Class) Total Vegetative Percent Cover (%)	48
Relative Percent Cover of Target Species (%)	99
Relative Percent Cover of Invasive Species (%)	1

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Table 3e
Submerged Aquatic Vegetation - Area 5

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D.						Canopy Cover Class				
Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Quadrat 5-1	Quadrat 5-2	Quadrat 5-3	Quadrat 5-4	Quadrat 5-5
Heteranthera dubia	Water stargrass	Y	N	17.9	35.3	2	3	3	4	--
Vallisneria americana	Wild celery	Y	N	12.9	25.4	--	3	1	4	1
Potamogeton nodosus	Long-leaved pondweed	Y	N	6.2	12.2	3	--	--	--	2
Spyrogyra and Cladophora spp	Filamentous green algae	Y	N	4.1	8.1	--	--	--	3	--
Elodea canadensis	Canada waterweed	Y	N	3.9	7.7	--	1	2	1	1
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	2.7	5.3	2	--	--	--	1
Nymphaea odorata	White water-lily	Y	N	1.2	2.4	1	--	--	1	--
Lemna spp	Duckweed	Y	N	0.60	1.2	--	1	--	--	--
Najas minor	Brittle waternymph	Y	N	0.60	1.2	1	--	--	--	--
Ceratophyllum demersum	Coontail	Y	N	0.60	1.2	--	1	--	--	--
Cover Type - % Cover										
					Vegetation (Cover Class)	4	4	4	5	3
					Vegetation (Raw Estimates)	45	40	40	70	25
Species Richness										
					Species Richness	5	5	3	5	4
Location Characteristics										
					Water Depth (feet)	2.20	3.00	2.90	2.30	1.80

(Cover Class) Total Vegetative Percent Cover (%)	40
Relative Percent Cover of Target Species (%)	95
Relative Percent Cover of Invasive Species (%)	5

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Table 3f
Submerged Aquatic Vegetation - Area 6

2023 Restoration Monitoring Report
New York State Electric & Gas Corporation
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Quadrat I.D. / Scientific Name	Common Name	Target Species (Y/N)	Invasive (Y/N)	Cover (%)	Species Composition (%)	Canopy Cover Class				
						Quadrat 6-1	Quadrat 6-2	Quadrat 6-3	Quadrat 6-4	Quadrat 6-5
Vallisneria americana	Wild celery	Y	N	13.2	23.2	--	--	--	5	1
Heteranthera dubia	Water stargrass	Y	N	10.3	18.1	--	2	--	1	4
Spyrogyra and Cladophora spp	Filamentous green algae	Y	N	7.6	13.3	--	--	4	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	7.6	13.3	--	--	4	--	--
Ceratophyllum demersum	Coontail	Y	N	7.5	13.2	2	1	2	1	2
Nymphaea odorata	White water-lily	Y	N	3.3	5.8	2	1	--	1	--
Schoenoplectus tabernaemontani	Soft stemmed bulrush	Y	N	2.1	3.7	--	2	--	--	--
Alisma triviale	Northern water plantain	Y	N	2.1	3.7	--	--	2	--	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	2.1	3.7	--	--	--	--	2
Elodea canadensis	Canada waterweed	Y	N	1.2	2.1	--	--	--	1	1
Cover Type - % Cover										
					Vegetation (Cover Class)	3	3	5	5	5
					Vegetation (Raw Estimates)	20	25	80	80	50
Species Richness										
					Species Richness	2	4	4	5	5
Location Characteristics										
					Water Depth (feet)	1.40	1.70	1.30	2.20	2.20

(Cover Class) Total Vegetative Percent Cover (%)	46
Relative Percent Cover of Target Species (%)	96
Relative Percent Cover of Invasive Species (%)	4

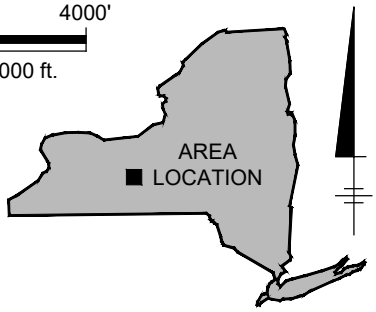
Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown in Table 1.
2. Canopy cover values can add up to greater than 100% due to overlapping vegetation.
3. Species composition is a proportional scaling of 0% to 100% and represents the percent a species contributes to the total vegetative cover.
4. -- = not applicable.

