New York State Electric & Gas

2022 Restoration Monitoring Report

Penn Yan Former Manufactured Gas Plant Site
NYSDEC Site Number: 862009

May 2023

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Acronyms and Abbreviations

EPT	Ephemeroptera, Plecoptera, Trichoptera
HBI	Hilsenhoff biotic index
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 2022 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 the data collected during the August 30-31, 2022 Restoration Monitoring event.

1.1 Background

The Site is approximately 0.815 acres and comprises 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® 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 2018a,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 area 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 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 area would be performed prior to the first Periodic Review Report.

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 the performance metrics;
- Evaluate the Keuka Lake Outlet restored bank stability;
- Assess benthic community reestablishment in the Keuka Lake Outlet remediated areas; and
- Summarize the completed and/or recommended corrective actions and proposed future restoration monitoring.

To document achieving the objectives, this report presents:

- Site-wide data collected during the 2022 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 bank 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 Restoration Monitoring and Sampling

Arcadis conducted 2022 Site upland, bank, and aquatic restoration monitoring that included the following:

- Quantitative total percent vegetation cover evaluation within the upland, bank, and restored SAV and near-shore emergent vegetation beds;
- Tree and shrub survival evaluation;
- Restored riverbank stability qualitative assessment;
- Benthic community sampling and assessment; and
- Wildlife observations.

3.1 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 riverbank was evaluated for evidence of significant erosion, excessive settlement, and/or drainage issues that may impact the riverbank stability. A petite ponar dredge was used to collect invertebrate samples to assess benthic community reestablishment within the restored channel bottom substrates installed in the Keuka Lake Outlet remediated sediment cells. 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.

3.2 Performance Criteria

The performance criteria specified in the Restoration Plan (RD Appendix G [AECOM 2015]) for the second year of monitoring (i.e., 2022) 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; and
- Less than 5% of any other invasive plant species not identified as prohibited.

3.3 Monitoring Activities and Results

Arcadis field personnel conducted the 2022 post-restoration monitoring and bank stability observation August 30-31, 2022. Monitoring activities and results are summarized in the following subsections.

3.3.1 Vegetation Monitoring

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

3.3.1.1 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 (i.e., Figure 3 – OU-1 through OU-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. Observed cover type categories included vegetation, bare soil, woody debris, and boulders/rock. This data was used to calculate 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 1 through 12). 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 48%, with the remaining 36% accounting for naturalized or introduced species. Invasive species observed within the quadrats included spotted knapweed (*Centaurea stoebe*), which accounted for approximately 5.6% of the relative percent cover. The species richness ranged from eight to nine herbaceous species observed. Birds-foot trefoil (*Lotus corniculatus*) and grass (*Poa sp.*) were the two dominant herbaceous plant species observed.

Bank area quadrat results (BK-1, BK-2, and BK-3) indicate that overall vegetative cover was approximately 98%. The relative target species percent cover was approximately 53%, with the remaining 45% accounting for naturalized or introduced species. No invasive species were observed within the quadrats. The species richness ranged from eight to 11 herbaceous species observed. Birds-foot trefoil and grass were the two dominant herbaceous plant species observed, similar to the upland results.

3.3.1.2 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, 12 shrubs were alive and

remained in the restored bank area. These shrubs included four red-osier dogwood, four pussy willow, two elderberry, and two gray dogwood. No speckled alder shrub plantings were present, despite being planted during Site restoration activities. The bank area condition suggested that shrubs were trampled from human and dog usage from the surrounding public access trail.

3.3.1.3 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. Tree photographs are included in Appendix A (see Photos 1 and 2).

3.3.1.4 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 observed SAV and emergent vegetation species within the six established Keuka Lake Outlet planting areas. Photographs 13-18 in Appendix A provide a representative quadrat picture from each planting area.

3.3.1.4.1 Aquatic Vegetation Area 1

Area 1 quadrat results (Table 3a) indicate that overall vegetative cover was approximately 63%. The relative target species percent cover was approximately 73%. Eurasian watermilfoil (*Myriophyllum spicatum*) was the only invasive species observed within the quadrats and accounted for approximately 25% of the relative cover. The species richness ranged from three to four species observed within each quadrat. Eight distinct species were observed across the Area 1 transect. Water star grass (*Heteranthera dubia*) and Eurasian watermilfoil were the two observed dominant herbaceous plant species.

3.3.1.4.2 Aquatic Vegetation Area 2

Area 2 quadrat results (Table 3b) indicate that overall vegetative cover was approximately 76%. The relative target species percent cover was approximately 95%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 5.1% of the relative cover. The species richness ranged from three to six species found within each quadrat. Seven distinct species were observed across the Area 2 transect. White water-lily (*Nymphaea odorata*) and long-leaved pondweed (*Potamogeton nodosus*) where the two observed dominant herbaceous plant species.

3.3.1.4.3 Aquatic Vegetation Area 3

Area 3 quadrat results (Table 3c) indicate that overall vegetative cover was approximately 84%. The relative target species percent cover was approximately 85%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 16% of the relative cover. The species richness ranged from one to six species observed within each quadrat. Seven distinct species were observed across the Area 3 transect. White water-lily and long-leaved pondweed were the two observed dominant herbaceous plant species.

3.3.1.4.4 Aquatic Vegetation Area 4

Area 4 quadrat results (Table 3d) indicate that overall vegetative cover was approximately 68%. The relative target species percent cover was approximately 97%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 3.1% of the relative cover. The species richness ranged from three to four species found within each quadrat. Seven distinct species were observed across the Area 4 transect. Coontail (*Ceratophyllum demersum*) and white water-lily were the two observed dominant herbaceous plant species.

3.3.1.4.5 Aquatic Vegetation Area 5

Area 5 quadrat results (Table 3e) indicate that overall vegetative cover was approximately 72%. The relative target species percent cover was approximately 93%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 7.4% of the relative cover. The species richness ranged from two to six species found within each quadrat. Nine distinct species were observed across the Area 5 transect. Water star grass and eelgrass (*Vallisneria americana*) were the two observed dominant herbaceous plant species.

