Section 3: Effects of Remediation on Onondaga Lake Habitat

Honeywell has already made progress with the remediation of upland sites and impacted tributaries adjacent to the lake. The overall lake remedy relies on the control of contamination in these upland areas and tributaries to help mitigate the movement of contamination into the lake. Cleaning up the areas around the lake is the first step in a restored Onondaga Lake bottom.

Remediation in these upland sites and impacted tributaries is proceeding under schedules and administrative agreements that are separate from the lake remedy, but their remedies will impact the overall lake habitats in different ways; therefore, a discussion of those remedies is included here.

Honeywell has completed the remediation at the former LCP Bridge Street site, which was once the primary source of mercury to Onondaga Lake. Honeywell has also started IRM construction activities, which include the construction and operation of a groundwater treatment plant and the initial underground barrier wall/groundwater collection system along the southern shoreline of Onondaga Lake to control ongoing releases of contaminated groundwater from upland sites/sources.

Extensive investigation and remedial alternative evaluation are also ongoing at many sites adjacent to the lake, such as Wastebeds 1 through 8 and Harbor Brook.

Littoral Zone Remedial Scope

The remedy for the littoral zone (from the shoreline to 30 feet water depth) includes a combination of sediment removal (dredging) and/or isolation capping to achieve sediment cleanup goals and the restoration of habitats. The selected remedy also includes habitat enhancement, which is an improvement of habitat conditions in areas where levels of CERCLA contaminants do not warrant active remediation, but where habitat impairment, due to stressors, has been identified as a concern. Habitat enhancement will be performed along an estimated 1.5 miles (2.4 km) of shoreline (Remediation Area B [SMU 3]) to reduce resuspension of Solvay Waste material and promote submerged vegetation in accordance with the ROD. Based on data collected since the ROD was released in 2005, habitat enhancement activities in SMU 5 may not be required due to the extensive growth of submerged vegetation in this area. Surveys conducted in 2008 of macrophyte coverage were provided in the habitat PDI data summary report. The four figures indicating overall coverage from July to October are included here as Appendix C.

The littoral zone remedy from the ROD includes dredging of sediment to remove mass and reduce contaminant concentrations within the ILWD, achieve favorable water depths for restoration of high quality habitat following placement of the isolation cap, and prevention of loss of lake...
The remedy also includes placing an isolation cap over a portion of the littoral zone, which will include a minimum 1-foot thick habitat layer as the upper portion of the cap.

The areas of dredging and/or capping have been refined since the ROD based on pre-design investigation data. The updated conceptual remediation areas are shown on Figures 3.1 and 3.2. Each of the areas shown in these figures will be subject to further refinement as the pre-design investigation and design progresses.

Dredging and/or capping in the shallow water adjacent to the shoreline is designed to remove and/or isolate contaminants and to achieve a post-capping water depth which promotes achievement of habitat-based goals. The cap thickness (including habitat material) along with the post-remedy water depth, were the main factors influencing the removal depth in areas outside the ILWD. Additionally, the representative biological communities and associated habitats have influenced the substrate type and thickness of the habitat layer.

Restoration strategies of the littoral and shoreline areas were evaluated for habitat suitability as well as their ability to provide stable conditions to limit resuspension and protect against erosion. The spatial extent of the nearshore areas and the process for determining post-capping habitat is discussed in more detail in Section 5 of this plan.

Additional dredging goals that were integrated into the habitat restoration strategy include dredging to cleanup criteria and dredging for removal of portions of the ILWD. Dredging to cleanup criteria refers to certain near-shore areas where the contamination will be removed via dredging to meet the ROD requirements without the use of an isolation cap. A habitat layer will be placed in the dredge to cleanup criteria areas just as it will be in all areas of remediation.

As specified in the ROD, an average dredge depth of 6.6 feet (2 m) of material will be removed from the area of the ILWD. The actual depth of dredging in the ILWD varies based on factors such as contaminant distribution and habitat and erosional considerations. An additional 3 feet (1 m) of ILWD material will be removed in areas defined as hot spots. The hot spot areas were defined by mapping the concentration of contaminants exceeding ROD-specified hot-spot criteria. Additional dredging of the ILWD may be performed to ensure geotechnical stability of the isolation cap.

**Profundal Zone Remedial Scope**

In the profundal zone (that is, in water depths of greater than 30 feet), organic contaminants and shallow mercury concentrations are much lower than they are in the littoral remediation areas. The remedy for the profundal sediment involves a combination of monitored natural recovery and thin layer capping to achieve the remedial objectives.

In addition, oxygenation and nitrate addition are being evaluated as potential methods for mitigating or reducing the formation of methylmercury in the deep water of the lake (hypolimnion) (Parsons 2009f). Methylmercury is a form of mercury that is more readily
available to organisms in the water column and sediment, and is produced by bacteria in the absence of oxygen under sulfate-reducing conditions. These conditions are present in the lake during the summer stratification when the deep waters of the lake become anoxic and nitrate becomes depleted. As discussed in the SOW attached to the Consent Decree, an evaluation will be performed to determine if nitrate can effectively reduce formation of methyl mercury in the water column while preserving the normal cycle of lake stratification. A nitrate addition program will be implemented in lieu of oxygenation if NYSDEC determines from this evaluation that nitrate addition is effective and appropriate. The methods for adding nitrate and/or oxygen to the lake are still under evaluation and will be addressed in future design submittals.

These remedy efforts in both the littoral and profundal zones are expected to cause short-term (temporary) and long-term disturbances to habitat, but the overall result will be a more robust habitat supporting a wide variety of species.

Short-term Effects

The ROD clearly states that the lake remedy will “not pose unacceptable short-term risks or cross-media impacts that cannot possibly be mitigated” (NYSDEC and USEPA, 2005, p. 82). Therefore, the remedial design is being prepared to decrease impacts due to the lake remedy in either the short- or long-term.

Short-term effects such as the complete removal of vegetation, resuspension of lake sediment, and an increased potential for erosion will most likely result from capping and dredging activities. Common best practices will be used to mitigate short-term effects associated with implementation of the lake remedy and may include silt curtains to decrease soil erosion, in addition to a monitoring program.

The installation of in-lake and shoreline structures is expected to cause a localized, temporary disturbance to vicinity habitat structures (e.g., substrate, bathymetry, and aquatic plant beds) and their related functions (e.g., aquatic invertebrate, fish, and wildlife habitat and sediment retention).

It is anticipated that implementation of the IRMs and other remediation activities may also cause temporary disturbances to vicinity habitat. For example, excavation of soil/substrate, which may be required to install a groundwater barrier wall and collection trench, remediate/restore wetlands, or implement other remedial measures, would result in temporary disturbance to habitat structure and functions (e.g., wildlife habitat, flood attenuation, and sediment retention) during execution activities. Wetlands impacted by the remediation activities will be restored, reconstructed, or mitigated at another location based on consultations with the NYSDEC.

Other short-term impacts may include the temporary displacement of existing animal species at the construction site. Birds and fishes that may be temporarily displaced will be able to return to the restored habitats after construction. Honeywell will consider the timing of
particular construction activities in order to protect the habitat requirements (such as breeding and/or nesting areas) for endangered species in and around the lake.