Figures

REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., PENN YAN, NY, 2019.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.

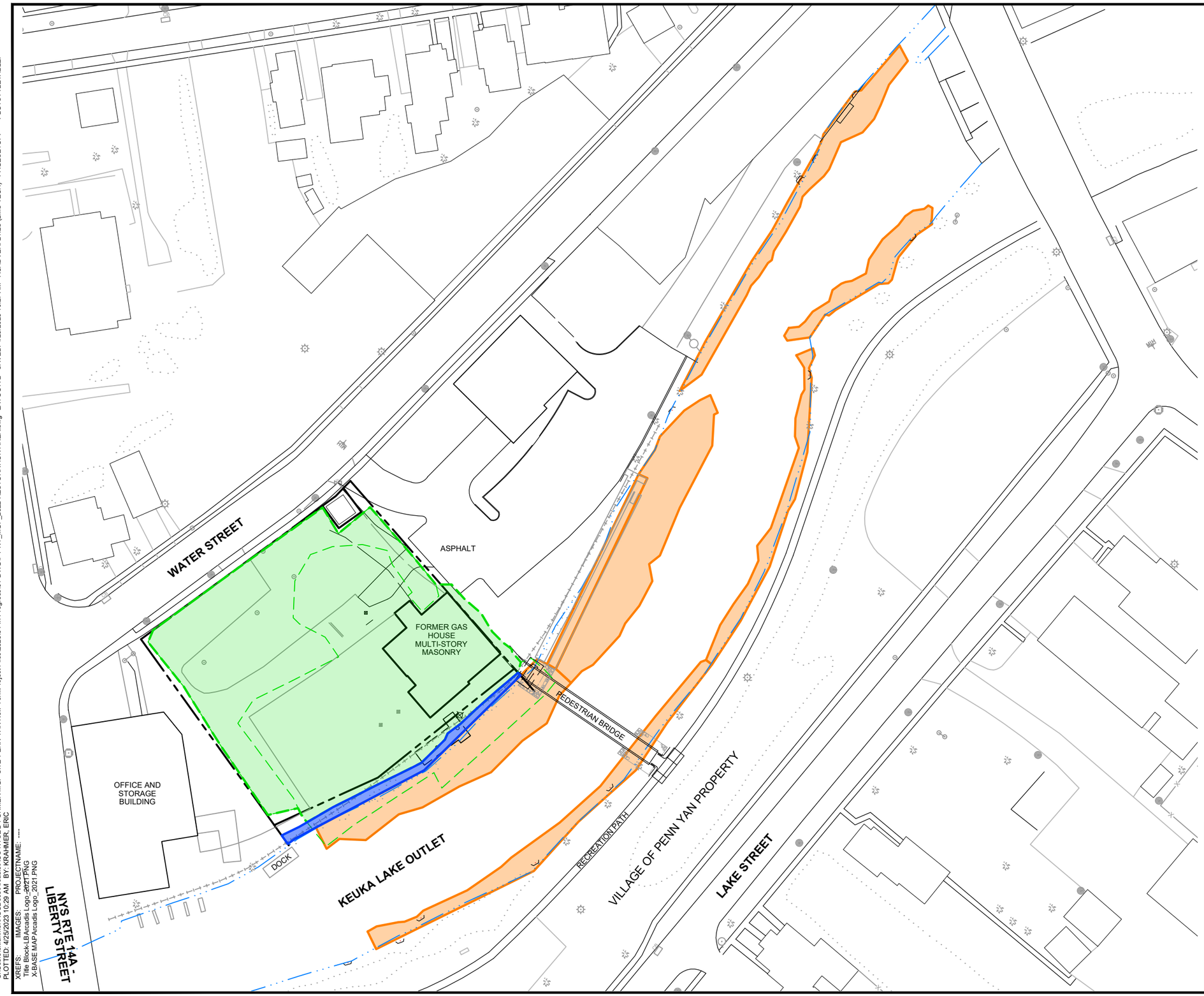


NYSEG
FORMER MGP SITE
PENN YAN, NEW YORK

SITE LOCATION MAP

ARCADIS

FIGURE
1



LEGEND:

