2010 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

LCP BRIDGE STREET SITE (OU-1)
Solvay, New York

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

ACRONYMS

LCP	Linden Chemicals and Plastics
METRO	Metropolitan Wastewater Treatment Facility
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation Maintenance & Monitoring
TES	Terrestrial Environmental Specialists

2010 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

1.0 INTRODUCTION

The maintenance program being implemented at the Linden Chemicals and Plastics (LCP) Bridge Street (OU-1) site in Solvay, New York has been effective. This report details the operation, maintenance and monitoring (OM&M) activities conducted at the site in 2010. It has been prepared in conjunction with the LCP OM&M Plan (Parsons, 2009a) and is intended to provide summaries of the collected data and status of OM&M activities.

Under direction of the New York State Department of Environmental Conservation (NYSDEC), the remediation of LCP involved a combination of sewer system closure, mercury removal from soil on the former plant property, excavation of impacted sediments in surrounding areas with relocation to the soil/sediment containment area, construction of an underground cut-off wall and low-permeability soil cover over the soil/sediment containment area, and installation of an on-site groundwater collection system. As part of the project, excavation areas were restored to provide habitats for wading birds, ducks, amphibians, fish, and mammals (Parsons 2009b).

OM&M operations consist of site and equipment maintenance in addition to monitoring of groundwater, sediment, surface water, wetlands, and biota. Upgrades to the site systems are performed as needed, more detail is provided in the respective sections below.

2.0 SYSTEM OPERATION

Groundwater extracted by the 15 pumping wells within the soil/sediment containment area was pumped to two 10,000-gallon tanks in the on-site extraction building (Figure 1). On January 21, 2010, the LCP pre-treatment system began operation. The pre-treatment system consists of a filter feed pump, two 5-micron bag filters, two fiberglass-reinforced plastic granular activated carbon vessels and a flow meter. The design pumping rate is approximately 5 to 25 gpm. Pre-treated groundwater is discharged to the Onondaga County West Side Trunk Sewer from which it flows to the Onondaga County Metropolitan Wastewater Treatment Facility (METRO). In 2010, approximately 2,188,969 gallons were pre-treated onsite and sent to METRO.

In addition to the groundwater pre-treated on-site, approximately 129,186 gallons were hauled to the Willis Avenue Treatment Plant. Monthly summaries are provided in Table 1 of this report.

3.0 MAINTENANCE

The OM&M contractor providing maintenance activities for the specified period was CH2M HILL OMI. Maintenance conducted included system equipment maintenance, cap mowing and snow removal. Maintenance conducted to system equipment was described in the weekly

inspection, operation and monitoring reports generated by OMI and submitted to the NYSDEC and associated distribution list with the monthly reports for the LCP OU-1 site.

In addition to CH2M HILL OMI, Ballard Sports maintained *Phragmites* control in and around the restored Wetland A/B complex and the West Flume. Control measures included cutting the reeds and hand application of herbicides.

From November to December, additional impacted material identified in the East Ditch Area during OM&M sampling events, was completely removed and relocated to a temporary soil storage area constructed in the soil/sediment containment area. The removal and restoration activities are being conducted in accordance with the *LCP OU1 Supplemental Sampling Data, Proposed Soil Removal and Additional Sampling Work Plan* dated September 21, 2010. A summary report of the activities will be prepared following the completion of restoration activities in the spring of 2011.

4.0 MONITORING

4.1 Groundwater

Containment of impacted sediments in the soil/sediment containment area is monitored both hydraulically and analytically using the piezometer and monitoring well network shown in Figure 1.

Final checks to the piezometer monitoring system were ongoing at the time of this report. In the interim, static water levels were measured manually and included in the monthly reports submitted to the NYSDEC (and associated distribution list). The static water level elevations presented in each monthly report have been consolidated and provided in Table 2 of this report.

During the time period covered by this report, water levels measured by the piezometers have remained generally consistent and below the elevation of the top of the cut-off wall. The groundwater elevations are being evaluated as they relate to achieving an inward and upward gradient. An inward gradient will be achieved when the interior shallow, intermediate, and deep piezometer readings are less than the corresponding exterior shallow, intermediate, and deep piezometer readings. Readings from each piezometer will be averaged over one month and compared to the corresponding piezometer on the other side of the cut-off wall. Upward gradient will be evaluated by comparison between interior intermediate piezometer readings and interior deep piezometer readings. It is anticipated that it will take several years after the final low-permeability cap is constructed to fully achieve an inward and upward gradient at the site.

The piezometers outside of the cut-off wall along the north side of the containment area (PZ 1B: shallow, intermediate and deep through PZ 4B: shallow, intermediate and deep) were sampled quarterly by CH2M HILL OMI and analyzed for total mercury by SW 846 Method 7470. The analytical results are provided in Table 3 of this report.

The analytical results for the exterior piezometer sampling are predominantly non-detect and generally within the same range or lower than the pre-remediation mercury results presented in the RI for the LCP OU-1 site. The exterior shallow piezometer data ranges from non-detect to

4.3 µg/L. The exterior intermediate piezometer data ranges from non-detect to 0.16 µg/L. The exterior deep piezometer data ranges from non-detect to 0.76 µg/L. The piezometer data indicates that the cut-off wall is effectively containing contaminated groundwater.

In addition to the exterior piezometers, monitoring wells 34D, 35D, and 36D located within the containment area were sampled by CH2M HILL OMI and analyzed for total mercury by SW 846 Method 7470. The monitoring well results are provided as Table 4 of this report. During each sampling event, the monitoring wells were also inspected for elemental mercury by the use of a copper probe. Elemental mercury was not detected during the sample events. The total mercury concentrations in the wells have been stable.

4.2 SURFACE WATER

Nine annual monitoring locations (Figure 2) have been established in the West Flume and Wetland A/B complex for total mercury, methylmercury, and dissolved mercury. Annual surface water samples were collected at the monitoring locations in October 2010. The data range for total mercury from the West Flume (excluding the upstream sample location (LCP1-SW-63)) was 3.4 ng/L to 6.0 ng/L, 32 ng/L to 61.8 ng/L for Wetland A and 0.5 ng/L to 4.7 ng/L for Wetland B. Individual sample results are provided in Table 5 of this report.

4.3 SEDIMENT

Sediment was also sampled at the nine annual monitoring locations and analyzed for total and methylmercury by SW 846 Method 7471 and EPA 1630. Samples were collected in October. The total mercury data ranges for the West Flume (excluding the upstream sample location (LCP1-SW-63)) were 0.21 mg/kg to 0.53 mg/kg, 0.33 to 1.5 mg/kg for Wetland A and 0.06 mg/kg to 0.6 mg/kg for Wetland B. Individual sample results are provided in Table 6 of this report.

In October 2010, six additional sediment samples were collected in the Wetland A basin to help delineate elevated sediment mercury concentrations detected during previous OM&M sampling events and finalize removal areas. Samples were collected in accordance with the OM&M Plan (Parsons, 2009) and analyzed for total mercury by SW846 Method 7471A. The results of the sampling are presented in Table 6 and Figure 3.

4.4 SOIL

In June 2010, additional soil samples were collected in the Dredge Spoils area to help delineate elevated mercury concentrations detected during previous OM&M sampling events and finalize removal boundaries. The samples were collected in accordance with the OM&M plan and analyzed for total mercury by SW846 Method 7471A. The results of the sampling were presented in the LCP OU-1 Supplemental Sampling Data, Proposed Soil Removal and Additional Sampling Work Plan dated September 23, 2010 (Parsons, 2010) and presented in Table 7 and Figure 4 of this report.

Soil samples were also collected along the West Ditch in October 2010 to delineate removal boundaries. The samples were collected in accordance with the OM&M Plan and analyzed for

total mercury by SW846 Method 7471A. The results of the sampling are presented in Table 7 and Figure 4a of this report.

In addition to the remedial design support sampling, post excavation confirmatory samples were collected in the East Ditch to support removal activities. The samples were collected in accordance with the NYSDEC-approved Construction Sampling and Analysis Plan (CSAP) and the Construction Quality Assurance Procedures Plan (CQAPP) (Parsons, 2004). The results of the sampling are presented in Table 7 and Figure 5 of this report.