**Long-term Effects**

In addition to potential short-term impacts, the lake remedy will also have some long-term effects on habitats.

Long-term effects of the remedy in the remediation areas within the littoral zone are expected to include significant habitat benefits, including optimized water depths in nearshore areas, improved substrates for biota, and in-lake habitat structure (e.g., large woody debris). These aquatic features will promote aquatic plant colonization and fish spawning, as well as increased area for benthic invertebrate colonization, and juvenile fish habitats.

Additionally, the integration of lake bottom and upland remediation/restoration will provide improved connectivity of nearshore littoral and adjacent shoreline areas, particularly wetlands. Along with improving the overall structure and functions of in-lake habitat, removing and/or isolating sediment impacted by contamination will greatly reduce the risks to ecological receptors.

Another positive long-term effect of the remedy includes the mitigation of wetlands that are not restored at their original locations, but are restored at a new location. This practice of creating new wetlands at another location ensures that no net loss of wetlands or wetland functions occurs. Mitigation requirements are addressed in more detail later in Section 3.4.

Other long-term effects may include change of substrate type, potential change in habitat type, alteration of shoreline bathymetry and alignment, and permanent removal of wetland habitats followed by subsequent restoration and mitigation of wetland acreage.

**Best-management Practices**

The lake remedy will contain specific examples of best management practices to mitigate risks and impacts to habitat associated with construction activities. These practices include the following:

- implementing controls to prevent the introduction or spread of non-native (exotic) or other undesirable species;
- implementing sediment resuspension control measures (e.g., silt curtains), and monitoring for comparison to performance standards (to be developed);
- properly managing the transportation and disposal of remediation derived wastes;
- restricting sediment removal to specified areas and depths as per contract drawings and specifications;
- diffusing pumped water at an effluent discharge point to reduce water velocity and thereby prevent erosion and suspension of sediments;
- prohibiting equipment, material lay down, and soil stockpile areas in adjacent wetlands;
- prohibiting work-related activities such as anchoring in non-target wetlands and aquatic plant areas;
- covering, minimizing the size of, and expediting the removal of soil/sediment stockpiles from the floodplain;
- consideration of construction restrictions to avoid spawning, nesting, and breeding populations of endangered species;
- implementing erosion and sediment controls throughout the project;
- taking into consideration the size of the remedial work support area footprint to avoid excessive temporary habitat loss within and outside of the lake; and
- considering the schedule during the restoration of disturbed habitat to minimize temporal loss and disturbance.

Specific measures to minimize potential adverse effects that cannot be avoided will be evaluated and incorporated into the remedial design activities for the lake and other sites.

### 3.1 Onondaga Lake Bottom Remedy

#### Expected Effects

Much of the lake remedy is focused on removing the impacts of hazardous substances that pose the risk of acute toxicity to the sediment-dwelling (benthic) organisms living on the lake bottom. Some remediation will extend beyond the lake to include the adjacent upland sites as part of the remedial design of these areas, as well as shoreline areas. These areas are either included in the Habitat Plan design or they will be contiguous to the Habitat Plan boundary and addressed as part of an upland site design.

#### 3.1.1 Shoreline/Wetlands

The substrates that will be placed during remediation will provide suitable near shore and shoreline conditions and moderate the transition from the lake to the adjacent shoreline habitats. As such, the long-term effects of the lake remedy are anticipated to provide improved connectivity of in-lake features with shoreline areas and adjacent wetlands.

Over 4 miles of shoreline will be addressed by the remedy, with the longest continuous areas in Remediation Areas, B (SMU 3) and D (SMU 1). In addition, approximately 34 acres of wetlands are located immediately adjacent to areas of the lake within the red line habitat boundary (Table 3.1). However, the full extent of impacts to these wetlands will be based on the results of ongoing investigations on Wastedb B/ Harbor Brook (includes wetland SYW-12), Wastedb 1 through 8 and Ninemile Creek (includes Wetland SYW-10).
Impacted wetlands will be restored or appropriately mitigated so that no net loss of wetlands or wetland functions occurs. Other impacts from staging areas, support areas, and the hydraulic dredging pipeline may also impact the shoreline.

3.1.2 Floodplain

The lake remedy is expected to cover the areas within the lake proper and do not include the floodplain. However, the floodplain will likely be affected by IRMs or other remediation sites as described in Sections 3.2 and 3.3. Other impacts from staging areas, support areas, and the hydraulic dredging pipeline may also impact the floodplain.

3.1.3 Littoral Zone (Remediation Areas A, B, C, D, E and F)

Dredging and/or isolation capping in the shallow waters of the lake will remove or cap existing substrates and associated biota (aquatic plants and benthic invertebrates) within the remediation areas. As previously discussed, the Remedial Design for dredging and/or isolation capping considers established habitat goals for representative biological communities and associated habitats, which are discussed in Section 4 of this Habitat Plan. Based on current information, approximately 408 acres of the littoral zone will be dredged and/or capped. Specific volumes of removal in these areas are discussed in more detail in the Cap and Dredge Area and Depth Technical Document (Parsons, 2009b).

Based on the aquatic plant mapping completed by Onondaga County in 2008, approximately 107 acres of aquatic plants were located within the remediation areas. The remaining 296 acres were described as unconsolidated bottom. These values differ from that in the ROD because these are estimates based on recent Pre-design Investigation data.

Expected Effects by Remediation Area

The use of SMUs to define areas within the lake has been updated with the more representative “remediation areas” as the lake remedy progresses out of the investigation phase into the design phase. In each remediation area, a combination of dredging and capping will have both short- and long-term impacts on habitat; however, the end result will be an improved habitat system. Changes in the lake bottom bathymetry will occur as a result of the remedy, and changes in water depth (pre- and post- remedy) are discussed in Section 5.1. A summary of dredge and/or cap areas is presented in the table below.
## Remedial Design Elements for Habitat Restoration

<table>
<thead>
<tr>
<th>Remediation Area</th>
<th>Dredge To Cleanup Criteria (acres)</th>
<th>Dredge and Cap (acres)</th>
<th>Cap Only (acres)</th>
<th>Total Area Impacted by Remedy (acres)</th>
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<td>0</td>
<td>2.9</td>
<td>13.2</td>
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<tr>
<td>C</td>
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<td>9.3</td>
<td>98.5</td>
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</tr>
<tr>
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<tr>
<td>F</td>
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<td>0</td>
<td>0</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**Remediation Area A (SMU 4 and portions of SMUs 3 and 5)**

In Remediation Area A, dredging will occur in approximately 24 acres near the shore. An isolation cap with habitat layer, or habitat layer only, will be placed over approximately 83.5 acres. Following placement of these materials, the resulting lake bottom will be deep enough to prevent a loss of lake surface area, protect the isolation cap from erosion, and to reestablish habitat.

**Remediation Area B (portions of SMU 3)**

In Remediation Area B, dredging will occur in approximately 3 acres near the shore. An isolation cap with habitat layer, or habitat layer only, will be placed over approximately 16 acres. Following placement of these materials, the resulting lake bottom will be deep enough to prevent a loss of lake surface area, protect the isolation cap from erosion, and to reestablish habitat.