3.3.1.4.6 Aquatic Vegetation Area 6

Area 6 quadrat results (Table 3f) indicate that overall vegetative cover was approximately 68%. The relative target species percent cover was approximately 93%. Eurasian watermilfoil was the only invasive species observed within the quadrats and accounted for approximately 7.2% of the relative cover. The species richness ranged from four to six species found within each quadrat. Eight distinct species were observed across the Area 6 transect. Water star grass and eelgrass were the two observed dominant herbaceous plant species.

3.3.1.4.7 Aquatic Vegetation Summary

Aquatic vegetation results overall indicate:

- Nine distinct submerged plant species, including one invasive species (Eurasian watermilfoil) and two emergent species (Arrowhead [*Sagittaria latifolia*] and flowering rush [*Butomus umbellatus*]) were observed in the SAV planting areas.
- Four of the five planted SAV species were observed along the planting area transects. Soft-stem bulrush was not observed in the transect quadrats but was observed within near-shore habitats within planting areas 1, 2, and 6A.
- The existing SAV vegetative cover in the planting areas ranged from 63% to 84%.
- Eurasian watermilfoil presence was observed across each planting area at relative covers ranging from 3.1% 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).

3.3.2 Restored Riverbank Qualitative Assessment

The restored bank qualitative assessment indicated that the overall vegetative cover spatial distribution was high throughout the restored bank area. 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.

3.3.3 Benthic Invertebrate Community Assessment

Arcadis conducted benthic invertebrate community assessment in each restored sediment cell to determine whether the benthic community had re-colonized after remediation and backfilling. Field personnel collected a representative petite ponar grab sample within each restored sediment cell. Samples were collected in substrates that allowed enough surface penetration to obtain a suitable sample for resident benthic organism taxonomic identification. Sample locations are shown on Figure 4. Samples were sieved and processed in the field, preserved with isopropanol, and sent to Normandeau Associates in Stowe, Pennsylvania, for identification and enumeration.

Restored substrates observed during sampling are a mix of predominately fine to coarse gravels with sands and silts. Organic materials include varying amounts of both fine and coarse particulate organic matter (i.e., leaf fragments, detritus, woody debris) and shell fragments (primarily zebra mussels and snail shells). Depositional silts and finer organic materials were observed in higher percentages within the shoreline of Cell 6A and Cell 2 when compared to sample locations in other cells. The remaining restored sediment cells had less fine-grained material and were typically composed of fine to coarse gravels and sand. Representative substrate photographs are included in Appendix A (Photographs 19 through 22).

The benthic community taxonomy results are provided in Tables 4a through 4h and indicate re-colonization has occurred within the Keuka Outlet remediated areas as invertebrates were observed in each of the samples. Similar to typical lake outlet waters, several benthic organism orders were more prevalent, including Tubificida (aquatic worms), Gastropoda (aquatic snails), and Chironomidae (midge larvae).

Chironomidae (midges) were the most observed organism, comprising an approximate 40% average of the invertebrate population across the eight restored sediment cells. Midges were most common in Cell 6A and Cell 2, comprising 71% and 65% of the benthic invertebrate samples, respectively, due to a higher frequency of observed soft substrates (i.e., silts and clays) in these cells. Gastropoda and Tubificida averaged approximately 11% and 6% of the community within the six restored sediment cells, respectively. In addition to these benthic organism orders, freshwater bivalves species (Veneroidea), including pill clams and zebra mussels, were relatively abundant, comprising an approximate 13% average of the community across the restored sediment cells.

Several community metrics were derived from each sample to facilitate comparing results, as summarized below:

- Species richness – Species richness ranged from 8 to 25, with an average of 20, which is within the index range of 7 to 24 for similar outlet waters (NYSDEC 2021).
- EPT richness – EPT richness was low and ranged from 0 to 2, with an average of 1, which is within the index range of 0 to 12 (NYSDEC 2021). Lake outlet waters that receive cold-water hypolimnion releases tend to interfere with the life cycles of Ephemeroptera, Plecoptera, Trichoptera (EPT) species such as mayflies, stoneflies, and caddisflies (NYSDEC 2021). As a result, these species are not as common in lake outlet locations.
- Hilsenhoff biotic index (HBI) – HBI measures an organism's potential to tolerate perturbation (i.e., nutrient loading or other pollution) and typically is a water quality indicator. A low HBI indicates organisms have a low tolerance to perturbation and, therefore, indicates a higher water quality. HBI observed within the restored

sediment cells ranged from 6.26 to 7.38, with an average of 6.75, which is within the index range of 4.48 to 8.22 (NYSDEC 2021).

- Percent model affinity – The percent model affinity is a metric used to compare how similar a study site is with respect to a model non-impacted community and is based on the percent abundance of seven major macroinvertebrate groups (Novak and Bode 1992). The higher the percentage, the less potentially impacted the site. The restored sediment cell benthic community samples ranged from 39% to 71%, with an average of 58%, which is within the index range of 24% to 67% (NYSDEC 2021).

Overall, the benthic community results indicate successful restored sediment substrate re-colonization and the identified invertebrate community results are within the expected ranges for this type of system (i.e., lake outlet waters) in New York State.

3.3.4 Aquatic Wildlife Observations

Several sunfish species (i.e., bluegill and pumpkinseed), along with larger macroinvertebrates (i.e., crayfish), were observed within the near-shore SAV areas during the Restoration Monitoring event. Limited on-site wildlife was observed during the monitoring event; however, the near-shore habitat and observed ample aquatic vegetation would support both passerine bird species and common migratory birds, such as waterfowl and herons. Pioneering species and those planted during Site restoration work are performing well to provide a diverse aquatic habitat for fish cover and wildlife.

4 Recommended Corrective Actions

The following corrective actions are recommended to meet the desired performance standards detailed in the Restoration Plan:

- Plant 13 replacement shrubs in the fall of 2023 to achieve 25 total shrubs planted and alive and meet the 100% survival performance standard requirement in the RD (AECOM 2015). Considering the lack of speckled alder and very few gray dogwood, the 13 replacement shrubs should comprise pussy willow, elderberry, and red-osier dogwood.
- Overseed the upland area. Vegetative cover in the upland area is relatively stable at 90% but is slightly less than the 95% performance standard for this restored area. Overseeding using an upland seed mix similar to the one used during restoration activities should be applied in the fall of 2023, at a rate of 30 pounds per acre, to fill in any thin patches observed. Additionally, spotted knapweed observed in the upland restoration area may require maintenance and control during future visits, as its presence is slightly greater than 5%. This will continue to be monitored and, if needed, manual plant removal during late spring of 2024 will be recommended to target this species.