4.5 BIOTA

Biota in and around the West Flume and Wetland A/B complex is sampled annually as part of OM&M. Baseline (or pre-remediation) samples were collected in 2005; three annual sampling events (post remediation) were conducted in December 2008, October 2009 and October 2010.

In general, post remediation sampling crews target organisms captured during the baseline monitoring event to provide consistent comparisons between organisms. In areas where crews were able to collect similar organisms, comparisons to the average values for the given types are provided in the summary tables below. The individual sample results are provided in Table 8 of this report.

Fish

Site Location	Baseline Average	2008 Average	2009 Average	2010 Average
West Flume				
- Creek Chub	0.12	0.29	0.24	0.21
- Brook Stickleback	0.2	0.24	0.1	0.1

Units: mg/Kg wet weight

Macroinvertebrates

Site Location	Baseline Average	2009 Average
West Flume		
- Crayfish	0.31 J	0.06

Units: mg/Kg wet weight

Field Mice

Site Location	Baseline Average	2008 Average	2009 Average	2010 Average
Perimeter Wetland A/B	Non-Detect	0.011 (J)	Non-Detect	0.07

Units: mg/Kg wet weight

Earthworms

Site Location	Baseline Average	2008 Average	2009 Average	2010 Average
Perimeter Wetland A/B	0.23	0.38(J)	0.34	0.39

Units: mg/Kg

4.6 WETLANDS MONITORING

Wetland A, Wetland B, and the West Flume were restored following the removal of impacted sediments by placement of 1 ft. of clean imported topsoil. Following placement of topsoil, the areas were restored to a variety of habitat types, including a wet meadow/scrub-shrub fringe, emergent wetland, aquatic bed, open water, and drainage channel. These habitat types were created by developing various water depth zones according to the wetland restoration plan.

The restoration plan places an emphasis on the development of aquatic bed and deep emergent marsh habitat types in order to limit invasive species (EPA, 2009).

During the OM&M period, the restored wetland areas are being monitored annually to evaluate the success of the restoration. The monitoring program began in 2008 and consists of three monitoring events per year during the early, mid and later parts of the growing season (Parsons, 2009a). The parameters monitored include:

- Vegetation (type, percent cover, and frequency)
- Hydrology
- Invasive species (species, location, and approximate size of patch)
- Wildlife usage

Similar to previous years, the wetland assessments in 2010 were made by Terrestrial Environmental Specialists (TES). The number of plant species recorded each year has increased steadily from 77 species in 2008, 97 in 2009, and up to 115 observed in 2010. This is substantially more than the *Phragmites*-dominated system that existed prior to remedial efforts.

Phragmites still exist in several locations in uplands around the restored areas; however ongoing efforts to control the common reed grass are underway as discussed above in Section 2.0. The 2010 wetlands report generated by TES is provided in Appendix A of this report.

5.0 MAINTENANCE PROGRAM SUCCESS

To date, the maintenance program being implemented at the LCP site has been effective. For the year 2011, two additional removal activities are anticipated to address the elevated mercury concentrations detected in soils and sediments in the West Ditch and Dredge Spoils areas from OM&M sampling activities.

6.0 REFERENCES

EPA. 2009. First Five Year Review Report, LCP Bridge Street Subsite (OU5) Onondaga Lake Site Village of Solvay, Town of Geddes Onondaga County New York. Prepared by the U.S. Environmental Protection Agency Region 2, October 2009.

Parsons. 2009a. Operation, Maintenance, and Monitoring Plan for the LCP Bridge Street Site. Prepared for Honeywell, Syracuse, New York. January 2009.

Parsons. 2009b. Operation, Maintenance and Monitoring Sampling Data Report and Supplemental Sampling Plan. Prepared for Honeywell.

Parsons, 2010. LCP OU-1 Supplemental Sampling Data, Proposed Soil Removal and Additional Sampling Work Plan. Prepared for Honeywell, Syracuse, New York. September 2010.

APPENDIX A

WETLANDS MONITORING REPORT YEAR 3 - 2010

WETLAND MONITORING REPORT – YEAR 3 (2010)
LCP BRIDGE STREET SITE

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TABLE OF CONTENTS

Page

LIST OF TABLES

(all tables follow text)

LIST OF FIGURES

(all figures follow tables)

1.0 INTRODUCTION

Terrestrial Environmental Specialists, Inc. (TES) worked with Parsons and the New York State Department of Environmental Conservation (NYSDEC) to develop a wetland restoration plan to restore wetlands and the West Flume following remediation work at the LCP Bridge Street site. The wetland restoration site is located in the Town of Geddes, Onondaga County, New York (Figure 1).

Remediation work involved the excavation of wetlands in portions of NYSDEC freshwater wetland SYW-14 (Figure 2) and an adjacent drainage feature called the West Flume (Figures 1 and 2). An April 2006 aerial photograph (Figure 3) shows the areas while remediation was underway. An April 2009 aerial photograph (Figure 3a) and a November 2008 oblique aerial photograph (Figure 3b) show the areas after completion of the remediation. The wetland restoration area occurred south of a gravel road that parallels the West Flume. The West Flume drains to the northwest into Geddes Brook, which flows under railroad tracks before discharging into Ninemile Creek, a tributary to Onondaga Lake.

The wetland areas and the West Flume were restored under a restoration plan approved by the review agencies. The plan is briefly described in Section 2.0 of *Wetland Monitoring Report – Year 1 (2008) LCP Bridge Street Site* (TES 2009).

Wetland monitoring was part of the restoration plan, with monitoring required for a five-year period specified in the *Operation, Maintenance, and Monitoring Plan for the LCP Bridge Street Site, Solvay, New York* (Parsons 2008). Methods and results for Year 3 (2010) of wetland monitoring are provided in Sections 3.0 and 4.0, respectively, of the following report. Maintenance procedures implemented in the wetland restoration area during the year are provided in Section 5.0.

2.0 WETLAND REMEDIATION/RESTORATION EFFORTS

Remediation at the LCP Bridge Street site required the excavation of portions of NYSDEC wetland SYW-14 and the adjacent West Flume. The remediation design was presented in the *Final (100%) Design Report for the LCP Bridge Street (OU-1) Site* (Parsons 2004). Details about the wetland restoration and reclamation plans can be found in the *Wetland Monitoring Report – Year 1 (2008) LCP Bridge Street Site* (TES 2009).

Native plant species were selected for the vegetation restoration efforts. Species, quantities, and types of stock planted in the wetland restoration area, West Flume, and adjacent uplands are presented in Table 1. Seeding and mulching details are provided in Table 2. Some supplemental tree and shrub plantings were performed in 2008. These are detailed in Section 5.0 of the Year 1 report (TES 2009), and are also listed in Table 3.

3.0 MONITORING METHODS

Methods proposed to monitor the restored wetland areas and West Flume are provided in Parsons (2008). The proposed parameters to be monitored included: vegetation, hydrology, wildlife usage, and invasive species.

3.1 Vegetation

Vegetation monitoring included field reconnaissance surveys, qualitative assessments, and quantitative sampling. Field reconnaissance surveys occurred at several times from May to September, 2010. More detailed qualitative assessments were performed in July and September, 2010. Quantitative sampling of vegetation occurred in September 2010.

Vegetation sampling was conducted on September 9, 2010 to assess the vegetation in Wetland A, Wetland B, and the West Flume. The vegetation data were collected from 18 permanent circular sample plots. The plots were located in each of the three restored areas and in the different vegetation cover types present in each area; plot locations are shown on Figures 5 and 5a.

Each permanent sample plot was 10 feet in diameter. Wooden stakes were installed to mark the center of each plot, which was also located using GPS equipment. To establish the 10-foot diameter, a cloth tape measure was attached to the stake, extended to 5 feet and walked around the stake.

Vegetation data collected in each sample plot consisted of the following: 1) the vegetation cover type present, 2) total percent areal cover of vegetation, 3) plant species observed, and 4) the percent areal cover of each species. Sample plot data sheets used are presented in Appendix A.