**Remediation Area C (SMU 2 and a small portion of SMU 3)**

In Remediation Area C, dredging will occur in approximately 7 acres near the shore. An isolation cap with habitat layer, or habitat layer only, will be placed over approximately 24 acres. Following placement of these materials, the resulting lake bottom will be deep enough to prevent a loss of lake surface area, protect the isolation cap from erosion, and to reestablish habitat.

**Remediation Area D (SMU 1 and small portions of SMUs 2 and 7)**

In Remediation Area D, dredging will be performed to an average depth of 6.5 feet (2 m) plus hot spots over approximately 89 acres to prevent loss of lake surface area, reduce contaminant mass and average concentrations in sediments and/or wastes remaining under the isolation cap, for erosion protection, and to reestablish habitat. An isolation cap and habitat layer will be placed over the entire 98.5 acres in this area.
Remediation Area D - Addendum (Small portion of SMU 8)

In Remediation Area D Addendum area, an isolation cap and habitat layer will be placed over the entire 5.6 acres in this area.

Remediation Area E (SMUs 6 and 7)

In Remediation Area E, dredging will occur in approximately 84 acres near the shore. An isolation cap with habitat layer, or habitat layer only, will be placed over approximately 174 acres. Following placement of these materials, the resulting lake bottom will be deep enough to prevent a loss of lake surface area, protect the isolation cap from erosion, and to reestablish habitat.

Remediation Area F

Remediation Area F consists of two small areas (less than 1 acre combined area) where additional data collection is required to determine the most appropriate remedial approach, and will be addressed in future design submittals.

3.1.4 Profundal Zone (SMU 8)

A long-term goal of thin layer capping and monitored natural recovery to lake habitat includes reducing mercury concentrations in profundal sediments, thereby reducing mercury concentrations in biota (including fish). Because of the water depth (i.e., greater than 30 feet {9 meters}), there are no aquatic plants located within the profundal zone.

Long-term effects of nitrate addition or oxygenation on the profundal zone are not certain at this time, but will be evaluated during the Pre-Design Investigation program and related design activities. An expected long-term effect associated with nitrate addition and oxygenation is the reduction of mercury methylation in the anoxic waters, resulting in a reduction in the methylmercury bioaccumulation in fish and other aquatic organisms. Oxygenation may improve habitat for coo water and/or coldwater species as well as benthic invertebrates, if provided in high enough concentrations (low levels of oxygenation will reduce methylation, but not provide suitable fish habitat). However, the overall effects of oxygenation on existing fish species and other parts of the food chain are uncertain given the complexities associated with lake biological communities.

The effects to biota mercury concentrations from colonization of the profundal zone are also uncertain. One possible effect caused by an increase in benthic invertebrates in profundal sediments may be a reduction in the rate of natural attenuation due to bioturbation and mixing of the surface sediments. Placement of a thin layer cap could bury the benthic community, if present. Recent sampling, however, indicates the near absence of benthic macroinvertebrates in profundal sediment (Parsons, 2004).
3.2 Interim Remedial Measures

3.2.1 Wastebed B/Harbor Brook IRM

The Wastebed B/Harbor Brook IRM is focused on the shoreline area of the Wastebed B/Harbor Brook site, while the remainder of the site will be addressed as part of the overall site remedy. The Wastebed B/Harbor Brook area encompasses approximately 90 acres, which includes Harbor Brook, the Lakeshore Area, the Penn-Can Property, and the Railroad Area. For administrative purposes, the SYW-12 wetland is also covered under the Wastebed B/Harbor Brook site.

The Lakeshore Area (which is comprised of Wastebed B, the East Flume, Dredge Spoils Areas #1 and #2, the I-690 Drainage Ditch; as well as Wetland SYW-19 and Area of Study (AOS) #1) is shown on Figure 3.3. It is approximately 3,200 feet wide (east to west) and 800 feet deep (north to south) and is situated along the southern shore of Onondaga Lake, near the southwest corner of the lake. The area referred to as the Penn-Can property is to the south of the Lakeshore Area and south of I-690. This property has historically been utilized for the production and storage of asphalt products. The Railroad Area is situated to the south of the Penn-Can property and is bounded to the north, south, and east by railroad tracks. Habitats and biological communities for Harbor Brook and the Lakeshore Area are described in this section, below.

The objective of the Wastebed B/Harbor Brook IRM is to address contaminated groundwater and non-aqueous phase liquid (NAPL) discharges to Onondaga Lake and Harbor Brook. To accomplish this objective, a barrier wall and groundwater collection system will be constructed along the lakeshore. Furthermore, the IRM includes the installation of a groundwater collection system along the west bank of Harbor Brook extending approximately 400 feet upstream (south) of I-690. The scope for the IRM also includes the following items:

- removal of impacted sediment from the Harbor Brook, the I-690 drainage ditch, and other Harbor Brook tributaries;
- reconfiguration of the Lower Harbor Brook channel into a system of braided channels;
- upgrades to existing culverts; and
- grading and backfill of portions of Wastebed B to facilitate wall stability and site drainage.

Remediation of Wastebed B/Harbor Brook is also likely to include removal of contaminated soils/sediments in the wetland and upland areas between the proposed barrier wall and the lake (Figure 3.3). This work currently falls under the Wastebed B/Harbor Brook FS, but most likely will be conducted concurrently with the lake remediation adjacent to these areas. The Habitat Plan is intended to cover the restoration design for this area.

An Engineering Evaluation/Cost Analysis (EE/CA) for this area is also currently under evaluation to ensure it is addressed in parallel with the...
Lake activities. The remaining scope of the remediation and restoration are to be outlined in the ROD for the Wastebed B/Harbor Brook site.

**Habitats**

Habitats associated with the Lakeshore Area of the site include aquatic (Harbor Brook, East Flume), wetland (SYW-19 and other delineated wetlands), and terrestrial habitats. NYS Wetland SYW-12, located in the northeast corner of the lake near the mouth of Ley Creek, was recently incorporated into the RI/FS scope of the Wastebed B/Harbor Brook. The habitats associated with Wetlands SYW-12 and SYW-19, Harbor Brook, and the East Flume were detailed previously. Habitats associated with the remainder of the site (Penn-Can property and Railroad Area) are not immediately adjacent to the lake, and will be addressed as part of the Wastebed B/Harbor Brook site documents.

**Biological Communities**

The biological communities expected to be found in cover types surrounding Onondaga Lake, including the Wastebed B/Harbor Brook area, were discussed in Sections 2.3 and 2.4. The wetland habitat and predominant plant communities associated with Wetlands SYW-12 and SYW-19 were discussed in Section 2.3.3. Biological communities observed in and along the banks of Harbor Brook were discussed in Section 2.4.

**Expected Effects of Remedial Activities**

Potential short-term impacts from this IRM scope are likely to include removal of soils and associated benthic communities, removal of *Phragmites*, and interruption of flow in Harbor Brook. Installation of the barrier wall and groundwater collection system will result in loss of wetland area(s) and cutting off wetlands from the lake. However, mitigation for wetlands impacted by the barrier wall will be completed such that there is no net loss of wetlands or wetland functions. Other elements of the IRM that will affect habitat restoration are the filling in of a portion of SYW-19, the reconfiguration of Harbor Brook into a braided channel system, and the removal of groundwater inputs to the remainder of the wetland.