- CURRENT SITE FEATURE
- APPROXIMATE PROPERTY LINE
- APPROXIMATE SHORE LINE
- SUBMERGED AQUATIC VEGETATION RESTORATION AREAS
- UPLAND RESTORATION AREA
- BANK RESTORATION AREA (APPROXIMATE)

NOTE:

1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURE BASED ON "MONITORING WELL LOCATION PLAN" BY AECOM, DATED SEPTEMBER 2021.

0 70' 140'

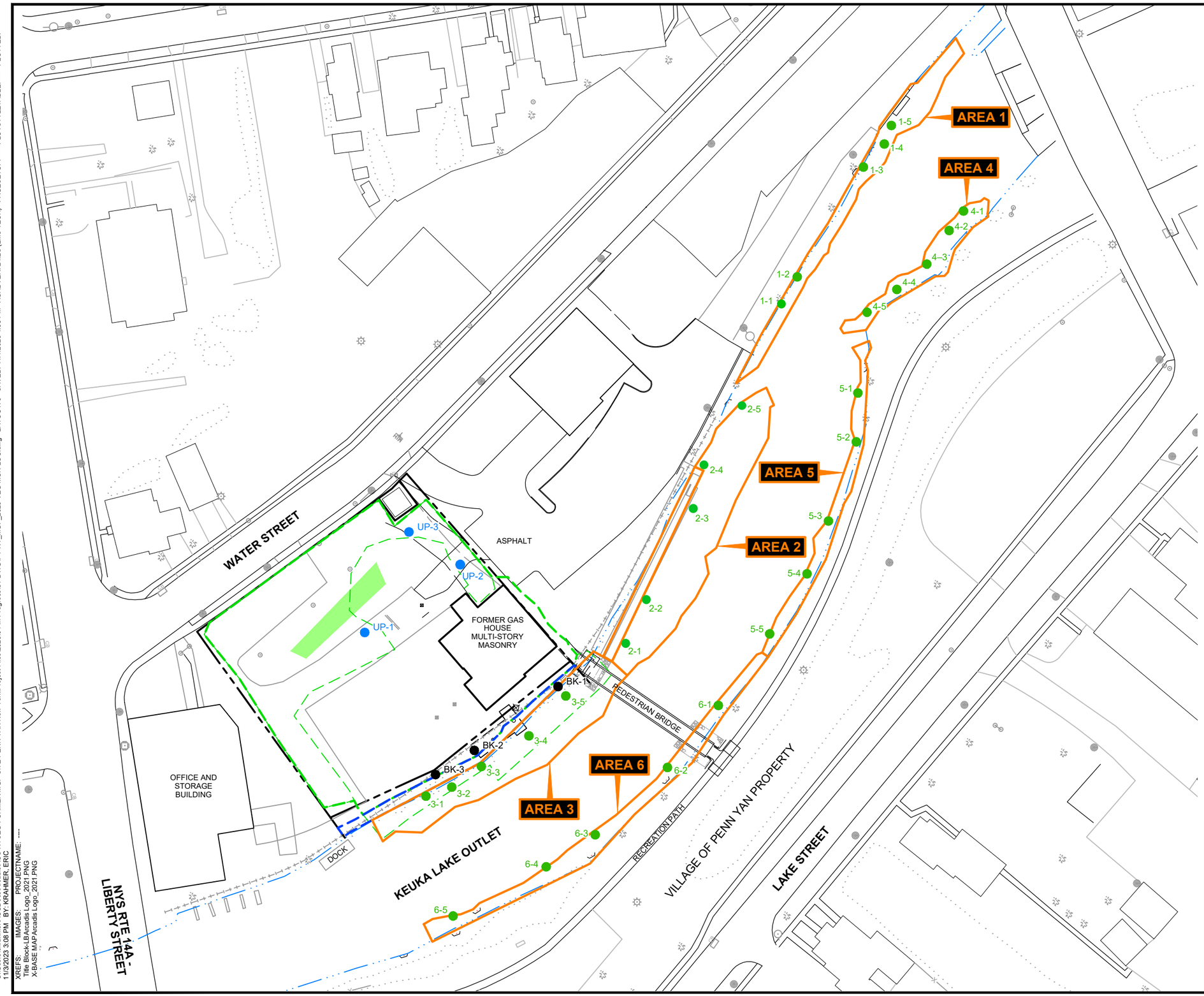
GRAPHIC SCALE

NYSEG
FORMER MGP SITE
PENN YAN, NEW YORK

RESTORATION AREAS

ARCADIS

FIGURE
2



LEGEND:

- UPLAND VEGETATION MONITORING LOCATION
- BANK VEGETATION MONITORING LOCATION
- AQUATIC VEGETATION MONITORING LOCATION
- CURRENT SITE FEATURE
- APPROXIMATE PROPERTY LINE
- APPROXIMATE SHORE LINE
- SUBMERGED AQUATIC VEGETATION RESTORATION LIMITS
- UPLAND RESTORATION LIMITS
- BANK RESTORATION LIMITS (APPROXIMATE)
- RESEEDED UPLAND AREA

NOTE:

1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURE BASED ON "MONITORING WELL LOCATION PLAN" BY AECOM, DATED SEPTEMBER 2021.

0 70' 140'

GRAPHIC SCALE

NYSEG
FORMER MGP SITE
PENN YAN, NEW YORK

2023 VEGETATION MONITORING LOCATIONS

ARCADIS

FIGURE 3

C:\Users\ekrahmer\ACCDocs\Arcadis\AUS-NYSEG-FORMER MGP SITE-PENN YAN New York\Project Files\2023\01-In Progress\01-DWG\PY-NY_MGP_2023 VEG MON LOC.dwg LAYOUT: 3 SAVED: 11/1/2023 4:38 PM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 11/3/2023 3:06 PM BY: KRAHMER, ERIC
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X-BASE MAPArcadis Logo_2021.PNG

Appendix A

Restoration Monitoring Photographs