Photographs were taken at various times during the 2010 monitoring. At the time of the quantitative sampling, photographs were taken at each plot and at permanent photograph points shown on Figure 5. The location and direction of the photographs are shown on Figure 5a and the photographs are presented in Appendix B.

3.2 Hydrology

The hydrology conditions in the restoration areas were monitored during the growing season using staff gauges. The gauges were installed in Wetland A and Wetland B on June 11, 2008. Staff gauge locations are shown on Figure 5.

Water level monitoring occurred eight times from April through September 2010. Water depths were also recorded at the center of each vegetation sample plot during the quantitative vegetation sampling that occurred on September 9, 2010.

3.3 Wildlife

During field reconnaissance visits to the restoration areas, records were kept of all wildlife species seen in or in the vicinity of the area. Specific efforts occurred during the breeding season for birds and amphibians in 2010.

4.0 MONITORING RESULTS

4.1 Introduction

The restoration area is composed of three areas: Wetland A, Wetland B, and the West Flume. An April 2009 aerial photograph (Figure 3a) and a November 2008 oblique aerial photograph (Figure 3b) show the three areas after restoration. The post-remediation grading plan for these three areas is provided as Figure 4. Figure 6 shows the location and extent of the vegetation cover types found in the restoration ares during the 2010 monitoring effort. Plant species observed in the areas are listed in Table 4. The vegetation, hydrology, and wildlife usage of the restored areas is described in the following sections.

4.2 Vegetation

A total of 115 plant species were recorded in and around Wetlands A and B and the West Flume in 2010 (Table 4). This is an increase of 18 species from the 2009 sampling and an increase of 38 species from the 2008 sampling.

Wetland A

Plant species observed in Wetland A are presented in Table 4. Vegetation plot data for Wetland A are provided in Appendix A, with a summary of the data presented in Table 5.

Wetland A contained one primary vegetation cover type during the September 2010 quantitative vegetation monitoring, which was emergent wetland. Three sampling plots were located in Wetland A, all occurring in emergent wetland (Figure 5).

The dominant plant in Wetland A was broad-leaf cattail (*Typha latifolia*), which was also closely associated with moss (*Chara* sp.), common reed (*Phragmites australis*), and soft-stem bulrush (*Scirpus tabernaemontani*). These four species account for approximately 94% of the total vegetation cover (Table 5). Broad-leaf cattail, moss and soft-stem bulrush have a wetland indicator status of obligate (OBL). Common reed has an indicator status of facultative-wet (FACW). Broad-leaf cattail continues to be the dominant plant in Wetland A, and this is consistent with what was found by the 2008 and 2009 monitoring efforts. Soft-stem bulrush cover decreased from 2009 to 2010, while common reed and moss cover increased.

Wetland B

Plant species observed in Wetland B are listed in Table 4. Vegetation plot data are presented in Appendix A, with summaries of the data presented in Tables 6 and 7.

Wetland B contained two vegetation cover types during the September 2010 quantitative vegetation monitoring. They were emergent wetland and aquatic bed. A total of twelve sampling plots were located in Wetland B, with seven in the emergent wetland area and five in the aquatic bed area. However, two of the five aquatic bed sample plots have begun to exhibit the characteristics of an emergent wetland cover type.

The emergent wetland portions of Wetland B were dominated by broad-leaf cattail and narrow-leaf/white cattail *(Typha angustifolia/glauca*). These two dominants were also closely associated with star duckweed (*Lemna trisulca*), coontail (*Ceratophyllum demersum*), and common bladder-wort (*Utricularia macrorhiza*). These five species account for approximately 85% of the total plant vegetation cover in the emergent wetland areas of Wetland B (Table 6). Both the dominant plants and the closely associated species have a wetland indicator status of obligate. As in 2009, the 2010 sampling data show broad-leaf cattail as a dominant plant.

The aquatic bed portion of Wetland B contained four dominant plant species: water-weed (*Elodea* sp.), white water lily (*Nymphaea odorata*), broad-leaf cattail, and common bladder-wort. The four dominant plant species account for approximately 82% of the total cover in the Wetland B aquatic bed area (Table 7). All of the plant species have a wetland indicator status of obligate. Dominant plants in the aquatic bed of Wetland B in 2010 were the same as 2009. However, the percent cover of each dominant plant species in the aquatic bed changed slightly from 2009 to 2010. Water-weed, white water lily, and broad-leaf cattail increased in percent cover, while common bladder-wort decreased.

West Flume

Plant species observed in the West Flume in 2010 are presented in Table 4. Vegetation plot data for the West Flume are provided in Appendix A, with a summary of the data presented in Table 8.

The West Flume contained one vegetation cover type during the September 2010 vegetation monitoring. It was emergent wetland. Three sampling plots were located in the West Flume.

The dominant plants in the West Flume were broad-leaf cattail and common reed. These two species account for approximately 74% of the total vegetation cover in the West Flume (Table 8). The total number of plant species sampled in the West Flume increased from 11 to 15 from 2009 to 2010. A majority (12 of 15) of the plant species sampled have an indicator status of facultative wet or wetter. The relative percent cover for broad-leaf cattail decreased and the relative percent cover for common reed slightly increased from 2009 to 2010.

An interesting plant species was found growing in the West Flume during the 2008 monitoring effort. The plant found is seaside bulrush (*Scirpus maritimus* spp. *paludosus*, currently *Bulboschoenus maritimus* spp. *paludosus*). The species has continued to persist in the upper portions of the West Flume through 2010. Seaside bulrush is a state-listed endangered plant. It is listed as endangered in New York under the Protected Plant Act (Section 9-1503 of the Environmental Conservation Law). It has a limited distribution in upstate New York; it is

confirmed extant in Cayuga and Onondaga Counties and also occurs in Nassau and Suffolk Counties (Young 2008).

Seaside bulrush was historically known from several locations in the Onondaga Lake area, including areas near the State Fair Grounds. These historical sitings are summarized in McMullen (1993). Recent records of the species are from near the Onondaga Lake Parkway in the southeastern portion of the lake.

4.3 Hydrology

Water levels in Wetland A and Wetland B were monitored eight times in 2010; April 15, May 25, June 8, June 25, June 28, July 21, August 18, and September 9. Based on the water elevation data collected in 2010 (Table 9), water levels were fairly consistent from April through September.

In Wetland A, the water surface elevation fluctuated between 379.90 feet and 380.22 feet (Table 9). The lowest water elevation was observed on July 21, 2010. The highest water elevation was recorded twice, on June 25, 2010 and September 9, 2010.

In Wetland B, the water surface elevation fluctuated between 375.81 feet and 376.56 feet (Table 9). The lowest water elevation was observed on July 21, 2010. The highest water elevation was observed on June 25, 2010.

4.4 Wildlife

Wildlife observations from the restoration areas are presented in Table 10. These observations were made at various times during the 2010 season. Mammals, fish, and macroinvertebrates collected during the 2010 bioassessment surveys are presented in Table 11.

Fish

Fish were noted in the West Flume and Wetland B during the 2010 monitoring. TES did not sample for fish, but fish collected during the biota assessment were identified by TES and are presented in Table 11. Fish species collected in the West Flume included brook stickleback (*Culaea inconstans*) and creek chub (*Semotilus atromaculatus*). Creek chub was the most abundant species. Both of these fish species were observed in Wetland B in 2010.

Macroinvertebrates

Macroinvertebrates were sampled in the West Flume and Wetland B during the 2010 bioassessment monitoring. One species of macroinvertebrate, crayfish (*Orconectes* sp.), was collected (Table 11). However, a large number of dragonfly nymph casings (infraorder *Anisoptera*) were observed on cattail fronds in Wetland A and Wetland B.

Amphibians/Reptiles

Three species of frogs were identified in the restoration area and vicinity during 2010 (Table 10). American bullfrog (*Lithobates catesbeianus*) was found in Wetland B and the West Flume. Northern green frog (*Lithobates clamitans melanota*) was found in Wetland A and the West Flume. Northern leopard frog (*Lithobates pipiens*) was found in Wetland A.