A long-term result of the IRM is that the migration of contaminated groundwater and NAPL to the lake will be controlled and risks to ecological receptors will be significantly reduced. Other long-term effects of the IRM will include the removal of wetland acreage, restoration of wetland in new locations, alteration of groundwater inputs to the remaining wetland, the alteration of shoreline alignment, potential limitations on shoreline use, reconfiguration of Harbor Brook, and potential changes to the remaining wetland lakeside of the barrier wall. See Figure 3.6 for a summary of wetland impacts in this area.

**3.2.2 East Flume IRM**

The 95% Basis of Design Report for the East Flume IRM (O’Brien & Gere, 2004d) describes the original anticipated scope for the IRM.
Since the submittal of this report, the alignment of the Willis/Semet IRM barrier wall and Wastedbed B/Harbor Brook barrier wall have been modified to reflect additional information collected as part of Onondaga Lake and Wastedbed B/Harbor Brook pre-design investigation activities (Figure 3.3). The adjustment of these wall alignments, and the associated modifications to the IRM scopes (e.g., backfilling and regrading), will address the objectives identified in the Consent Order for the East Flume IRM.

The two primary objectives of the IRM are to (1) eliminate potential impacts to fish and wildlife, and (2) eliminate the transport of contaminants from the East Flume sediments to Onondaga Lake.

Final alignment of the barrier wall near the East Flume is identified on Figure 3.3. Areas inboard of the wall will be filled and outboard areas will be restored as wetlands.

**Habitats**

In 1977, the Upper East Flume was reconstructed to serve as a holding pond for the process cooling waters prior to their entry into a thermal diffuser and subsequent discharge to the lake. The upper portion was widened to a maximum width of approximately 150 feet and deepened to a maximum depth of approximately 6 feet. The bottom (substrate) of the Upper East Flume is constructed of crushed stone underlain by a geotextile. At the eastern end of the Upper East Flume are the thermal diffuser building (now the new groundwater pumping station) and a dam originally constructed to allow cooling water to flow when the diffuser pumps were turned off. The dam and a berm to the north separate the Upper East Flume from the Lower East Flume (described below) and Onondaga Lake, respectively (O’Brien & Gere, 2002).

The Lower East Flume is a narrower channel that is approximately 25 feet wide with water depths of 3 to 4 feet. The Lower East Flume meanders to the south and east and discharges to Onondaga Lake. The Lower East Flume is not specifically classified by NYSDEC, therefore, it receives the classification of the surface water to which it discharges (Onondaga Lake, Class C). The source of water in the Lower East Flume is primarily water from the Upper East Flume and, to a lesser degree, groundwater. The Lower East Flume discharges to Onondaga Lake near the north-central portion of the Wastedbed B/Harbor Brook Site. The substrate of the Lower East Flume is primarily unvegetated sediment. Organic sediments, approximately 2 feet deep (2.3 feet measured maximum), are underlain by solidified Solvay waste (O’Brien & Gere, 2002). Sediments in the Lower East Flume will be remediated as part of the Outboard Area portion of the Wastedbed B/Harbor Brook site.

O’Brien & Gere performed a survey of the East Flume for wetland characteristics in September 2003. Wetland habitat totaling approximately 1 acre, was delineated along the fringe of the Upper East Flume (O’Brien & Gere, 2004b). The outer boundary of the wetland is defined by the banks of the flume, and the inner boundary is defined by
the presence of plants living in the water (hydrophytic vegetation), predominantly _Phragmites_.

**Biological Communities**

The bottom of the East Flume is primarily unvegetated, while the banks are vegetated predominantly with _Phragmites_. The existing biological characteristics of the East Flume were qualitatively assessed as part of efforts performed for the Harbor Brook Site Ecological Risk Assessment Problem Formulation Document (O’Brien & Gere 2004). Given the proposed remedial action for this area, additional characterization of the biological communities is not required.

**Expected Effects of Remedial Activities**

As design activities and restoration strategies for the East Flume are still under development, the final scope of the East Flume IRM and the resulting effects on habitat remain undefined at this time. However, it is likely that the existing biological communities of the Upper and Lower East Flume will be at least temporarily impacted as part of the IRM activities. However, the result of the mitigation and restored wetlands will be a more suitable habitat for many of the representative species.

**3.2.3 Willis/Semet IRM**

The site has been, and continues to be, used primarily for access to the Wastedbed B/Harbor Brook Site and to the various utilities which run through the site. The Upper East Flume and wetlands around the East Flume are also areas affected by this IRM. The objective of the Willis/Semet IRM is to address groundwater and dense non-aqueous phase liquid (DNAPL) discharges from the two sites to Onondaga Lake. To accomplish this objective, a groundwater treatment plant has been constructed on the Willis Avenue Site, and a barrier wall and collection system has been constructed along the lakeshore, or up to approximately 100 feet into the lake down gradient of the two sites, as shown in Figure 3.3. To date, the northern-most quarter-mile stretch of the IRM barrier wall (referred to as Semet portion), with the accompanying groundwater collection trench, has been installed in the narrow section of land between Onondaga Lake and I-690. This area is a narrow grassy right-of-way area for Onondaga County and other utilities. The Willis portion of the barrier wall has been installed just off the shoreline of the lake and lightweight fill has been placed behind the wall. The collection trench for the Willis portion of the wall is scheduled to be completed during the late summer of 2009.

Based on an investigation of the extent of NAPL in the nearshore lake sediments, the barrier wall alignment for the Willis portion of the barrier wall has been repositioned into the lake to contain NAPL areas. Approximately 2.3 acres of open water from the lake was filled in with light-weight fill behind the Willis portion of the barrier wall. Following completion of the groundwater collection trench and DNAPL extraction system, the causeway bridge will be removed, leaving the pilings supporting the existing utilities in place, and the area behind the barrier wall will be graded to an elevation consistent with the upland grade.
The utility bridge is being dismantled and the rip-rap shoreline is being planted and restored as an additional mitigation requirement for the Willis IRM barrier wall. To date, the following vegetation has been planted along the shoreline: Pussy willow (Salix discolor), burr oak (Quercus macrocarpa), American sycamore (Platanus occidentalis), common spicebush (Lindera benzoin), and red maple (Acer rubrum). Planned restoration includes both an upland conservation seed mix and a wetland conservation seed mix.

The finished slope in this area will be a combination of restored upland, naturalized shoreline and deep water nearshore to enhance public access and fishing opportunities. Completion of the IRM will incorporate other elements such as placement of topsoil, and restoration in accordance with the restoration mitigation design. Compensatory mitigation for the loss of 2.3 acres of lake surface area resulting from the wall installation will also be required at the Wastebeds 1 through 8 site (Figure 3.4). Based on the current Wastebed B/Harbor Brook barrier wall alignment, the design will provide 4.7 acres of inland wetlands along the eastern shoreline of the Wastebeds 1-8 site. Section 5 contains a discussion of the preliminary design of the restored shoreline lake ward of the barrier wall and the preliminary design of the mitigation.

