March 21, 2013

To:        Diane Carlton, NYSDEC, Region 7 (1 CD)
            Holly Sammon, Onondaga County Public Library (1 bound)
            Samuel Sage, Atlantic States Legal Foundation (1 bound)
            Joseph J. Heath, Esq., Onondaga Nation (cover letter)
            Cara Burton, Solvay Public Library (1 bound)

Re:     Letter of Transmittal – Wastebeds 1-8 Site Repository Addition

The below document has been approved by the New York State Department of Environmental Conservation (NYSDEC) and is enclosed for your document holdings:

- Wastebeds 1-8 Integrated Interim Remedial Measure, Mitigation Wetlands, and Remediation Area A Hydraulic Control System – 100% Design – dated October 2012 and revised in January and February 2013

Sincerely,

John P. McAuliffe, P.E.
Program Director, Syracuse

Enc.

cc: Tracy A. Smith- Project Manager
Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System
100% Design Report
Wastebeds 1-8

October 2012
Revised January 2013
Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 100% Design Report Wastebeds 1-8

Prepared for:

Honeywell

DOUGLAS M. CRAWFORD, PE, VP
O’Brien & Gere Engineers, Inc.
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<td>BBL</td>
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EXECUTIVE SUMMARY

This 100% Remedial Design Report presents the remediation activities that will take place to mitigate contamination from Wastebeds 1-8, to the extent necessary and practical, from reaching Onondaga Lake. Remediation of the Wastebeds 1-8 site proper will be addressed as part of the ongoing Remedial Investigation and Feasibility Study process. The Onondaga Lake remedy, which was selected by the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA), must be coordinated with upland remedial activities because the control of potential contamination migrating to the lake from the various upland sites (including the Wastebeds 1-8 Site) is an integral part of the overall cleanup of Onondaga Lake.

Onondaga Lake is part of a larger system of creeks, rivers, wetlands, floodplains, and wildlife. According to the NYSDEC and USEPA in the Onondaga Lake ROD, “the control of contamination migrating from...upland sub-sites to Onondaga Lake is an integral part of the overall remediation of Onondaga Lake.” This statement reinforces the idea that remediation of adjacent sites is necessary for a clean lake. The ROD also acknowledges the importance of coordinating the work at these upland sites with the lake bottom activities.

This design calls for the following remediation activities:

- Shoreline stabilization
- Vegetative cover
- Groundwater and surface water collection system
- Removal of Solvay waste substrate and sediment from Ditch A
- Installation of low permeability/habitat cover in lower Ditch A

The design also includes new wetlands along the lakeshore that will enhance habitat. The design is the work of more than 100 local engineers and scientists who work with nationally recognized experts from universities, research institutions, specialty engineering firms, and receive input from community stakeholders.

Community input remains an important component to Honeywell’s design for the restoration of Onondaga Lake and adjacent sites. Honeywell is committed to working with community leaders, interested stakeholders, and citizens to include their input, recommendations, comments, and perspectives into the design process.
1 INTRODUCTION

This document presents the 100% Remedial Design Report for the Interim Remedial Measure (IRM), Mitigation Wetlands, and Remediation Area A Hydraulic Control System for the Wastebeds 1-8 Site (Site) located in the Town of Geddes, New York. O’Brien & Gere prepared this report on behalf of Honeywell International Inc. (Honeywell). The Remedial Design was performed pursuant to the Order on Consent (Index # D7-0002-02-08) between Honeywell and the New York State Department of Environmental Conservation (NYSDEC), and in accordance with the NYSDEC-approved Integrated IRM, Mitigation Wetlands and Remediation Area A Hydraulic Control System Work Plan (O’Brien & Gere 2011a).

The IRM was developed to mitigate groundwater and seep discharges from the Site to Ninemile Creek (NMC) and Onondaga Lake and mitigate erosion of Solvay waste along the Site’s Onondaga Lake Shoreline and also reduce upwelling velocities for cap effectiveness in adjacent Remediation Area B and a portion of Remediation Areas A and C. The IRM is documented in the NYSDEC's Response Action Document (RAD) (NYSDEC and United States Environmental Protection Agency [USEPA] 2011).

In order to meet the objectives set forth in the RAD, the following major remedial components are included in the design:

- Shoreline stabilization systems
- Groundwater and seep collection trenches
- Groundwater pumping stations and associated forcemain piping
- Removal of Solvay waste and sediment from lower Ditch A and installation of a low permeability/habitat layer

In addition to and integrated with the IRM, the design also includes mitigation wetlands, remediation of the Middle Reach of Ditch A, and a groundwater hydraulic control system. The groundwater hydraulic control system is designed to reduce groundwater upwelling velocities adjacent to a portion of Onondaga Lake Remediation Area A and C. Collectively, these are called the “Integrated IRM.”

1.1 SITE DESCRIPTION

The Site is located along the southwestern shore of Onondaga Lake as shown in Figure 1. The irregularly shaped wastebeds cover approximately 315 acres, extending approximately 2.1 miles along the shoreline, with a maximum width of 0.5 mile. The entire Site, including the wastebeds, measures approximately 404 acres. The Site elevation ranges from approximately 363 to 430 feet above mean sea level. NMC borders the Site along the northwest side and flows into Onondaga Lake. A Site plan depicting these features is included as Figure 2.