5 Conclusions

Overall, the 2022 Restoration Monitoring results indicate satisfactory vegetative cover that is supporting 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 4.

The restored upland area was stable with no observed erosion and exhibited a high vegetative cover spatial distribution. The restored bank area was stable and had a diverse mix of seeded species, 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. Invasive Eurasian watermilfoil was observed at a lower frequency/coverage relative to the baseline assessment when 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 aquatic species control. Aquatic life and potential wildlife use is supported by upland, bank, and aquatic restoration areas, which provide in-water shelter and food, along with near-shore vegetation for nesting and cover. Benthic community sampling results indicated that the restored sediment areas have been re-colonized, and the community is similar to what would be expected in lake outlet waters observed in New York State.

Invasive Eurasian watermilfoil was observed in the restored SAVs. Additionally, invasive starry stonewort 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 the fact that the invasive species' coverage is less than the coverages observed during the baseline assessment.

Site restoration monitoring will continue in 2023, constituting the third year post-remediation monitoring event.

6 References

AECOM. 2015. Remedial Design Report, Penn Yan Former MGP Site, Penn Yan, New York, NYSDEC Site No., 8-62-009. February.

AECOM. 2016a. Design Modification No. 001 (Rev 1) – Untitled. (Subject: Flow Control Modifications). September 15.

AECOM. 2016b. Design Modification No. 002 (Rev 2) – Modification of Excavation/Dredging Procedures in Cell 6. December 22.

AECOM. 2018a. Design Modification No. 003 (Rev 0) – Excavation Procedures and Underpinning of the Former MGP Building. January 9.

AECOM. 2018b. Design Modification No. 004 (Rev 0) – Bank Area Excavation Redesign. January 9.

AECOM. 2020. Interim Site Management Plan, Penn Yan Water Street MGP Site, Penn Yan, New York, NYSDEC Site No., 8-62-009. December 2020.

AECOM. 2023. Final Engineering Report, Penn Yan Water Street MGP Site, Penn Yan, New York, NYSDEC Site No., 862009. January 2023.

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

Novak, M.A. and R.W. Bode. 1992. Percent model affinity, a new measure of macroinvertebrate community composition. J. North American Benthological Society 11(1):80-85.

NYSDEC. 2021. Standard Operating Procedure: Biological Monitoring of Surface Waters in New York State. Division of Water. Albany, New York. SOP-208_V21-1. April 2021.

Tables

Table 1
Cover Class System

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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.								Canopy Cover Class		
Scientific Name	Common Name	Growth Form	Indicator Status	Target Species (Y/N)	Invasive (Y/N)	Canopy Cover (%)	Species Composition (%)	Quadrat UP-1	Quadrat UP-2	Quadrat UP-3
Poa sp.	Grasses	graminoid	FACU	Y	N	29	24	4	4	2
Symphyotrichum pilosum	Frostweed aster	herbaceous	FACU	Y	N	13	10	4	--	--
Lotus corniculatus	Birds-foot trefoil	herbaceous	FACU	N	N	46	38	4	4	5
Festuca sp.	Fescue	graminoid	FACU	Y	N	7.8	6.5	3	--	1
Achillea millefolium	Common yarrow	herbaceous	FACU	Y	N	2.0	1.7	1	1	--
Trifolium pratense	Red clover	herbaceous	FACU	Y	N	2.0	1.7	1	1	--
Phleum pratense	Timothy	graminoid	FACU	N	N	2.0	1.7	1	--	1
Panicum sp.	Switchgrass species	graminoid	FAC	Y	N	3.5	2.9	2	--	--
Taraxacum officinale	Common dandelion	herbaceous	FACU	N	N	3.0	2.5	1	1	1
Aster sp.	Aster species	herbaceous	FACU	Y	N	1.0	0.83	--	1	--
Plantago major	Common plantain	herbaceous	FACU	N	N	2.0	1.7	--	1	1
Rumex crispus	Curly dock	herbaceous	FAC	N	N	1.0	0.83	--	1	--
Cichorium intybus	Chicory	herbaceous	FACU	N	N	1.0	0.83	--	--	1
Picris hieracioides	Hawkweed oxtongue	herbaceous	NI	N	N	1.0	0.83	--	--	1
Centaurea stoebe	Spotted knapweed	herbaceous	NI	N	Y	6.8	5.6	--	--	3
Cover Type - % Cover										
							Vegetation (Cover Class)	7	6	6
							Vegetation (Raw Estimates)	98	85	98
Species Richness										
							Species Richness	9	8	9

(Cover Class) Total Vegetative Percent Cover (%)	90
Relative Percent Cover of Target Species (%)	48
Relative Percent Cover of Invasive Species (%)	5.6

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

Table 2b
Bank Vegetation Monitoring Quadrat Data

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
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
Poa sp.	Grasses	graminoid	FACU	Y	N	3.5	3.1	--	2	--
Daucus carota	Queen Anne's lace	herbaceous	UPL	Y	N	4.5	4.0	--	1	2
Mentha arvensis	Wild mint	herbaceous	FACW	Y	N	1.0	0.89	--	1	--
Verbena hastata	Blue vervain	herbaceous	FACW	Y	N	1.0	0.89	--	--	1
Solidago altissima	Tall goldenrod	herbaceous	FACU	N	N	7.0	6.2	--	2	2
Elymus riparius	Riverbank rye	graminoid	FACW	Y	N	12.7	11.3	4	--	--
Cirsium vulgare	Bull thistle	herbaceous	FACU	Y	N	2.0	1.8	1	1	--
Symphyotrichum pilosum	Frostweed aster	herbaceous	FACU	Y	N	1.0	0.89	--	--	1
Lotus corniculatus	Birds-foot trefoil	herbaceous	FACU	N	N	32	29	3	4	4
Festuca sp.	Fescue	graminoid	FACU	Y	N	26	23	4	3	3
Trifolium pratense	Red clover	herbaceous	FACU	Y	N	8.0	7.1	1	2	2
Phleum pratense	Timothy	graminoid	FACU	N	N	1.0	0.9	1	--	--
Plantago major	Common plantain	herbaceous	FACU	N	N	2.0	1.8	--	1	1
Rumex crispus	Curly dock	herbaceous	FAC	N	N	2.0	1.8	1	1	--
Cichorium intybus	Chicory	herbaceous	FACU	N	N	1.0	0.89	1	--	--
Picris hieracioides	Hawkweed oxtongue	herbaceous	NI	N	N	7.0	6.2	--	2	2
Cover Type - % Cover										
							Vegetation (Cover Class)	7	7	7
							Vegetation (Raw Estimates)	100	100	100
Plant Height/Species Richness										
							Species Richness	8	11	9