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 1

Location: Former MGP Site; Penn Yan, NY.

Description: Upland area reseeded with native grass seed mix and covered with straw. Facing northeast.

Photo: 2

Location: Quadrat UP-1

Description: Upland vegetation quadrat UP-1

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 3

Location: Quadrat UP-2

Description: Upland vegetation quadrat UP-2

Photo: 4

Location: Quadrat UP-3

Description: Upland vegetation quadrat UP-3

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 5

Location: Quadrat BK-1

Description: Bank vegetation quadrat BK-1

Photo: 6

Location: Quadrat BK-2

Description: Bank vegetation quadrat BK-2

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 7

Location: Quadrat BK-3

Description: Bank vegetation quadrat BK-3

Photo: 8

Location: Former MGP Site; Penn Yan, NY.

Description: Restored upland area. Facing north.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 9

Location: Former MGP Site; Penn Yan, NY.

Description: Restored bank area. Facing east; Keuka Lake Outlet Trail Bridge in background.

Photo: 10

Location: Former MGP Site; Penn Yan, NY.

Description: Near-shore aquatic and emergent vegetation present adjacent to restored bank area. Facing east.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 11

Location: Former MGP Site; Penn Yan, NY.

Description: Planted red-osier dogwood (*Cornus sericea*) in restored bank.

Photo: 12

Location: Former MGP Site; Penn Yan, NY.