An eastern snapping turtle (*Chelydra s. serpentina*) was observed in the West Flume during the 2010 monitoring effort. As during the 2009 monitoring effort when a painted turtle (*Chrysemys picta*) was observed in Wetland B, this observation is important because it further indicates the restored site's suitability and success in supporting wildlife. No reptiles were observed in 2008.

Birds

Table 10 lists the bird species seen or heard in the vicinity of the restoration areas. Species observed included several wetland species, such as Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), pied-billed grebe (*Podilymbus podiceps*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), spotted sandpiper (*Actitis macularis*), willow flycatcher (*Empidonax traillii*), swamp sparrow (*Melospiza georgiana*), and red-winged blackbird (*Agelaius quiscula*). Pied-billed grebe is listed as a threatened species by the NYSDEC. Observations of an adult pied-billed grebe with young in Wetland B in early June 2010 indicates that the species successfully nested in the wetland. This is another positive indication of the successful restoration of the area.

Mammals

Tracks from coyote (*Canis latrans*) were observed in the mud around Wetland A and Wetland B. White-tailed deer (*Odocoileus virginianus*) were observed in the vicinity of Wetland A and Wetland B and tracks were also noted. Muskrat (*Ondatra zibeticus*) sign was observed in Wetland B and the West Flume. There was a significant increase in muskrat lodges in Wetland B in 2010. Eastern cottontail rabbit (*Sylvilagus floridanus*) and eastern gray squirrel (*Sciurus caroliniensis*) were observed in Wetland A. During the bioassessment work, several species of small mammal were collected. These included: white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), deer mouse (*Peromyscus maniculatus)* and short-tailed shrew (*Blarina brevicauda*).

5.0 WETLAND RESTORATION SUCCESS AND MAINTENANCE

Restoration of the LCP remediation areas, including Wetland A, Wetland B, and the West Flume, has been tremendously successful. Areas that were previously dominated by a monoculture of the invasive common reed with little aquatic habitat component, are now diverse wetlands, supporting a mix of plant and animal species and containing an interspersion of aquatic habitat. The improvement in habitat value of these areas is significant. As previously noted, the nesting of a state-listed bird and the occurrence of a state-listed plant are also indications of restoration success.

While the restoration of the LCP remediation areas is considered very successful based on the three years of monitoring, maintenance of the areas is considered necessary to maintain the habitat value. The two concerns are: 1) the encroachment of common reed into the areas, and 2) the success of the plantings, particularly woody species.

5.1 Invasive Species Control

Common reed does occur in various locations within and around the edges of Wetlands A and B, and the West Flume. Most of the common reed is in upland areas or in wetland fringes. The more abundant areas are shown on Figure 7. There has been a slight increase in common reed from 2009 to 2010. Portions of Wetland A, Wetland B and the West Flume have been affected by common reed.

Honeywell retained Ballard Construction in 2010 to perform mowing and cutting in an effort to control common reed. Figure 7 shows the locations of the common reed areas that were mowed and cut.

5.2 Woody Species Plantings

Many tree and shrub plantings around Wetland B were originally installed at a lower elevation than specified in the plan. This woody material did not survive when the area was recharged with water. Recommendations were made to replace material. On May 19, 2008, forty-eight additional trees and shrubs were planted at the LCP Restoration site. The species and quantities are presented in Table 3.

Additional tree and shrub plantings are recommended around Wetland B. These plantings are primarily needed along the western edge of Wetland B. Details on quantities, species, and location for the plantings could be developed for a recommended spring 2011 planting.

6.0 SUMMARY

Remediation efforts at the LCP Bridge Street site were focused on impacted wetland areas and a drainage feature called the West Flume. The wetland areas (Wetland A and Wetland B) are part of NYSDEC Wetland SYW-14.

Detailed plans were developed by Parsons, TES, and NYSDEC to restore these areas. These plans are presented in Parsons (2004).

The wetlands and the West Flume were originally dominated by a monoculture of the invasive grass common reed and had limited aquatic habitat. Design for the restoration targeted a wetter wetland system to diversify the habitats, provide areas unsuitable for common reed, and increase the aquatic habitat component. Shrub and tree plantings were provided around the restored areas. Remediation efforts occurred from 2005 to 2007. Initial restoration of the wetlands and West Flume occurred in the latter portion of this time period, with extensive vegetation planting in the fall of 2007.

Monitoring of the restored areas was required and is described in the Operation, Maintenance and Monitoring Plan (Parsons 2008). Monitoring occurred in 2008 and 2009. Results of the third year of monitoring (2010) are presented in the current report.

Vegetation, hydrology, and wildlife usage were monitored during 2010 in the restored wetlands and the West Flume. A vegetation cover map of the restored areas is provided. Vegetation in the restored wetlands and West Flume was primarily persistent emergent and aquatic bed. A total of 115 plant species were observed in the area, most of which were wetland species. Interestingly, seaside bulrush, a state-listed endangered plant, was found in the restored West Flume in 2008 and has persisted to 2010.

Hydrology was monitored in Wetlands A and B from April through September 2010 using staff gauges. Water levels were fairly consistent throughout the year.

Wildlife usage of the restored wetlands and the West Flume was extensive. Species of fish were observed in Wetland B and the West Flume in 2010. Leopard frogs were particularly abundant in the restored wetlands, with green frogs and bullfrogs being noted as well. A snapping turtle was observed in the West Flume in 2010. Numerous wetland birds were observed in the area during the year, including the state-listed threatened pied-billed grebe, which successfully nested in Wetland B. A few mammals were noted, and muskrat usage increased significantly; many additional species likely utilize the area.

Overall, the restored areas were found to be very successful during the first, second and third years of monitoring. Common reed still occurs in several locations in uplands around the restored areas and has slightly increased in percent cover in certain areas, especially the West Flume. Herbicide treatment or cuttings to control common reed occurred in 2008 and 2009. Mowing and hand cutting to control common reed occurred in 2010. Control of some kind will likely be required in future years. Additional tree plantings around the edge of the wetlands were performed in 2008 to replace material that died. Additional tree plantings are recommended.

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TABLES

Table 1.

Plantings at the LCP Bridge Street Restoration Area

Quantity	Scientific Name[(a)]	Common Name
WETLAND PLANTING ZONE A2 (edge of water to 2 feet above water)		
118	*Populus deltoides*	Eastern cottonwood
118	*Fraxinus pennsylvanica*	Green ash
30	*Populus tremuloides*	Trembling aspen
88	*Quercus bicolor*	Swamp white oak
59	*Sambucus canadensis*	Elderberry
59	*Salix amygdaloides*	Peach-leaf willow
118	*Salix discolor*	Pussy willow
118	*Cornus amomum*	Silky dogwood
WETLAND PLANTING ZONE B1 (water 0 to 1 foot deep)		
348	*Sagittaria latifolia*	Arrowhead
348	*Sparganium americanum*	Burreed
348	*Scirpus tabernaemontani*	Soft-stem bulrush
348	*Leersia oryzoides*	Rice cutgrass
348	*Juncus effusus*	Soft rush
348	*Eleocharis obtusa*	Creeping spikerush
348	*Carex vulpinoidea*	Fox sedge
348	*Scirpus cyperinus*	Woolgrass
348	*Polygonum hydropiperoides*	Swamp smartweed
WETLAND PLANTING SUB-ZONE B2 (water 1 to 2 feet deep)		
3432	*Alisma subcordatum*	Water plantain
500	*Pontederia cordata*	Pickerel weed
280	*Pontederia cordata*	Pickerel weed
624	*Utricularia vulgaris*	Bladderwort
WETLAND PLANTING ZONE C AQUATIC BED (water 2 to 4 feet deep)		
1155	*Elodea canadensis*	Water weed
924	*Coleogeton pectinatum*	Sago pondweed
231	*Nymphaea odorata*	Water lily
231	*Nuphar lutea*	Yellow water lily
WEST FLUME AREA (side slopes to flume)		
90	*Populus deltoides*	Eastern cottonwood
90	*Fraxinus pennsylvanica*	Green ash
30	*Populus tremuloides*	Trembling aspen
60	*Quercus bicolor*	Swamp white oak
45	*Sambucus canadensis*	Elderberry
45	*Salix amygdaloides*	Peach-leaf willow
90	*Salix discolor*	Pussy willow
90	*Cornus amomum*	Silky dogwood

[(a)] Nomenclature follows Mitchell and Tucker (1997).