(Cover Class) Total Vegetative Percent Cover (%)	98
Relative Percent Cover of Target Species (%)	53
Relative Percent Cover of Invasive Species (%)	0.0

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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
UPL = Upland

Table 3a
Submerged Aquatic Vegetation - Area 1

2022 Restoration Monitoring Report
New York State Electric & Gas
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 1-1	Quadrat 1-2	Quadrat 1-3	Quadrat 1-4	Quadrat 1-5
Nymphaea odorata	White water-lily	Y	N	2.1	3.2	--	--	--	--	2
Sagittaria latifolia	Arrowhead	Y	N	2.1	3.2	--	--	--	2	--
Vallisneria americana	Wild celery	Y	N	0.60	0.91	1	--	--	--	--
Najas minor	Brittle waternymph	Y	N	1.2	1.8	1	--	1	--	--
Elodea canadensis	Canada waterweed	Y	N	1.2	1.8	--	--	1	--	1
Ceratophyllum demersum	Coontail	Y	N	2.7	4.1	--	1	--	2	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	17	25	3	2	2	1	4
Heteranthera dubia	Water star grass	Y	N	40	60	4	5	4	4	3
Cover Type - % Cover										
					Vegetation (Cover Class)	5	5	5	4	6
					Vegetation (Raw Estimates)	65	75	55	50	80
Species Richness										
					Species Richness	4	3	4	4	4

(Cover Class) Total Vegetative Percent Cover (%)	63
Relative Percent Cover of Target Species (%)	75
Relative Percent Cover of Invasive Species (%)	25

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

2022 Restoration Monitoring Report
New York State Electric & Gas
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 2-1	Quadrat 2-2	Quadrat 2-3	Quadrat 2-4	Quadrat 2-5
Nymphaea odorata	White water-lily	Y	N	45	49	6	4	4	5	--
Vallisneria americana	Wild celery	Y	N	1.2	1.3	--	--	1	1	--
Elodea canadensis	Canada waterweed	Y	N	1.2	1.3	--	1	1	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	27	30	--	4	2	1	6
Ceratophyllum demersum	Coontail	Y	N	6.3	6.8	2	2		2	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	4.7	5.1	--	3	1	--	--
Heteranthera dubia	Water star grass	Y	N	6.5	7.0	1	3	1	1	1
Cover Type - % Cover										
					Vegetation (Cover Class)	6	6	4	6	6
					Vegetation (Raw Estimates)	90	90	45	80	95
Species Richness										
					Species Richness	3	6	6	5	2

(Cover Class) Total Vegetative Percent Cover (%)	76
Relative Percent Cover of Target Species (%)	95
Relative Percent Cover of Invasive Species (%)	5.1

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

2022 Restoration Monitoring Report
New York State Electric & Gas
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
Nymphaea odorata	White water-lily	Y	N	25	25	4	4	2	--	4
Potamogeton richardsonii	Richardson's pondweed	Y	N	0.60	0.59	--	--	1	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	35	35	4	--	1	7	4
Ceratophyllum demersum	Coontail	Y	N	2.1	2.1	2	--	--	--	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	16	16	1	4	4	--	--
Heteranthera dubia	Water star grass	Y	N	16	16	1	4	4	--	--
Najas minor	Brittle waternymph	Y	N	6.8	6.7	1	--	3	--	2
Cover Type - % Cover										
					Vegetation (Cover Class)	6	6	6	7	5
					Vegetation (Raw Estimates)	95	85	85	100	75
Species Richness										
					Species Richness	6	3	6	1	3

(Cover Class) Total Vegetative Percent Cover (%)	84
Relative Percent Cover of Target Species (%)	85
Relative Percent Cover of Invasive Species (%)	16

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

2022 Restoration Monitoring Report
New York State Electric & Gas
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
Nymphaea odorata	White water-lily	N	N	23	27	--	4	3	3	4
Vallisneria americana	Wild celery	Y	N	4.1	4.7	3	--	--	--	--
Potamogeton nodosus	Long-leaved pondweed	Y	N	7.6	8.8	--	--	--	--	4
Potamogeton richardsonii	Richardson's pondweed	Y	N	15	18	4	--	--	--	4
Ceratophyllum demersum	Coontail	N	N	27	31	3	4	4	4	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	2.7	3.1	--	--	2	1	--
Heteranthera dubia	Water star grass	Y	N	6.9	7.9	2	1	--	2	2
Cover Type - % Cover										
					Vegetation (Cover Class)	5	5	5	6	5
					Vegetation (Raw Estimates)	75	70	75	80	65
Species Richness										
					Species Richness	4	3	3	4	4

(Cover Class) Total Vegetative Percent Cover (%)	68
Relative Percent Cover of Target Species (%)	97
Relative Percent Cover of Invasive Species (%)	3.1

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

2022 Restoration Monitoring Report
New York State Electric & Gas
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
Nymphaea odorata	White water-lily	Y	N	4.2	5.3	--	--	--	2	2
Potamogeton nodosus	Long-leaved pondweed	Y	N	7.6	9.5	4	--	--	--	--
Potamogeton richardsonii	Richardson's pondweed	Y	N	4.1	5.2	3	--	--	--	--
Butomus umbellatus	Flowering rush	Y	N	7.6	9.5	--	--	--	--	4
Vallisneria americana	Wild celery	Y	N	11	14	--	1	3	3	2
Elodea canadensis	Canada waterweed	Y	N	2.7	3.4	--	--	--	1	2
Ceratophyllum demersum	Coontail	Y	N	1.2	1.5	--	--	1	1	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	5.9	7.4	1	--	1	1	3
Heteranthera dubia	Water star grass	Y	N	35	44	4	5	4	4	--
Cover Type - % Cover										
					Vegetation (Cover Class)	6	5	5	5	6
					Vegetation (Raw Estimates)	80	65	60	70	80
Species Richness										
					Species Richness	4	2	4	6	5