Habitats

The Willis/Semet IRM affects the shoreline and near shore area of Onondaga Lake. The primary habitat associated with this area is the lake area (littoral habitat) to be encompassed by the portion of the barrier wall that is off-shore and the adjacent shoreline area. Onondaga Lake’s littoral habitat is broadly described in Section 2.3. Presently, the predominant features of the lakeshore in this area are a riprap embankment for erosion protection and a concrete utility bridge (i.e., causeway). This area does provide habitat for submerged aquatic vegetation, and the area tends to be favored by waterfowl.

Biological Communities

The biological communities include species that inhabit the shallow portions of Onondaga Lake and its shoreline. The biological communities expected to be found within Onondaga Lake and in cover types surrounding the lake are discussed in Section 2.4.

Expected Effects of Remedial Activities

A significant long-term effect associated with the Willis portion of the IRM is the conversion of an estimated 2.3 acres of aquatic habitat to terrestrial habitat resulting from placement of the barrier wall off-shore. The details of this design are still being developed, however, Honeywell will replace aquatic habitat lost as a result of the IRM along the shoreline of the Wastebeds 1 through 8 site. As a result of the complete IRM, mobile NAPLs in Remediation Area D (SMUs 1 and 2) will be contained behind the barrier wall reducing risks to ecological receptors. Other long-term effects known to impact habitat will be the creation of new shoreline (lake ward of the wall), temporal loss of shoreline habitat, and cut-off groundwater flow (along the barrier wall) to Onondaga Lake.
Short-term effects will include the temporary displacement of open water and wetland habitats during construction.

3.3 Other Remediation Sites

3.3.1 Ninemile Creek Dredge Spoils Area

The Ninemile Creek Dredge Spoils Area Site consists of 19 basins situated along the northwest shore of Onondaga Lake between Ninemile Creek and the lake outlet at the Seneca River, as shown in Figure 3.5. The basins were created between 1966 and 1968 to accommodate material dredged from the Ninemile Creek delta and sediment from the nearshore area between Ninemile Creek and the lake outlet, although many of them may not have been used for this purpose. The site is currently used by the public as a recreational area for walking, jogging, biking, cross-country skiing, etc. The Onondaga County Parks Department maintains paths at the site, which consist of paved and stone surfaces. Some of these paths are located on top of the berms associated with the basins.

The Ninemile Creek Dredge Spoils Area was investigated in 2000 as part of the Onondaga Lake RI/FS. A PSA was conducted at the site in 2004 and 2005, and a data summary was submitted to NYSDEC in September 2005. Compounds identified in the basins, including those outside of the delineated wetland boundaries, are discussed in the PSA Data Summary Report (O’Brien & Gere, 2005). The scope of any additional investigation or remedial actions at this site is currently undefined.

Habitats

The primary habitats associated with the Ninemile Creek Dredge Spoils Area are those associated with Wetland SYW-6, including emergent and forested wetlands and adjacent successional old field areas. The habitat conditions for Wetland SYW-6 are detailed in Section 2.3.3.

Biological Communities

The biological communities expected to be found in the vegetative cover types surrounding Onondaga Lake are discussed in Section 2.4. The predominant plant communities associated with Wetland SYW-6 are discussed in Section 2.3.3.

Expected Effects of Remedial Activities

The scope of any additional investigation or remedial actions at this site is currently undefined; therefore, the effects of remedial activities (if necessary) on habitat is uncertain.

3.3.2 Wastebeds 1 through 8

The Wastebeds 1 through 8 site is located on the southwestern side of Onondaga Lake and extends north to the mouth of Ninemile Creek and south to approximately Ditch A located near the I-690 off-ramp, as
Wastebeds 1 through 8 are located along the southwestern and western shorelines of Onondaga Lake.

shown in Figure 3.4. The irregularly shaped beds extend roughly 1.5 miles along the shoreline to a maximum width of 0.5 miles and cover approximately 315 acres. The surface elevations of the site range from 363 to 430 feet (NAVD 88).

The wastebeds were constructed over a portion of the former Geddes Marsh, which was reclaimed from Onondaga Lake when the lake level was lowered (BBL, 2001). They are composed of perimeter dikes that were constructed of piles, sheeting, or earth depending on location. These dikes were used to contain waste materials (primarily Solvay waste) which consist largely of calcium carbonate, gypsum, sodium chloride (salt), and calcium chloride (O’Brien & Gere, 2005). These wastes were generated at the former Main Plant as part of soda ash production using the Solvay Process method.

Wastebeds 1 through 6 were in use before 1926 and may have begun use as early as 1916, although no definitive construction date is available. The construction of Wastebeds 5 and 6 required the diversion of Ninemile Creek, which was rerouted to the north around the perimeter of Wastebed 6. Wastebeds 7 and 8 were not utilized until after 1939 and remained in use with Wastebeds 1 to 6 until 1943 (BBL, 2001). After 1944, Wastebeds 1 through 8 were used for disposal of various materials from Crucible Specialty Metals, Inc. in a permitted landfill, disposal of municipal sewage sludge by Onondaga County, and as a parking lot for the New York State Fairgrounds. The site, which was deeded to the people of New York in 1953, is currently owned by the State of New York and Onondaga County (Calocerinos & Spina, 1986). Onondaga County is planning to construct two miles of paved Class 1 trail on the West Shore of Onondaga Lake from the present trail end at Ninemile Creek to the State Fair parking lots near I-690 Exit 7 using Wastebeds 1 through 8.

A PSA was conducted in 2004 followed by an RI in 2006/2007 for this site. Supplemental RI activities, including further evaluation of site soils and the former Ninemile Creek sand-and-gravel unit, are currently underway. In addition, field activities to evaluate groundwater in the Marl unit along the eastern shoreline were conducted in 2008 and 2009 in support of Focused Feasibility Study for the site. Future remedial actions at this site have yet to be defined.

Habitats

O’Brien & Gere performed a wetland boundary delineation and floodplain assessment at the Wastebeds 1 through 8 site and is currently preparing a BERA in accordance with the Wastebeds 1 through 8 Focused Remedial Investigation Work Plan (O’Brien & Gere, 2005). Findings from the wetland/floodplain assessment are reported in the Wetland Delineation and Floodplain Final Report for the Wastebeds 1 through 8 Site (O’Brien & Gere, 2009) and are summarized below.

A portion of the site is used as a parking lot during NYS Fairground activities, while the rest of the site is currently vegetated (O’Brien & Gere, 2006). The exceptions to this are the Wastebed slopes along the shoreline of Onondaga Lake and east of the mouth of Ninemile Creek
that contain exposed Solvay waste and minimal vegetation. Dominant terrestrial cover types on the site were identified as successional northern hardwood and successional old field. An aquatic cover type identified on the site was ditch/artificial intermittent stream. Confined river (Ninemile Creek) and eutrophic dimictic lake (Onondaga Lake) are the two dominant aquatic cover types that are identified adjacent to the site. Two small areas of wetland totaling 0.7 acre were delineated on the low-lying area of Wastebeds 1-8.

**Biological Communities**

A large portion of the site is characterized as successional old field and contains significant stands of common buckthorn (*Rhamnus cathartica*) and goldenrod (O’Brien & Gere, 2006). *Phragmites* was observed at many upland locations at the site. Vegetation on the general lakeshore area is dominated by *Phragmites*, which is also present on the Wastebed slopes (O’Brien & Gere, 2006). The general lakeshore area also contained an additional mix of wetland and upland vegetative species. Biological communities expected to be found in cover types surrounding Onondaga Lake are discussed in Section 2.4 of this Habitat Plan.