Table 2.

Seeding and Mulching at the LCP Bridge Street Restoration Area

WETLAND SEED MIX[b]	
Scientific Name[a]	**Common Name**
Agrostis alba	Redtop
Carex comosa	Cosmos sedge
Carex vulpinoidea	Fox sedge
Carex scoparia	Blunt broomsedge
Scirpus atrovirens	Green bulrush
Typha latifolia	Broad-leaf cattail
Bidens cernua	Beggars-tick
Glyceria striata	Fowl mannagrass
Polygonum pensylvanicum	Pennsylvania smartweed
Polygonum hydropiperoides	Marsh smartweed
Eleocharis obtusa	Spikerush
Juncus effusus	Soft rush
Sparganium americanum	Eastern burreed
Verbena hastata	Blue vervain
Leersia oryzoides	Rice cutgrass

CONSERVATION SEED MIX[c]		
Scientific Name[a]	**Common Name**	**Lbs./Acre**
Trifolium repens	White clover, Dutch	2.5
Agrostis perennans	Autumn bentgrass, PA Ecotype	5
Lolium perenne	Perennial ryegrass, “Saint” (turf type)	10
Phleum pratense	Timothy	10
Dactylis glomerata	Orchard grass, “Potomac”	10
Bromus inermis	Smooth brome	10
Agrostis scabra	Ticklegrass (rough bentgrass), PA Ecotype	4
	Total	51.5

[a] Nomenclature follows Mitchell and Tucker (1997).
[b] Seeding rate – 15 bulk lbs./acre.
[c] Seeding rate – 51.51 lbs./acre.

Table 3.

Supplemental Tree and Shrub Plantings on May 19, 2008

Quantity	Scientific Name[(a)]	Common Name
9	*Populus deltoides*	Eastern cottonwood
9	*Fraxinus pennsylvanica*	Green ash
10	*Salix purpurea*	Streamco willow
10	*Salix discolor*	Pussy willow
10	*Cornus amomum*	Silky dogwood

[(a)] Nomenclature follows Mitchell and Tucker (1997).

Table 4.

Plant Species Observed in 2010, LCP Wetland Restoration Areas

TREES

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Acer negundo	Box elder	FAC	✓	✓	✓
Fraxinus pennsylvanica	Green ash	FACW	✓	✓	✓
Juglans nigra	Black walnut	FACU			✓
Populus deltoides	Eastern cottonwood	FAC	✓	✓	✓
Populus tremuloides	Quaking aspen	FACU	✓	✓	✓
Quercus bicolor	Swamp white oak	FACW		✓	
Robinia pseudoacacia	Black locust	FACU	✓	✓	✓
Salix amygdaloides	Peach-leaf willow	FACW	✓	✓	✓
Salix sp.	Willow	FACW	✓	✓	✓

SHRUBS

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Cornus amomum	Silky dogwood	FACW	✓	✓	✓
Rhus hirta	Staghorn sumac	UPL	✓	✓	✓
Salix discolor	Pussy willow	FACW		✓	✓
Salix purpurea	Streamco willow	NI	✓	✓	✓
Sambucus canadensis	Elderberry	FACW		✓	✓

HERBACEOUS

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Agrostis gigantea	Redtop	FACW	✓(E)	✓(E)	✓(E)
Agrostis stolonifera	Bentgrass	FACW	✓	✓	
Agrostis sp.	Bentgrass	FACW	✓		✓
Alisma subcordatum	Water plantain	OBL		✓	✓
Ambrosia artemisiifolia	Ragweed	FACU	✓(E)	✓(E)	✓(E)
Andropogon gerardii	Big bluestem	FAC	✓(E)	✓(E)	✓(E)
Apocynum cannabinum	Indian hemp	FACU	✓(E)	✓(E)	✓(E)
Arctium minus	Common burdock	FACU	✓(E)	✓(E)	✓(E)
Artemisia vulgaris	Felon-herb mugwort	FACU	✓(E)	✓(E)	✓(E)

[(a)] Nomenclature follows Mitchell and Tucker (1997).

[(b)] Obligate Wetland (OBL): occur almost always (estimated probability >99%) in wetlands. Facultative Wetland (FACW): usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Facultative Upland (FACU): usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%). Obligate Upland (UPL): occur almost always (estimated probability >99%) in non-wetlands.

(E) - Found primarily along the edge of the restoration area.

Table 4. (cont.)

HERBACEOUS

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Aster sp.	Aster	FAC	✓(E)	✓(E)	✓(E)
Aster lateriflorus	Calico aster	FACW	✓	✓	✓
Aster novae-angliae	New England aster	FACW			✓
Aster puniceus	Purple-stemmed aster	OBL		✓	✓
Aster racemosus	Small white aster	FACW	✓(E)	✓(E)	✓(E)
Atriplex patula	Seaside orach	FACW			✓
Bidens coronata	Large-fruit beggar-ticks	OBL		✓	✓
Bidens frondosa	Devil's Beggar-ticks	FACW	✓	✓	✓
Carex sp.	Sedge	FACW	✓		
Carex comosa	Long-hair sedge	OBL	✓		
Carex lupulina	Hop sedge	OBL			✓
Carex lurida	Shallow sedge	OBL	✓		
Carex vulpinoidea	Fox sedge	OBL	✓	✓	
Centaurea maculosa	Spotted knapweed	FACU	✓(E)	✓(E)	✓(E)
Ceratophyllum demersum	Coontail	OBL	✓	✓	
Chara sp.	Moss	OBL	✓	✓	
Cichorium intybus	Chicory	FACU	✓(E)	✓(E)	✓(E)
Cirsium arvense	Canada thistle	FACU	✓(E)	✓(E)	✓(E)
Coleogeton pectinatum	Sago pondweed	OBL		✓	✓
Cyperus esculentus	Yellow nutsedge	FACW	✓		✓
Dactylis glomerata	Orchard grass	FACU	✓(E)	✓(E)	✓(E)
Daucus carota	Wild carrot	FACU	✓(E)	✓(E)	✓(E)
Dipsacus fullonum	Teasel	FACU		✓	✓
Dulichium arundinaceum	Three-way sedge	OBL		✓	
Echinochloa crusgalli	Barnyard grass	FACU	✓	✓	
Elodea canadensis	Broad water-weed	OBL		✓	
Elodea sp.	Water-weed	OBL		✓	
Elymus virginicus	Virginia wild rye	FACW	✓	✓	
Epilobium ciliatum	Hairy willow-herb	FAC	✓	✓	✓
Epilobium coloratum	Purple-leaf willow-herb	OBL		✓	✓
Erechtites hieracifolia	Pilewort	FACU		✓	
Eupatorium perfoliatum	Boneset	FACW	✓	✓	✓
Euthamia graminifolia	Flat-top goldenrod	NI	✓	✓	
Galium sp.	Bedstraw	FAC		✓	
Galium palustre	Marsh bedstraw	OBL		✓	
Glyceria grandis	Reed meadowgrass	OBL	✓	✓	
Glyceria striata	Fowl mannagrass	OBL		✓	
Inula helenium	Elecampane	FACU		✓(E)	
Impatiens capensis	Jewelweed	FACW		✓	
Juncus sp.	Rush	NI	✓		
Juncus brachycephalus	Small-headed rush	OBL	✓	✓	
Juncus effusus	Soft rush	FACW	✓	✓	

Table 4. (cont.)