(Cover Class) Total Vegetative Percent Cover (%)	72
Relative Percent Cover of Target Species (%)	93
Relative Percent Cover of Invasive Species (%)	7.4

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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

2022 Restoration Monitoring Report
New York State Electric & Gas
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
Nymphaea odorata	White water-lily	N	N	8.3	9.9	2	--	3	2	--
Vallisneria americana	Wild celery	Y	N	25	30	--	4	2	4	4
Potamogeton richardsonii	Richardson's pondweed	Y	N	9.7	12	2	--	4	--	--
Najas minor	Brittle waternymph	Y	N	0.6	0.7	--	--	--	--	1
Elodea canadensis	Canada waterweed	N	N	0.60	0.72	--	--	--	--	1
Ceratophyllum demersum	Coontail	N	N	4.8	5.7	--	2	1	2	--
Myriophyllum spicatum	Eurasian watermilfoil	N	Y	6	7.2	1	2	2	1	1
Heteranthera dubia	Water star grass	Y	N	29	35	4	4	3	2	4
Cover Type - % Cover										
					Vegetation (Cover Class)	5	6	5	5	5
					Vegetation (Raw Estimates)	65	80	70	65	65
Species Richness										
					Species Richness	4	4	6	5	5

(Cover Class) Total Vegetative Percent Cover (%)	68
Relative Percent Cover of Target Species (%)	93
Relative Percent Cover of Invasive Species (%)	7.2

Notes:
1. Vegetative cover of individual species estimated at each plot using cover class midpoints shown on 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 4a
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 1-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 1-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Hiridinida			
Erpobdellidae			
Erpobdella sp.	leech	2	1.7%
Tubificida			
Tubificinae			
Limnodrilus sp.	tube worm	27	23.1%
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	2	1.7%
Planorbidae			
Ferrissia sp.	limpet snail	1	0.9%
Gyraulus sp.	orb snail	6	5.1%
Pisidiidae			
Pisidium sp.	pill clam	6	5.1%
Amphipoda			
Gammaridae			
Gammarus sp.	side swimmer	2	1.7%
Ephemeroptera			
Caenidae			
Caenis sp.	mayfly	3	2.6%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	2	1.7%
Coleoptera			
Elmidae			
Dubiraphia sp.	riffle beetle	8	6.8%
Diptera			
Ceratopogonidae			
Culicoides sp.	sand fly	3	2.6%
Chironomidae			
Ablabesmyia sp.	midge	3	2.6%
Clinotanypus pinguis	midge	4	3.4%
Cryptochironomus fulvus gr.	midge	1	0.9%
Cryptotendipes sp.	midge	7	6.0%
Labrundinea sp.	midge	4	3.4%
Microchironomus sp.	midge	1	0.9%
Orthocladiinae	midge	7	6.0%
Paratanytarsus sp.	midge	16	13.7%
Polypedilum illinoense gr.	midge	6	5.1%
Procladius sp.	midge	4	3.4%
Tanytarsus sp.	midge	2	1.7%
	Total Taxa:	22	
	Total Specimens:	117	100%
	Community Density (no. / square meter):	17,804	

Community Metrics:	**Value**
Species Richness	22
Ephemeroptera, Plecoptera, Trichoptera Richness	1
Hilsenhoff Biotic Index	7.38
Percent Model Affinity (Ponar)	68%

Table 4b
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 2-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 2-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Tubificida			
Tubificinae			
Aulodrilus piguetti	tube worm	2	2.2%
Limnodrilus sp.	tube worm	5	5.4%
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	4	4.3%
Planorbidae			
Gyraulus sp.	orb snail	4	4.3%
Planorbella sp.	ram's-horn snail	2	2.2%
Veneroidea			
Pisidiidae			
Pisidium sp.	pill clam	2	2.2%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	8	8.6%
Trichoptera			
Hydropsychidae			
Hydropsyche sp.	caddisfly	1	1.1%
Hydroptilidae			
Oxyethira sp.	caddisfly	1	1.1%
Diptera			
Ceratopogonidae			
Probezzia sp.	sand fly	1	1.1%
Chironomidae			
Ablabesmyia sp.	midge	3	3.2%
Cladopelma sp.	midge	2	2.2%
Clinotanypus pinguis	midge	2	2.2%
Corynoneuria sp.	midge	2	2.2%
Dicrotendipes sp.	midge	10	10.8%
Guttipelopia sp.	midge	1	1.1%
Labrundinea sp.	midge	1	1.1%
Nanocladius sp.	midge	5	5.4%
Paratanytarsus sp.	midge	7	7.5%
Polypedilum halterale gr.	midge	5	5.4%
Polypedilum tritum	midge	6	6.5%
Procladius sp.	midge	5	5.4%
Psectrocladius sp.	midge	2	2.2%
Pseudochironomus sp.	midge	3	3.2%
Tanytarsus sp.	midge	6	6.5%
Tabanidae			
Chrysops sp.	deer fly	3	3.2%
	Total Taxa:	26	
	Total Specimens:	93	100%
	Community Density (no. / square meter):	4,043	

Community Metrics:	**Value**
Species Richness	25
Ephemeroptera, Plecoptera, Trichoptera Richness	2
Hilsenhoff Biotic Index	6.86
Percent Model Affinity (Ponar)	55%