**Expected Effects of Remedial Activities**

Additional investigation of the low-lying area along the lake is currently ongoing. The scope of any additional investigation or remedial actions at this site is undefined; therefore, the effects of remedial activities on habitat is uncertain. Temporary impacts to the existing biological communities of Ditch A are likely as a result of the remedial efforts at the site. However, habitat restoration will be conducted at the site following completion of remedial activities.

### 3.3.3 Wastebed B/Harbor Brook

The RI/FS is currently in progress for Wastebed B/Harbor Brook (Figure 3.6). The scope of any additional remedial actions and resulting habitat effects outside the IRM scope at this site are currently undefined. Habitat restoration activities at this location will be integrated with the Habitat Plan as the design efforts progress.

**Habitats**

Habitats associated with Wastebed B/Harbor Brook are discussed in Section 3.2.1.

**Biological Communities**

Biological communities associated with Wastebed B/Harbor Brook are discussed in Section 3.2.1.

**Expected Effects of Remedial Activities**

The scope of remedial actions at this site is currently undefined, therefore the effects of remedial activities on habitat is uncertain.
3.3.4 Geddes Brook/Ninemile Creek

The Geddes Brook/Ninemile Creek Feasibility Study Report (FS) (Parsons, 2005) presents a variety of channel and floodplain alternatives for the site. Since submittal of that FS, the site has been organized into two operable units (OUs)—OU-1 and OU-2. In addition, a number of supplemental site investigations and assessments have been conducted. Based on these recent investigations and assessments, a Supplemental FS was prepared for both OU-1 in November 2008 (Parsons, 2008) and OU-2 in May 2009 (Parsons, 2009). NYSDEC and the USEPA also issued a Proposed Plan for OU-1 in November 2008 (NYSDEC/USEPA, 2008). The remedy recommended by both the OU-1 Supplemental FS and the OU-1 Proposed Plan is based on a better understanding of site conditions, opportunities for tailoring the remedy to site-specific features, and synergies between site remediation and habitat enhancement opportunities. A ROD was issued for OU-1 on April 29, 2009 (NYSDEC/USEPA, 2009).

Remedial alternatives under consideration for the remediation of Ninemile Creek include removal of impacted sediment within the channel and floodplain and contiguous wetland areas, followed by capping and/or habitat restoration. There is some overlap of the Onondaga Lake Remedy and the Habitat Plan with this site as Ninemile transitions into the lake. The remediation of sediments in the most downstream portion of Ninemile Creek (approximately 300 feet) is being addressed under the lake remedy. The habitat restoration in this overlap area may also be determined in part by the design for both sites. Even though much of this site actually occurs outside of the habitat restoration boundary, it is likely that the remediation may impact the lifecycles of various representative species.

The remediation of Geddes Brook has been outlined in a separate IRM to address impacted sediment and floodplain soils associated with the lower Geddes Brook. The scope of the IRM will include the removal of impacted sediments within the Geddes Brook channel and culverts. Additionally, removal of impacted floodplain soils and wetland sediments associated with Geddes Brook will be conducted in accordance with the ROD for Ninemile Creek.

Habitats

Habitats associated with the Geddes Brook/Ninemile Creek site are primarily associated with Ninemile Creek and the adjacent riparian corridor, including Wetlands SYW-18 and SYW-10.

Biological Communities

Biological communities associated with the Geddes Brook/Ninemile Creek site are primarily those associated with Ninemile Creek, discussed in Section 2.3.5, and the adjacent Wetland SYW-10, discussed in Section 2.3.3.
The benthic zone includes the sediments that often house organisms called benthic macroinvertebrates.

Native plants like this White spruce were planted along the lakeshore as part of an event for Earth Day.

Expected Effects of Remedial Activities

The removal of soil/sediment would temporarily impact the existing benthic macroinvertebrate and terrestrial species in the area, and indirect effects may be experienced by fish that forage in the affected area due to temporary disruption of the benthic food web. Studies of benthic recolonization indicate that recovery occurs within one to three years.

These short-term impacts will be offset by the positive long-term effects of a clean cover system or backfill materials for benthic habitat. In addition, forested areas in the floodplain and wetland would be impacted by the removal of trees and soil/sediment. Some of the impacts would be temporary, while the re-establishment of mature trees would take longer. Although it would take many years for the trees to reach mature size, some wetland functions would be partially restored immediately following remediation (e.g., nutrient removal), and the long-term benefits associated with the remediation and enhancement of the forested wetland and other portions of OU 2 are anticipated to offset the relatively shorter term impacts associated with the re-establishment of mature trees (Niemi et al., 1990). Refer to the Geddes Brook/Ninemile Creek ROD for more details regarding the remedial approach for the forested wetland.

3.4 Mitigation Requirements

Willis IRM Barrier Wall

The two components of the Willis Wall IRM Restoration/Mitigation scheduled to be completed by the fall of 2009 include mitigation of the Semet Shoreline Area and restoration in the Willis Wall IRM Design Section 4 areas (Figure 3.3). The Design Section 4 portion of the Willis Wall includes the in-lake portion in the eastern area of SMU 2 and western area of SMU 1. Mitigation of the Semet shoreline area entails shoreline enhancement including the placement of topsoil over the existing riprap embankment and the establishment of a native plant community using upland and shoreline plantings and seeding. The Design Section 4 restoration includes amending the top 0.5 feet of lightweight fill with organic material (e.g., addition of compost, mulch, or biosolids), placing 0.5 feet of topsoil, and establishing native upland and shoreline vegetation communities by plantings and seeding. In addition, the barrier wall will be cut down to the final elevation of 365 feet (NAVD 1988).

Additional mitigation for the loss of 2.3 acres of open water in the lake due to the construction of the Willis IRM barrier wall will be conducted at the Wastebeds 1-8 site (Figure 3.6). A conceptual design for this mitigation was submitted to NYSDEC in November 2008 and consisted of the construction of a connected wetland along the shoreline. Future design submittals for this mitigation will be integrated with other considerations for the remedial approach for this part of the Wastebed 1-8 site.
**Wastedbed B/Harbor Brook IRM Barrier Wall**

The placement of the IRM barrier wall along the lake shoreline near Wastedbed B and Harbor Brook will have temporary and permanent impacts to the habitat at the site. The wall alignment bisects the site and creates two separate areas—the “inboard” area is that portion on the landward side of the wall, and the “outboard” area lies between the wall and the lake. The wall will displace some wetlands areas along the shoreline and alter open water areas. Figure 3.6 illustrates the existing conditions near the Wastedbed B/Harbor Brook site. Currently, there are approximately 13.0 acres of wetlands, 2.3 acres of open water (East Flume and the Harbor Brook channel), and 8.5 acres of upland within the habitat plan boundary.