HERBACEOUS

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Juncus pelocarpus	Brown-fruited rush	OBL	✓	✓	✓(E)
Juncus tenuis	Slender rush	FAC	✓	✓	
Lactuca sp.	Lettuce	FACU			✓
Lathyrus sylvestris	Flat pea	FAC	✓(E)	✓(E)	✓(E)
Leersia oryzoides	Rice cutgrass	OBL	✓	✓	✓
Lemna minor	Lesser duckweed	OBL	✓	✓	
Lemna trisulca	Star duckweed	OBL		✓	
Lolium arundinaceum	Tall fescue	FACU		✓(E)	
Lotus corniculata	Bird's-foot trefoil	FACU	✓(E)	✓(E)	✓(E)
Ludwigia palustris	Water purslane	OBL		✓	
Lythrum salicaria	Purple loosestrife	FACW	✓	✓	✓
Melilotus alba	White sweet clover	FACU		✓(E)	
Mimulus ringens	Monkeyflower	OBL		✓	
Myriophyllum spicatum	Eurasian milfoil	OBL		✓	
Myosotis sp.	Forget-me-not	OBL			✓
Nymphaea odorata	White water-lily	OBL		✓	
Oenothera biennis	Evening primrose	FACU		✓(E)	
Onoclea sensibilis	Sensitive fern	FACW		✓	✓
Panicum sp.	Panic grass	FACW	✓		
Phalaris arundinacea	Reed canary grass	FACW	✓	✓	
Phragmites australis	Common reed	FACW	✓	✓	✓
Picris hieracoides	Ox-tongue	FACU	✓(E)	✓(E)	✓(E)
Plantago lanceolata	Narrow-leaf plantain	UPL	✓(E)	✓(E)	✓(E)
Plantago major	Common plantain	FACU	✓(E)	✓	
Poa compressa	Canada bluegrass	FACU	✓(E)	✓(E)	✓(E)
Polygonum amphibium	Water smartweed	OBL	✓	✓	✓
Polygonum hydropiper	Marshpepper smartweed	OBL		✓	✓
Polygonum lapathifolium	Willow-weed	FACW			✓
Polygonum pensylvanicum	Pennsylvania smartweed	FACW	✓		✓
Ranunculus sp.	Buttercup	FAC	✓	✓	
Rumex sp.	Dock	FAC		✓	
Scirpus sp.	Bulrush	OBL	✓	✓	✓
Scirpus atrovirons	Green bulrush	OBL	✓	✓	
Scirpus cyperinus	Woolgrass	FACW	✓	✓	
Scirpus maritimus	Saltmarsh bulrush	OBL			✓
Scirpus microcarpus	Barberpole sedge	OBL		✓	
Scirpus tabernaemontani	Soft-stem bulrush	OBL	✓	✓	✓
Solidago sp.	Goldenrod	FAC	✓(E)	✓(E)	✓(E)
Solidago canadensis	Canada goldenrod	FACU	✓(E)	✓(E)	✓(E)
Solanum dulcamara	Bittersweet	FAC		✓	✓
Sparganium americanum	Burreed	OBL		✓	✓
Trifolium hybridum	Alsike clover	FACU	✓(E)	✓(E)	✓(E)

Table 4. (cont.)

HERBACEOUS

Scientific Name[(a)]	Common Name	Wetland Indicator Status[(b)]	Wetland A	Wetland B	West Flume
Typha angustifolia/glauca	Narrow-leaf/White cattail	OBL	✓	✓	✓
Typha glauca	White cattail	OBL	✓		
Typha latifolia	Broad-leaf cattail	OBL	✓	✓	✓
Utricularia macrorhiza	Common bladder-wort	OBL		✓	
Verbascum blattaria	Moth-mullein			✓(E)	
Verbena hastata	Blue vervain	FACW		✓	
Veronica anagallis-aquatica	Water speedwell	OBL		✓	
Vitis sp.	Grape	FAC		✓	

Table 5.

Vegetation Data Summary, Wetland A, Emergent Cover Type
LCP Bridge Street Restoration Area (2010)

Scientific Name[(a)]	Common Name	Indicator Status[(b)]	Relative Cover (%)
Typha latifolia	Broad-leaf cattail	OBL	68.57
Chara sp.	Moss	OBL	17.14
Phragmites australis	Common reed	FACW	4.29
Scirpus tabernaemontani	Soft-stem bulrush	OBL	4.29
Typha angustifolia/glauca	Narrow-leaf/White cattail	OBL	2.00
Juncus effusus	Soft rush	FACW	1.43
Lemna minor	Lesser duckweed	OBL	1.14
Leersia oryzoides	Rice cutgrass	OBL	0.57
Lythrum salicaria	Purple loosestrife	FACW	0.57
		Total	100.00

[(a)] Nomenclature follows Mitchell and Tucker (1997).

[(b)] Obligate Wetland (OBL): occur almost always (estimated probability >99%) in wetlands. Facultative Wetland (FACW): usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Facultative Upland (FACU): usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%). Obligate Upland (UPL): occur almost always (estimated probability >99%) in non-wetlands.

Table 6

Vegetation Data Summary, Wetland B, Emergent Cover Type
LCP Bridge Street Restoration Area (2010)

Scientific Name[(a)]	Common Name	Indicator Status[(b)]	Relative Cover (%)
Typha latifolia	Broad-leaf cattail	OBL	42.25
Typha angustifolia/glauca	Narrow-leaf/White cattail	OBL	16.60
Lemna trisulca	Star duckweed	OBL	10.14
Ceratophyllum demersum	Coontail	OBL	9.94
Utricularia macrorhiza	Common bladder-wort	OBL	5.96
Leersia oryzoides	Rice cutgrass	OBL	3.18
Scirpus tabernaemontani	Soft-stem bulrush	OBL	3.18
Lythrum salicaria	Purple loosestrife	FACW	2.49
Phragmites australis	Common reed	FACW	2.49
Elodea sp.	Water-weed	OBL	1.99
Lemna minor	Lesser duckweed	OBL	0.80
Polygonum hydropiper	Marshpepper smartweed	OBL	0.50
Sparganium americanum	Burreed	OBL	0.50
		Total	100.00

[(a)] Nomenclature follows Mitchell and Tucker (1997).

[(b)] Obligate Wetland (OBL): occur almost always (estimated probability >99%) in wetlands. Facultative Wetland (FACW): usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Facultative Upland (FACU): usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%). Obligate Upland (UPL): occur almost always (estimated probability >99%) in non-wetlands.

Table 7.

Vegetation Data Summary, Wetland B, Aquatic Bed Cover Type
LCP Bridge Street Restoration Area (2010)

Scientific Name[(a)]	Common Name	Indicator Status[(b)]	Relative Cover (%)
Elodea sp.	Water-weed	OBL	25.13
Nymphaea odorata	White water lily	OBL	23.34
Typha latifolia	Broad-leaf cattail	OBL	19.75
Utricularia macrorhiza	Common bladder-wort	OBL	14.36
Ceratophyllum demersum	Coontail	OBL	7.18
Typha angustifolia/glauca	Narrow-leaf/White cattail	OBL	5.39
Lemna trisulca	Star duckweed	OBL	2.69
Coleogeton pectinatum	Sago pondweed	OBL	1.80
Lemna minor	Lesser duckweed	OBL	0.36
		Total	100.00

[(a)] Nomenclature follows Mitchell and Tucker (1997).

[(b)] Obligate Wetland (OBL): occur almost always (estimated probability >99%) in wetlands. Facultative Wetland (FACW): usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Facultative Upland (FACU): usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%). Obligate Upland (UPL): occur almost always (estimated probability >99%) in non-wetlands.

Table 8.