Table 4c
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 3-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 3-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	6	6.7%
Planorbidae			
Micromenetus dilitatus	orb snail	3	3.3%
Veneroidea			
Pisidiidae			
Pisidium sp.	pill clam	7	7.8%
Amphipoda			
Crangonyctidae			
Crangonyx sp.	side swimmer	1	1.1%
Gammaridae			
Gammarus sp.	side swimmer	4	4.4%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	5	5.6%
Gomphidae			
Gomphus sp.	dragonfly	1	1.1%
Trichoptera			
Leptoceridae			
Leptocerus americanus	caddisfly	1	1.1%
Coleoptera			
Elmidae			
Dubiraphia sp.	riffle beetle	47	52.2%
Diptera			
Chironomidae			
Clinotanypus pinguis	midge	3	3.3%
Cryptochironomus fulvus gr.	midge	1	1.1%
Paralaterborniella nigrohalteralis	midge	3	3.3%
Polypedilum halterale gr.	midge	1	1.1%
Procladius sp.	midge	5	5.6%
Tanytarsus sp.	midge	1	1.1%
Xenochironomus xenolabis	midge	1	1.1%
	Total Taxa:	16	
	Total Specimens:	90	100%
	Community Density (no. / square meter):	6,957	

Community Metrics:	**Value**
Species Richness	16
Ephemeroptera, Plecoptera, Trichoptera Richness	1
Hilsenhoff Biotic Index	6.26
Percent Model Affinity (Ponar)	57%

Table 4d
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 4-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 4-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Tubificida			
Tubificinae			
Spirosperma ferox	tube worm	1	0.9%
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	16	15.1%
Planorbidae			
Ferrissia sp.	limpet snail	3	2.8%
Veneroidea			
Dreissinidae			
Dreissina polymorpha	zebra mussel	3	2.8%
Pisidiidae			
Musculium sp.	fingernail clam	2	1.9%
Pisidium sp.	pill clam	17	16.0%
Amphipoda			
Gammaridae			
Gammarus sp.	side swimmer	2	1.9%
Decapoda			
Cambaridae			
Orconectes sp.	crayfish	1	0.9%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	8	7.5%
Trichoptera			
Leptoceridae			
Oecetis sp.	caddisfly	1	0.9%
Coleoptera			
Elmidae			
Dubiraphia sp.	riffle beetle	25	23.6%
Diptera			
Chironomidae			
Ablabesmyia sp.	midge	2	1.9%
Clinotanypus pinguis	midge	2	1.9%
Labrundinea sp.	midge	1	0.9%
Nanocladius sp.	midge	4	3.8%
Paralaterborniella nigrohalteralis	midge	1	0.9%
Paratanytarsus sp.	midge	2	1.9%
Polypedilum flavum	midge	3	2.8%
Procladius sp.	midge	6	5.7%
Tanytarsus sp.	midge	5	4.7%
Tabanidae			
Chrysops sp.	deer fly	1	0.9%
	Total Taxa:	21	
	Total Specimens:	106	100%
	Community Density (no. / square meter):	6,145	

Community Metrics:	**Value**
Species Richness	20
Ephemeroptera, Plecoptera, Trichoptera Richness	1
Hilsenhoff Biotic Index	6.33
Percent Model Affinity (Ponar)	59%

Table 4e
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 5A-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 5A-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Tubificida			
Tubificinae			
Ilyodrilus templetoni	tube worm	6	5.9%
Limnodrilus sp.	tube worm	8	7.8%
Gastropoda			
Planorbidae			
Gyraulus sp.	orb snail	5	4.9%
Veneroidea			
Pisidiidae			
Pisidium sp.	pill clam	1	1.0%
Amphipoda			
Gammaridae			
Gammarus sp.	side swimmer	9	8.8%
Hyalellidae			
Hyalella azteca	side swimmer	3	2.9%
Ephemeroptera			
Caenidae			
Caenis sp.	mayfly	1	1.0%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	14	13.7%
Gomphidae			
Gomphus sp.	dragonfly	1	1.0%
Trichoptera			
Hydroptilidae			
Oxyethira sp.	caddisfly	1	1.0%
Coleoptera			
Elmidae			
Dubiraphia sp.	riffle beetle	20	19.6%
Diptera			
Ceratopogonidae			
Palpomyia gr.	sand fly	1	1.0%
Chironomidae			
Ablabesmyia sp.	midge	5	4.9%
Clinotanypus pinguis	midge	4	3.9%
Corynoneuria sp.	midge	1	1.0%
Dicrotendipes sp.	midge	3	2.9%
Labrundinea sp.	midge	7	6.9%
Nanocladius sp.	midge	4	3.9%
Paratanytarsus sp.	midge	1	1.0%
Polypedilum illinoense gr.	midge	5	4.9%
Procladius sp.	midge	1	1.0%
Tanytarsus sp.	midge	1	1.0%
	Total Taxa:	22	
	Total Specimens:	102	100%
	Community Density (no. / square meter):	4,435	

Community Metrics:	**Value**
Species Richness	22
Ephemeroptera, Plecoptera, Trichoptera Richness	2
Hilsenhoff Biotic Index	7.24
Percent Model Affinity (Ponar)	71%

Table 4f
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 5B-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 5B-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Hirudinida			
Glossophoniidae			
Helobdella sp.	leech	1	0.9%
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	8	7.3%
Physidae			
Physella sp.	pouch snail	1	0.9%
Planorbidae			
Ferrissia sp.	limpet snail	4	3.6%
Helisoma anceps	ram's-horn snail	1	0.9%
Planorbella sp.	ram's-horn snail	3	2.7%
Pleuroceridae			
Goniobasis virginica	horn snail	1	0.9%
Pleurocera acuta	horn snail	2	1.8%
Viviparidae			
Viviparus georgiana	mystery snail	1	0.9%
Veneroidea			
Dreissinidae			
Dreissina polymorpha	zebra mussel	31	28.2%
Pisidiidae			
Pisidium sp.	pill clam	9	8.2%
Amphipoda			
Gammaridae			
Gammarus sp.	side swimmer	1	0.9%
Isopoda			
Asellidae			
Caecidotea sp.	water slater	3	2.7%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	10	9.1%
Libellulidae	dragonfly	2	1.8%
Trichoptera			
Leptoceridae			
Leptocerus americanus	caddisfly	6	5.5%
Coleoptera			
Elmidae			
Dubiraphia sp.	riffle beetle	3	2.7%
Diptera			
Chironomidae			
Ablabesmyia sp.	midge	1	0.9%
Chironomini	midge	3	2.7%
Cladopelma sp.	midge	2	1.8%
Dicrotendipes sp.	midge	3	2.7%
Nanocladius sp.	midge	1	0.9%
Polypedilum illinoense gr.	midge	2	1.8%
Procladius sp.	midge	6	5.5%
Pseudochironomus sp.	midge	1	0.9%
Tanytarsus sp.	midge	4	3.6%
	Total Taxa:	26	
	Total Specimens:	110	100%
	Community Density (no. / square meter):	6,377	