The current wall alignment will bisect this area and alter the distribution of the existing habitats (Figure 3.7). Design constraints also require that the wall be supported by a certain amount of material outboard of the barrier wall to maintain its stability. The alignment of the wall and the necessary engineering requirements will result in a net loss of approximately 0.5 acres of wetlands. Wetland mitigation will be required in this area at a ratio 2:1 to address filling of approximately 4.2 acres of existing wetlands behind the barrier wall. The 2.3 acres of open water area from the East Flume and Harbor Brook will be restored outside the wall alignment to ensure no net loss of open water. The remediation and restoration of the area outboard of the barrier wall is expected to take place at the same time as the adjacent remediation in the lake.

In the event that the final design of the Wastedbed B/Harbor Brook IRM barrier wall design results in a net loss of wetland acreage, mitigation for those impacts in the form of additional wetland acreage will be conducted in the shoreline area of the Wastedbeds 1-8 site. The design for this mitigation will be integrated with the remedy for the Wastedbeds 1-8 site and other mitigation proposed in this area.

**3.5 Summary of Habitat Areas to be Affected by Remediation Activities**

Habitat areas to be affected by remedial activities associated with the lake bottom, IRMs, and other sites include aquatic, shoreline/wetland, and terrestrial habitats. Aquatic habitats include portions of the littoral and profundal zones within Onondaga Lake, as well as tributaries, such as Geddes Brook, Ninemile Creek, and Harbor Brook, and industrial conveyances, such as the East Flume. Wetland habitats situated along Onondaga Lake’s shoreline to be affected by remedial activities include State regulated Wetlands SYW-10, SYW-12, and SYW-19. Terrestrial habitats to be affected by remedial activities are associated with the floodplain and upland portions of the IRMs and other site remedies.
### TABLE 3.1

**Preliminary Estimate of Areas Impacted by Onondaga Lake Remedy**

<table>
<thead>
<tr>
<th>Remediation Area(2)</th>
<th>General Location</th>
<th>Total Acreage of Remediation Area (5)</th>
<th>Shoreline Impacted by Remedy (feet) (4)</th>
<th>Wetland Areas within Habitat Plan Boundary (acres) (6)</th>
<th>Vegetated Areas (Acreage) (1, 3)</th>
<th>Unvegetated Areas (Acreage) (1, 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SMU 4</td>
<td>83.5</td>
<td>850.1</td>
<td>2.1</td>
<td>22.7</td>
<td>60.8</td>
</tr>
<tr>
<td>B</td>
<td>SMU 3</td>
<td>16.1</td>
<td>693.0</td>
<td>0.7</td>
<td>0.4</td>
<td>21.1</td>
</tr>
<tr>
<td>C</td>
<td>SMU 2</td>
<td>25.5</td>
<td>1470.0</td>
<td>0.0</td>
<td>2.9</td>
<td>22.6</td>
</tr>
<tr>
<td>D</td>
<td>SMU 1</td>
<td>98.5</td>
<td>5002.0</td>
<td>5.8</td>
<td>9.9</td>
<td>88.6</td>
</tr>
<tr>
<td>D Addendum</td>
<td>SMU 8</td>
<td>5.6</td>
<td>NA</td>
<td>0.0</td>
<td>0.0</td>
<td>5.6</td>
</tr>
<tr>
<td>E</td>
<td>SMU 6/7</td>
<td>184.6</td>
<td>4773.0</td>
<td>25.5</td>
<td>73.1</td>
<td>111.5</td>
</tr>
<tr>
<td>F</td>
<td>SMU 5</td>
<td>0.6</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td>414.4</td>
<td>12788.1</td>
<td>34.1</td>
<td>109.3</td>
<td>305.1</td>
</tr>
</tbody>
</table>

**NOTES:**

- NA - Not Applicable
- SMU - Sediment Management Unit

**REFERENCES:**

2. Final areas of remediation to be determined during future discussions between Honeywell and NYSDEC.
3. Conditions are variable and vegetated areas should be considered a snapshot in time.
4. SMU 3 - ROD identifies 1.5 miles of habitat enhancement.
5. SMU 5 - ROD identifies 23 acres of habitat enhancement; but may not be required.
6. Areas are based on NYSDEC wetlands that are contiguous with the Onondaga Lake shoreline.
   All of these areas may not require remediation.
### TABLE 3.2

**Wetland, Open Water, and Upland Acreage Assessment Within the Habitat Plan Boundary**

**Adjacent Shoreline Areas**

<table>
<thead>
<tr>
<th>Area</th>
<th>Type</th>
<th>Approximate Area Inboard of the IRM Barrier Wall Within the Habitat Boundary (Acres)</th>
<th>Approximate Area Outboard of the IRM Barrier Wall Within the Habitat Boundary (Acres)</th>
<th>Type of Disturbance and Restoration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wasted B/Harbor Brook Area (1) (2) (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL1 (east of HB)</td>
<td>Wetland</td>
<td>1.0</td>
<td>5.8</td>
<td>Excavation of soil and placement of new substrate</td>
</tr>
<tr>
<td>WL2 (west of HB)</td>
<td>Wetland</td>
<td>2.3</td>
<td>0.7</td>
<td>Regrading (behind wall) and excavation of soil with placement of new substrate</td>
</tr>
<tr>
<td>WL3 (east of EF)</td>
<td>Wetland</td>
<td>0.0</td>
<td>1.7</td>
<td>Regrading (behind wall) and excavation of soil with placement of new substrate</td>
</tr>
<tr>
<td>WL4 (west of EF)</td>
<td>Wetland</td>
<td>0.0</td>
<td>0.5</td>
<td>Regrading (behind wall) and excavation of soil with placement of new substrate</td>
</tr>
<tr>
<td>WL7 (UEF fringe)</td>
<td>Wetland</td>
<td>0.9</td>
<td>0.1</td>
<td>Regrading (behind wall) and excavation of soil with placement of new substrate</td>
</tr>
<tr>
<td>Harbor Brook</td>
<td>Open Water</td>
<td>0.3</td>
<td>0.3</td>
<td>Realignment of Harbor Brook channel though new wetland complex</td>
</tr>
<tr>
<td>East Flame</td>
<td>Open Water</td>
<td>1.3</td>
<td>0.4</td>
<td>Backfilling of East Flume with placement of new substrate</td>
</tr>
<tr>
<td>Remaining Upland</td>
<td>Upland</td>
<td>1.5</td>
<td>7.0</td>
<td>Limited removal/regrading and placement of new substrate</td>
</tr>
</tbody>
</table>

**Existing Wetlands**

<table>
<thead>
<tr>
<th>Existing Wetlands</th>
<th>1.0</th>
<th>8.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Open Water</td>
<td>2.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Existing Upland</td>
<td>1.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Total Existing</td>
<td>7.3</td>
<td>16.5</td>
</tr>
</tbody>
</table>

**Proposed Wetlands**

<table>
<thead>
<tr>
<th>Proposed Wetlands</th>
<th>0.0</th>
<th>12.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Open Water</td>
<td>0.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Proposed Upland</td>
<td>7.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Total Proposed</td>
<td>7.3</td>
<td>16.5</td>
</tr>
</tbody>
</table>

**Permanent Wetland Loss**

<table>
<thead>
<tr>
<th>Permanent Wetland Loss</th>
<th>4.2</th>
<th>0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Open Water Loss</td>
<td>1.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Permanent Loss</td>
<td>5.8</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Temporary Loss of Wetlands**