Vegetation Data Summary, West Flume, Emergent Cover Type
LCP Bridge Street Restoration Area (2010)

Scientific Name[(a)]	Common Name	Indicator Status[(b)]	Relative Cover (%)
Typha latifolia	Broad-leaf cattail	OBL	45.19
Phragmites australis	Common reed	FACW	29.15
Bidens frondosa	Devil's beggar-ticks	FACW	8.75
Leersia oryzoides	Rice cutgrass	OBL	5.83
Typha angustifolia/glauca	Narrow-leaf/White cattail	OBL	2.92
Epilobium coloratum	Purple-leaf willow-herb	OBL	1.46
Lactuca sp.	Lettuce	FACU	1.46
Bidens coronata	Large-fruit beggar-ticks	OBL	0.87
Lythrum salicaria	Purple loosestrife	FACW	0.87
Alisma sp.	Water plantain	OBL	0.58
Daucus carota	Wild carrot	FACU	0.58
Myosotis sp.	Forget-me-not	OBL	0.58
Polygonum pensylvanicum	Pennsylvania smartweed	FACW	0.58
Scirpus tabernaemontani	Soft-stem bulrush	OBL	0.58
Solanum dulcamara	Bittersweet	FAC	0.58
		Total	100.00

[(a)] Nomenclature follows Mitchell and Tucker (1997).

[(b)] Obligate Wetland (OBL): occur almost always (estimated probability >99%) in wetlands. Facultative Wetland (FACW): usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands. Facultative (FAC): equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Facultative Upland (FACU): usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%). Obligate Upland (UPL): occur almost always (estimated probability >99%) in non-wetlands.

Table 9.

Staff Gauge Readings, 2010
LCP Wetland Restoration Areas

Wetland A

Date	Reading on Gauge (feet)	0.0 Elevation (feet)	Water Elevation (feet)
4/15/10	1.35	378.84	380.19
5/25/10	1.24	378.84	380.08
6/8/10	1.27	378.84	380.11
6/25/10	1.38	378.84	380.22
6/28/10	1.36	378.84	380.20
7/21/10	1.03	378.84	379.90
8/18/10	1.21	378.84	380.05
9/9/10	1.38	378.84	380.22

Wetland B

Date	Reading on Gauge (feet)	0.0 Elevation (feet)	Water Elevation (feet)
4/15/10	2.00	374.16	376.16
5/25/10	1.91	374.16	376.07
6/8/10	1.92	374.16	376.08
6/25/10	2.40	374.16	376.56
6/28/10	1.85	374.16	376.01
7/21/10	1.65	374.16	375.81
8/18/10	1.75	374.16	375.91
9/9/10	1.86	374.16	376.02

Table 10.

Wildlife Observed, 2010, LCP Wetland Restoration Areas

BIRDS[a]				
Common Name	**Scientific Name**	**LCP Wetland Restoration Areas**		
		Wetland A	**Wetland B**	**West Flume**
Canada Goose	*Branta canadensis*		✓	✓
Wood Duck	*Aix sponsa*		f.o.[b]	
Mallard	*Anas platyrhynchos*	✓	✓	✓
Pied-billed Grebe	*Podilymbus podiceps*	✓		
Great Blue Heron	*Ardea herodias*	f.o.	✓	
Green Heron	*Butorides virescens*	✓	✓	
Red-tailed Hawk	*Buteo jamaicensis*	f.o.	✓	✓
American Kestrel	*Falco sparverius*	f.o.		
Killdeer	*Charadrius vociferus*	✓	✓	✓
Spotted Sandpiper	*Actitis macularius*	✓		
Ring-billed Gull	*Larus delawarensis*	f.o.	f.o.	
Rock Pigeon	*Columba livia*			✓
Mourning Dove	*Zenaida macroura*	✓	✓	f.o.
Downy Woodpecker	*Picoides pubescens*		✓	✓
Hairy Woodpecker	*Picoides villosus*		f.o.	
Northern Flicker	*Colaptes auratus*	✓		✓
Willow Flycatcher	*Empidonax traillii*	✓		
Blue Jay	*Cyanocitta cristata*		✓	
American Crow	*Corvus brachyrhynchos*	f.o.	f.o.	f.o.
Tree Swallow	*Tachycineta bicolor*	✓		✓
Black-capped Chickadee	*Poecile atricapillus*	✓	✓	✓
American Robin	*Turdus migratorius*	✓	✓	✓
Northern Mockingbird	*Mimus polyglottos*			✓
European Starling	*Sturnus vulgaris*		✓	
Common Yellowthroat	*Geothlypis trichas*	✓		
Song Sparrow	*Melospiza melodia*	✓	✓	✓
Swamp Sparrow	*Melospiza georgiana*	✓		
Northern Cardinal	*Cardinalis cardinalis*		✓	✓
Red-winged Blackbird	*Agelaius phoeniceus*	✓	✓	✓

[a] Common and scientific names according to AOU (1998) and supplements through 2008.
[b] f.o. indicates fly-over.

Table 10. (cont.)

BIRDS				
Common Name	**Scientific Name**	**LCP Wetland Restoration Areas**		
		Wetland A	**Wetland B**	**West Flume**
Common Grackle	*Quiscalus quiscula*		✓	✓
Brown-headed Cowbird	*Molothrus ater*	✓		
American Goldfinch	*Carduelis tristis*	✓	✓	✓
House Sparrow	*Passer domesticus*			✓

AMPHIBIANS AND REPTILES[(c)]				
Common Name	**Scientific Name**	**LCP Wetland Restoration Areas**		
		Wetland A	**Wetland B**	**West Flume**
American Bullfrog	*Lithobates catesbeianus*		✓	✓
Northern Green Frog	*Lithobates clamitans melanota*	✓		✓
Northern Leopard Frog	*Lithobates pipiens*	✓		
Eastern Snapping Turtle	*Chelydra s. serpentina*			✓

MAMMALS[(d)]				
Common Name	**Scientific Name**	**LCP Wetland Restoration Areas**		
		Wetland A	**Wetland B**	**West Flume**
Short-tailed Shrew	*Blarina brevicauda*	Collected during Bioassessment		
Deer Mouse	*Peromyscus maniculatus*			
White-footed Mouse	*Peromyscus leucopus*			
Meadow Vole	*Microtus pennsylvanicus*			
Eastern Cottontail Rabbit	*Sylvilagus floridanus*	✓		
Eastern Gray Squirrel	*Sciurus caroliniensis*	✓		
Common Muskrat	*Ondatra zibethicus*		✓	✓
Coyote	*Canis latrans*	✓	✓	
White-tailed Deer	*Odocoileus virginianus*	✓	✓	

[(c)] Common and scientific names according to Crother *et al.* (2008).
[(d)] Common and scientific names according to Whitaker and Hamilton (1998).

Table 11.

Mammals, Fish, and Macroinvertebrates Collected during 2010 Bioassessment Surveys, LCP Wetland Restoration Area

MAMMALS

Common Name	**Scientific Name**
Short-tailed Shrew	*Blarina brevicauda*
Deer Mouse	*Peromyscus maniculatus*
White-footed Mouse	*Peromyscus leucopus*
Meadow Vole	*Microtus pennsylvanicus*