Community Metrics:	**Value**
Species Richness	24
Ephemeroptera, Plecoptera, Trichoptera Richness	1
Hilsenhoff Biotic Index	6.84
Percent Model Affinity (Ponar)	59%

Table 4g
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 6A-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 6A-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Hirudinida			
Glossophoniidae			
Helobdella stagnalis	leech	1	3.6%
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	1	3.6%
Veneroidea			
Pisidiidae			
Pisidium sp.	pill clam	6	21.4%
Diptera			
Chironomidae			
Chironomini	midge	13	46.4%
Clinotanypus pinguis	midge	1	3.6%
Dicrotendipes sp.	midge	3	10.7%
Tanypodinae	midge	1	3.6%
Tanytarsini	midge	2	7.1%
	Total Taxa:	8	
	Total Specimens:	28	100%
	Community Density (no. / square meter):	1,217	

Community Metrics:	**Value**
Species Richness	8
Ephemeroptera, Plecoptera, Trichoptera Richness	0
Hilsenhoff Biotic Index	6.36
Percent Model Affinity (Ponar)	39%

Note:
This matrix was processed in its entirety but did not produce enough specimens (100) to calculate valid community metrics. As a result, community metrics for Species and Ephemeroptera, Plecoptera, Trichoptera Richness are biased high.

Table 4h
Benthic Community Monitoring Petite Ponar Dredge Data - Cell 6B-B

2022 Restoration Monitoring Report
New York State Electric & Gas
Penn Yan Former Manufactured Gas Plant Site
Penn Yan, New York

Location: Cell 6B-B			
Taxon	**Common Name**	**Number of Individuals**	**Percent Abundance**
Gastropoda			
Hydrobiidae			
Amnicola sp.	dusky snail	10	9.3%
Physidae			
Physella sp.	pouch snail	1	0.9%
Planorbidae			
Helisoma anceps	ram's-horn snail	3	2.8%
Planorbella sp.	ram's-horn snail	4	3.7%
Veneroidea			
Dreissinidae			
Dreissina polymorpha	zebra mussel	1	0.9%
Pisidiidae			
Pisidium sp.	pill clam	12	11.1%
Amphipoda			
Gammaridae			
Gammarus sp.	side swimmer	1	0.9%
Hyalellidae			
Hyalella azteca	side swimmer	1	0.9%
Odonata			
Coenagrionidae			
Enallagma sp.	damselfly	22	20.4%
Corduliidae			
Epicordulia princeps	dragonfly	1	0.9%
Libellulidae	dragonfly	2	1.9%
Sympetrum sp.	dragonfly	1	0.9%
Diptera			
Ceratopogonidae			
Culicoides sp.	sand fly	2	1.9%
Sphaeromais sp.	sand fly	2	1.9%
Chironomidae			
Ablabesmyia sp.	midge	2	1.9%
Clinotanypus pinguis	midge	1	0.9%
Dicrotendipes sp.	midge	10	9.3%
Endochiromus nigricans	midge	1	0.9%
Phaenopsectra punctipes gr.	midge	1	0.9%
Polypedilum halterale gr.	midge	1	0.9%
Polypedilum illinoense gr.	midge	12	11.1%
Procladius sp.	midge	4	3.7%
Pseudochironomus sp.	midge	9	8.3%
Tanytarsus sp.	midge	2	1.9%
Tabanidae			
Chrysops sp.	deer fly	2	1.9%
	Total Taxa:	25	
	Total Specimens:	108	100%
	Community Density (no. / square meter):	5,366	

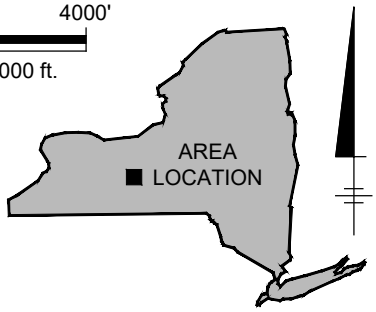
Community Metrics:	**Value**
Species Richness	24
Ephemeroptera, Plecoptera, Trichoptera Richness	0
Hilsenhoff Biotic Index	6.72
Percent Model Affinity (Ponar)	57%

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

WATER STREET

ASPHALT

FORMER GAS HOUSE MULTI-STORY MASONRY

PEDESTRIAN BRIDGE

OFFICE AND STORAGE BUILDING

DOCK

KEUKA LAKE OUTLET

RECREATION PATH

VILLAGE OF PENN YAN PROPERTY

LAKE STREET

NYS RTE 14A - LIBERTY STREET

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'