<table>
<thead>
<tr>
<th>Temporary Loss of Wetlands</th>
<th>0.0</th>
<th>8.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Loss of Open Water</td>
<td>0.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Total Temporary Loss</td>
<td>0.0</td>
<td>9.5</td>
</tr>
</tbody>
</table>

1. The eastern end of WL1 is extends beyond the Honeywell property; therefore, this area was not used in these calculations.
2. Other wetlands on the BBB/HB site (WL5, WL6, and wetlands in Penn-Can and Railroad Areas) are not included herein since it is not expected that the barrier wall will impact these areas.
3. 0.4 acres of WL7 is located outside the habitat plan boundary, but has been included here since it will be impacted by the IRM barrier wall.
4. Acreage of permanent wetland loss inside the barrier wall will be mitigated at a ratio of 2:1.
### TABLE 3.2 (Continued)

Wetland, Open Water, and Upland Acreage Assessment Within the Habitat Plan Boundary

Adjacent Shoreline Areas

<table>
<thead>
<tr>
<th>Area</th>
<th>Type</th>
<th>Approximate Area Within the Habitat Boundary (Acres)</th>
<th>Type of Disturbance and Restoration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastebeds 1-8 Area</td>
<td>Wetland</td>
<td>0.7</td>
<td>0.7 acres of inland wetlands</td>
</tr>
<tr>
<td></td>
<td>Upland</td>
<td>31.1</td>
<td>2.3 Acres of Connected Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.7 Acres of Inland Wetlands</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24.1 Acres of Vegetative Cover</td>
</tr>
<tr>
<td>Ninemile Creek Area</td>
<td>Wetland</td>
<td>2.1</td>
<td>Connected Wetlands</td>
</tr>
<tr>
<td></td>
<td>Upland</td>
<td>0.2</td>
<td>0.2 Acres of Upland</td>
</tr>
<tr>
<td></td>
<td>Open Water</td>
<td>0.2</td>
<td>0.16 Acres of Open Water</td>
</tr>
<tr>
<td>SYW-12 Area</td>
<td>Wetland</td>
<td>18.3</td>
<td>TBD (1)</td>
</tr>
<tr>
<td></td>
<td>Upland</td>
<td>20.9</td>
<td>TBD (1)</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing Wetlands</td>
<td>21.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Open Water</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Upland</td>
<td>52.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Existing</strong></td>
<td>73.3</td>
<td></td>
</tr>
</tbody>
</table>

|                           | Proposed Wetlands | TBD (1)                                              |                                                      |
|                           | Proposed Open Water | 0.2                                               |                                                      |
|                           | Proposed Upland    | TBD (1)                                              |                                                      |
|                           | **Total Proposed** | TBD (1)                                              |                                                      |

|                           | Permanent Wetland Loss | TBD (1)                                              |                                                      |
|                           | Permanent Open Water Loss | 0.0                                               |                                                      |
|                           | **Total Permanent Loss** | TBD (1)                                              |                                                      |

|                           | Temporary Loss of Wetlands | TBD (1)                                              |                                                      |
|                           | Temporary Loss of Open Water | 0.2                                               |                                                      |
|                           | **Total Temporary Loss**    | TBD (1)                                              |                                                      |

(1) Pending resolution of remedial approach in this area.
Note: These areas will be modified as appropriate based on ongoing investigation and design activity.
Note: These areas will be modified as appropriate based on ongoing investigation and design activity.
FIGURE 3.5

Dredge Spoils Area

Remediation Area F
Remediation Area A
SYW-6
BR-4
SYW-10
0 600 1,200 1,200 Feet

Remediation Area Boundary (Parsons, 2009)
Sediment Management Unit (SMU) Boundary
Dredge Spoils Area (DSA)
NYSDEC Wetlands (NYSDEC, 2007)
Delineated and Approved Portion of NYSDEC Wetland

SYW-10
BR-7

### Existing WBB/HB Acreages Within Habitat Plan Boundary

<table>
<thead>
<tr>
<th></th>
<th>Inboard</th>
<th>Outboard</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wetlands</strong></td>
<td>4.2*</td>
<td>8.8</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Open Water</strong></td>
<td>1.6</td>
<td>0.7</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Upland</strong></td>
<td>1.5</td>
<td>7.0</td>
<td>8.5</td>
</tr>
</tbody>
</table>

* Includes 0.4 acres of WL7 outside the red line.

### Summary of Existing Wetland and Open Water Acreages

- **Existing WBB/HB Acreages Within Habitat Plan Boundary**
  - **Totals**
    - **Outboard**: 12.6
    - **Inboard**: 8.7
    - **Wetlands**: 2.3
    - **Open Water**: 9.2
    - **Upland**: 4.2

- **SYW-12**
  - **Wetlands**: 18.3 Acres
  - **Upland**: 20.9 Acres

- **Ninemile Creek Area**
  - **Wetlands**: 2.1 Acres
  - **Open Water**: 0.2 Acres
  - **Upland**: 0.2 Acres

- **Wastebeds 1-8 Area**
  - **Wetlands**: 0.7 Acres
  - **Upland**: 29.7 Acres

- **SMU 1**
  - **WL1**: 0.7 Ac.

- **SMU 2**
  - **WL7**: 0.4 Ac. Outboard
  - **WL7**: 0.1 Ac. Inboard

- **SMU 3**
  - **WL7**: 0.3 Ac.

- **SMU 4**
  - **WL7**: 0.5 Ac.

- **SMU 5**
  - **WL7**: 0.1 Ac.

- **SMU 6**
  - **WL7**: 0.4 Ac.
  - **WL7**: 0.1 Ac.

- **SMU 7**
  - **WL7**: 0.5 Ac.

- **SMU 8**
  - **WL7**: 0.3 Ac.

- **Onondaga Lake**
  - **Wetlands**: 18.3 Acres
  - **Upland**: 20.9 Acres

* Includes 0.4 acres of WL7 outside the red line.

FIGURE 3.6

Summary of Existing Wetland and Open Water Acreages
### Proposed WBB/HB Acreages Within Habitat Plan Boundary

<table>
<thead>
<tr>
<th></th>
<th>Inboard</th>
<th>Outboard</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands</td>
<td>0</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Open Water</td>
<td>0</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Upland</td>
<td>7.3*</td>
<td>1.7</td>
<td>9.0</td>
</tr>
</tbody>
</table>

* Includes 0.4 acres of WL7 outside the red line.

**Totals**

<table>
<thead>
<tr>
<th></th>
<th>Outboard</th>
<th>Inboard</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands</td>
<td>0</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Open Water</td>
<td>0</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Upland</td>
<td>7.3*</td>
<td>1.7</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Summary of Proposed Wetland and Open Water Acreages**

- **Outboard**
  - Wetlands: 12.5 Ac.
  - Open Water: 12.4 Ac.
  - Upland: 4.1 Ac.
- **Inboard**
  - Wetlands: 2.3 Ac.
  - Open Water: 2.3 Ac.
  - Upland: 8.3 Ac.

**Note:** The acreage of wetland restoration will not change.

**Configuration of spit may change based on removal in adjacent areas.**