Description: Planted black elderberry (*Sambucus canadensis*) in restored bank.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 13

Location: Former MGP Site; Penn Yan, NY.

Description: Planted pussy willow (*Salix discolor*) in restored bank.

Photo: 14

Location: SAV Area 1; Quadrat 1-4

Description: Example of emergent and floating aquatic vegetation from SAV Area 1. A total of 5 quadrats surveyed in SAV Area 1.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 15

Location: SAV Area 2; Quadrat 2-3

Description: Example of submerged and floating aquatic vegetation from SAV Area 2. A total of 5 quadrats surveyed in SAV Area 2.

Photo: 16

Location: SAV Area 3; Quadrat 3-2

Description: Example of emergent and floating aquatic vegetation from SAV Area 3. A total of 5 quadrats surveyed in SAV Area 3.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 17

Location: SAV Area 4; Quadrat 4-4

Description: Example of submerged and floating aquatic vegetation from SAV Area 4. A total of 5 quadrats surveyed in SAV Area 4.

Photo: 18

Location: SAV Area 5; Quadrat 5-3

Description: Example of submerged aquatic vegetation from SAV Area 5. A total of 5 quadrats surveyed in SAV Area 5.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

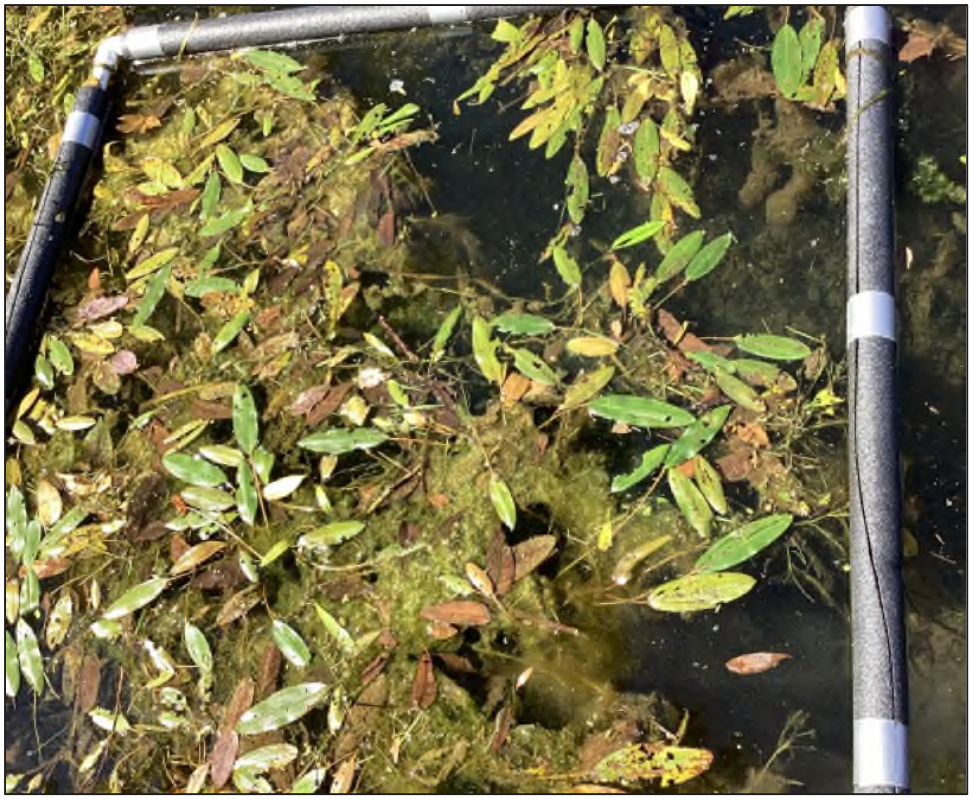

Photo: 19

Location: SAV Area 6; Quadrat 6-3

Description: Example of submerged and floating aquatic vegetation from SAV Area 6. A total of 5 quadrats surveyed in SAV Area 6.

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