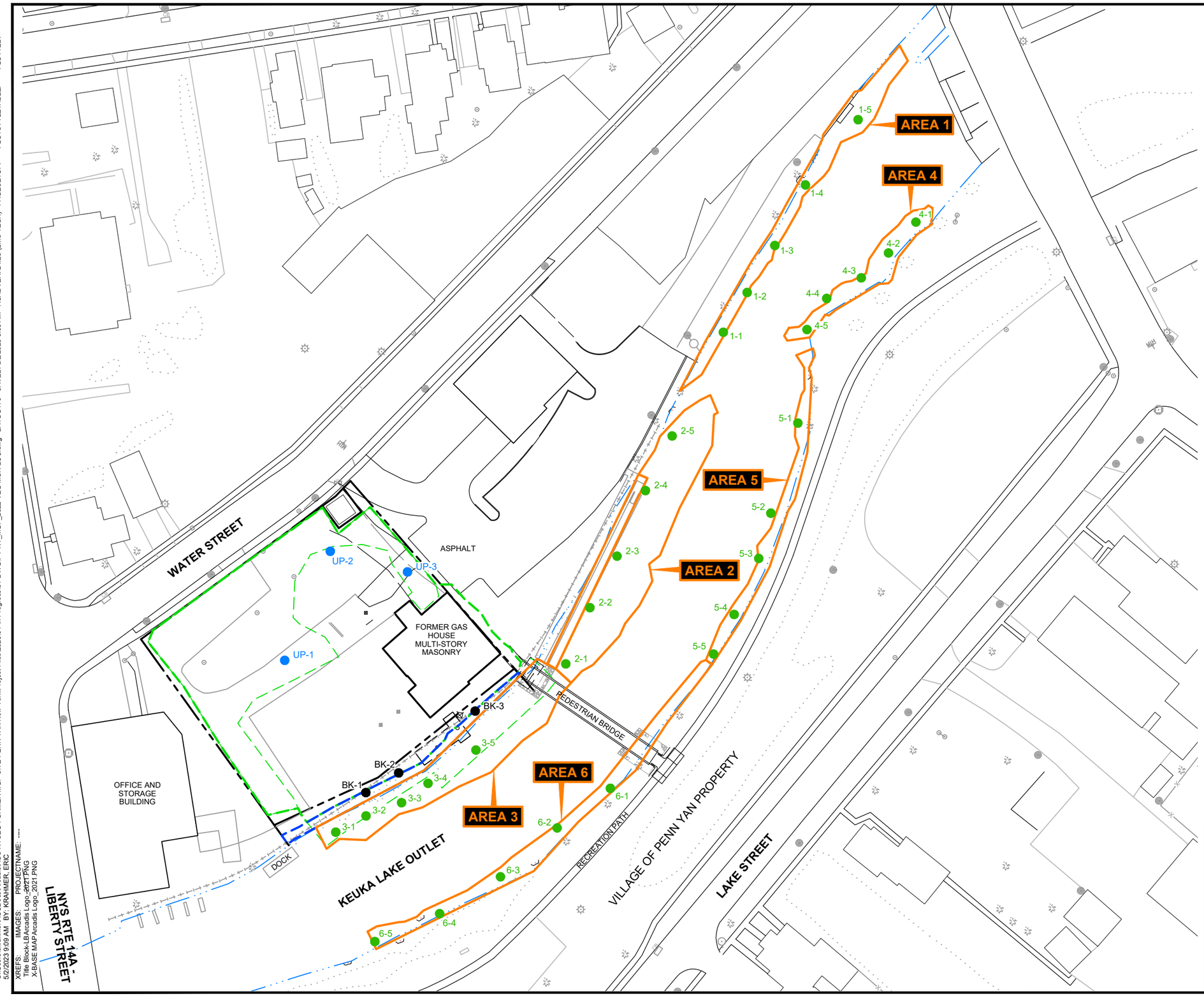
GRAPHIC SCALE

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)

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

2022 VEGETATION MONITORING LOCATIONS

ARCADIS

FIGURE 3

CELL 1-B
CELL 2-B
CELL 3-B
CELL 4-B
CELL 5A-B
CELL 5B-B
CELL 6A-B
CELL 6B-B
Cell 1
Cell 2
Cell 3
Cell 4
Cell 5A
Cell 5B
Cell 6A
Cell 6B
WATER STREET
ASPHALT
FORMER GAS HOUSE MULTI-STORY MASONRY
PEDESTRIAN BRIDGE
OFFICE AND STORAGE BUILDING
DOCK
KEUKA LAKE OUTLET
RECREATION PATH
VILLAGE OF PENN YAN PROPERTY
LAKE STREET
NYS RTE 14A - LIBERTY STREET

LEGEND:

- BENTHIC COMMUNITY MONITORING LOCATION
- CURRENT SITE FEATURE
- APPROXIMATE PROPERTY LINE
- APPROXIMATE SHORE LINE
- DREDGE CELL LIMITS

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

2022 BENTHIC MONITORING LOCATIONS

ARCADIS

FIGURE
4

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: Planted and healthy black walnut trees (*Juglans nigra*). Photographed at Liberty St. bridge, facing southwest.

Photo: 2

Location: Former MGP Site; Penn Yan, NY.

Description: Planted and healthy silver maple (*Acer saccharinum*). Facing northeast; Keuka Lake Outlet Trail bridge and former MGP building in background.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 3

Location: Former MGP Site; Penn Yan, NY.

Description: Restored upland area. Facing north; former MGP Building in the background

Photo: 4

Location: Former MGP Site; Penn Yan, NY.

Description: Restored upland area. Facing northwest; Water Street in background.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 5

Location: Former MGP Site; Penn Yan, NY.

Description: Restored upland area. Facing east; Water Street in background.

Photo: 6

Location: Former MGP Site; Penn Yan, NY.

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

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 7

Location: Quadrat UP-1

Description: Upland vegetation quadrat UP-1.

Photo: 8

Location: Quadrat UP-2

Description: Upland vegetation quadrat UP-2.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 9

Location: Quadrat UP-3

Description: Upland vegetation quadrat UP-3.

Photo: 10

Location: Quadrat BK-1

Description: Bank vegetation quadrat BK-1.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 11

Location: Quadrat BK-2

Description: Bank vegetation quadrat BK-2.

Photo: 12

Location: Quadrat BK-3

Description: Bank vegetation quadrat BK-3.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 13

Location: SAV Area 1; Quadrat 1-1.

Description: Example submerged aquatic vegetation quadrat from SAV Area 1. A total of 5 quadrats surveyed in SAV Area 1.

Photo: 14

Location: SAV Area 2; Quadrat 2-1.

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

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 15

Location: SAV Area 3; Quadrat 3-1.

Description: Example submerged aquatic vegetation quadrat from SAV Area 3. A total of 5 quadrats surveyed in SAV Area 3.

Photo: 16

Location: SAV Area 4; Quadrat 4-1.

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

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 17

Location: SAV Area 5; Quadrat 5-1.

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

Photo: 18

Location: SAV Area 6; Quadrat 6-1.

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

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 19

Location: Benthic Cell 2-B

Description: Benthic sample Cell 2-B prior to being sieved.

Photo: 20

Location: Benthic Cell 2-B

Description: Benthic sample Cell 2-B post-sieving.

Appendix A
Restoration Monitoring Photographs

NYSEG Former MGP Site
Penn Yan, New York

Photo: 21

Location: Benthic Cell 5B-B

Description: Benthic sample Cell 5B-B prior to being sieved.

Photo: 22

Location: Benthic Cell 5B-B

Description: Benthic sample Cell5B-B post-sieving.

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