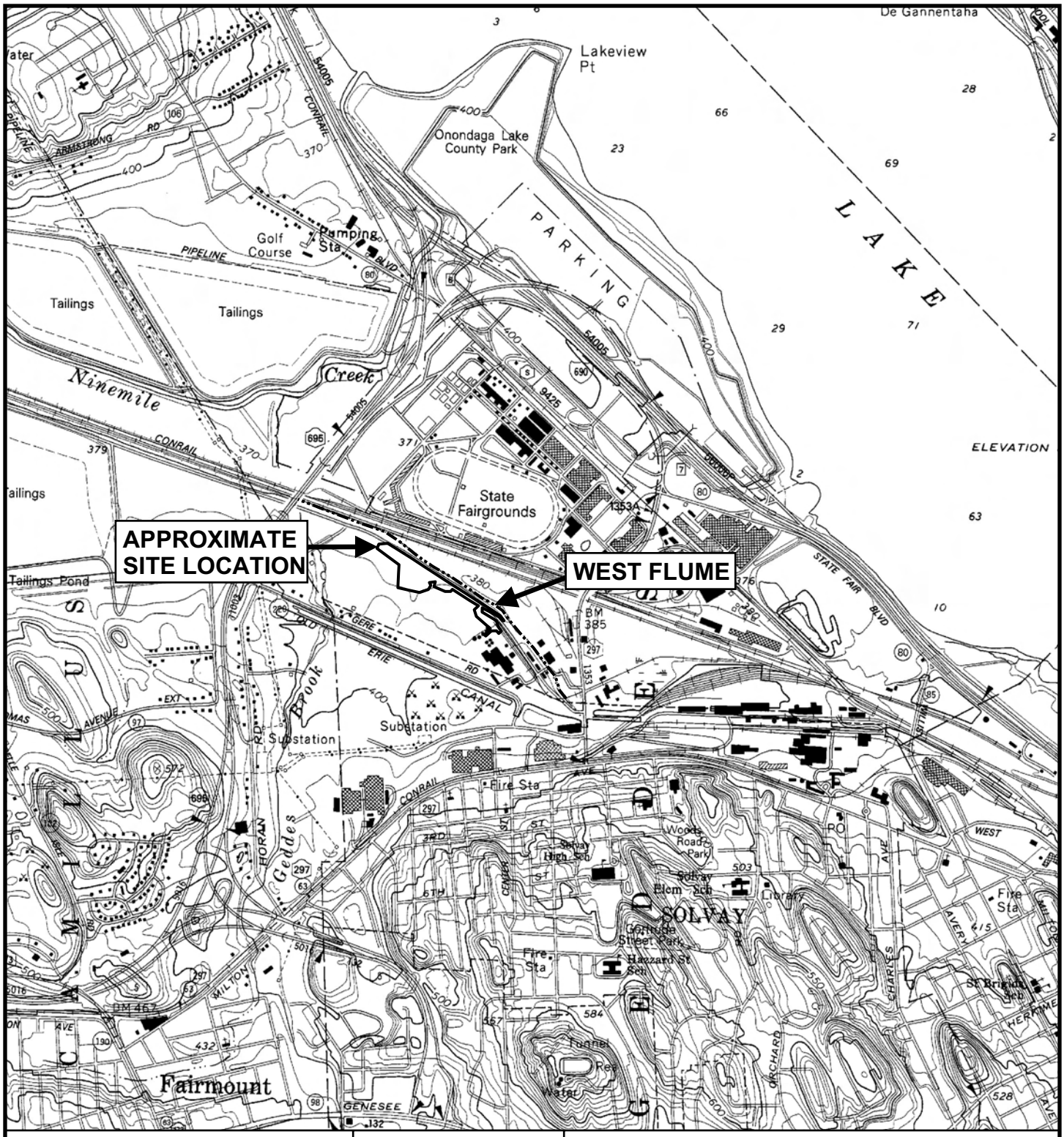
FISH

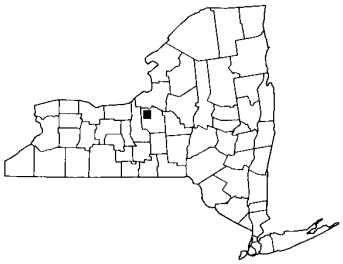
Common Name	**Scientific Name**
Creek Chub	*Semotilus atromaculatus*
Brook Stickleback	*Culaea inconstans*

MACROINVERTEBRATES

Common Name	**Scientific Name**
Crayfish	*Orconectes* sp.

FIGURES





QUADRANGLE LOCATION

0 1000' 2000'

SCALE 1" = 2000'

NORTH

Figure 1. Site Location

LCP Bridge Street Restoration Area

NYS DOT Topographic Map

Syracuse West Quadrangle
1990

Prepared by TERRESTRIAL ENVIRONMENTAL SPECIALISTS, Inc.

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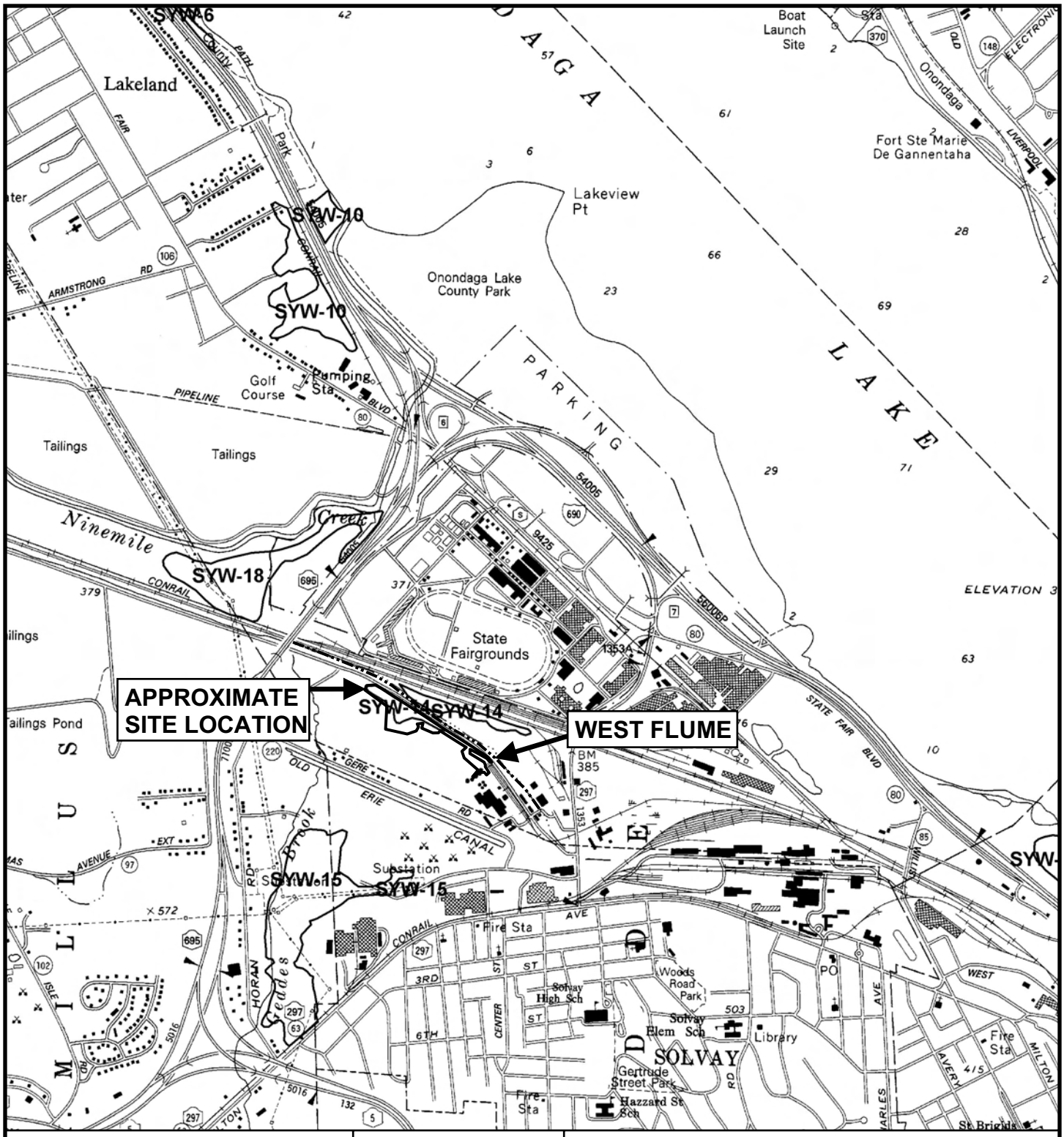

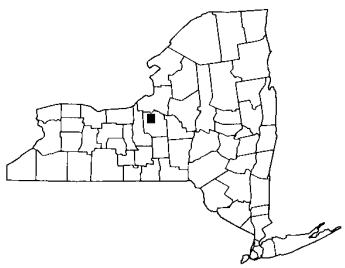

QUADRANGLE LOCATION

0 1000' 2000'

SCALE 1" = 2000'

NORTH

Figure 2. NYS Freshwater Wetlands Map

LCP Bridge Street Restoration Area

NYS Dept. of Environmental Conservation
cugir.mannlib.cornell.edu

Syracuse West Quadrangle
2007

Prepared by TERRESTRIAL ENVIRONMENTAL SPECIALISTS, Inc.

TES file: PAR-2682\2682_Monit_Rpt_2010_DEC_wetlands_2.dsf\1-27-11