The wastebeds were constructed over the Geddes Marsh, which resulted from the lowering of the lake level in 1822 to the same level as the Seneca River (Blasland, Bouck & Lee [BBL] 1989). The wastebeds are composed primarily of Solvay waste, which consists of particles of insoluble residues, hydroxides, calcium carbonate, gypsum, sodium chloride (salt), and calcium chloride. These wastes were generated at the former Main Plant during soda ash production using the Solvay process. Soda ash production began in 1884 and continued until 1986. The Solvay waste was hydraulically placed in the wastebeds in slurry form (90 to 95% water and 5 to 10% solid material).

Chlorinated benzene was produced at the Willis Avenue plant between 1918 and 1977. Additional operations reportedly took place at the Willis Avenue plant from 1918 to 1977 including production of hydrochloric acid, caustic soda, caustic potash, and chlorine gas (O’Brien & Gere 1990). The Benzol plant operated from as early as 1903. This plant produced benzene, toluene, xylenes, and naphthalene by the fractional distillation of coke “light
The Solvay Process Company operated a coke plant from 1892 through 1923\(^1\). A phenol production plant operated from 1942 to 1946 (PTI 1992). Materials associated with these operations may have been disposed of in Wastebeds 1-8 with the Solvay waste slurry or by alternative means, although there are no records or reports to indicate this occurred.

Wastebeds 1-6 were in use before 1926, although no definitive construction date is available. Wastebeds 7 and 8 were not used until after 1939 and remained in use with Wastebeds 1-6 until 1943, when all wastebeds were closed because of an incident involving one of them (BBL 1989). A dike along Wastebed 7 failed on November 25, 1943, and an area along State Fair Boulevard was flooded with Solvay waste.

Subsequent uses of the Site included construction of I-690 prior to 1958, construction of the I-690 and NYS Route 695 interchange between 1973 and 1978, and the operation of a landfill on a portion of Wastebed 5 by Crucible Specialty Metals (Crucible) from 1973 to 1988 (Calocerinos & Spina [C&S] 1986). The Crucible Landfill covers approximately 20 acres and contains an estimated volume of 225,100 cubic yards of non-hazardous and hazardous wastes (C&S 1986). The NYSDEC approved the revised Crucible Landfill closure plan in 1986, and the landfill was closed with a cap in 1988. Long-term monitoring of the Crucible Landfill is performed annually consistent with the landfill closure requirements. The City of Syracuse and Onondaga County used a portion of the wastebeds from 1925 to 1978 for sewage sludge disposal; however, the nature, volume, and exact boundaries of this activity are unknown.

The Site is owned by the State of New York and Onondaga County. The New York State Fair uses a portion of the Site for parking. The remainder of the Site is currently vegetated, except for the wastebed slopes along the Onondaga Lake shoreline and east of the mouth of NMC where Solvay waste is exposed and minimal vegetation exists. Figure 2 depicts the approximate Site and property boundaries. The Onondaga County Deed requires that this property be maintained as parkland or for other public use.

### 1.2 Purpose

This report presents a level of design commensurate with 100% of the Integrated IRM, including:

- Bases of Design
- Summary of Remedial Design
- 100% Design Drawings
- Technical Specifications

The document provides revisions to the 95% design that was documented in the Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 95% Design Report (O’Brien & Gere 2012d) in April 2012. NYSDEC issued comments on the 95% Design Report on June 29, 2012 (NYSDEC 2012). Responses to these comments were provided to NYSDEC on August 29, 2012 (Honeywell 2012b).

The 95% Design Report provided an update to the 50% design that was documented in the Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 50% Design Report (O’Brien & Gere 2011b). NYSDEC issued comments to the 50% Design Report on August 24, 2011 (NYSDEC 2011a). A number of interim submittals were provided to NYSDEC in response to comments. These interim submittals were reviewed by NYSDEC, and subsequent comments were issued. Responses to these comments were provided to NYSDEC on February 10, 2012 (Honeywell 2012a). NYSDEC provided comments on the responses on March 7, 2012.

\(^1\) There is an apparent discrepancy regarding the dates of operation of the coke plant in the referenced Site History Report [PTI 1992]; page 54 of the report states that the coke plant was operational from 1892 to 1923, and page 47 of the report states that coke ovens were used through 1924, although the 1924 map on page 14 of the report denotes “coke ovens not present.”
2 PRE-DESIGN INVESTIGATIONS

Three pre-design investigations (PDIs) have been completed for the Wastebeds 1-8 Site in connection with the Integrated IRM. These were performed in accordance with the 2009 NYSDEC-approved Pre-Design Investigation Work Plan (O'Brien & Gere 2009), the 2010 SMU-4 PDI Addendum Work Plan (Honeywell 2010), and the 2011 Supplemental Design Investigation (SDI) Work Plan (O'Brien & Gere 2011d). The purpose of these investigations was to collect data for use in preparing the Integrated IRM remedial design for the Site.

The initial PDI was implemented in winter 2009 and spring 2010. Field activities consisted of geotechnical borings, geotechnical testing, material compatibility testing, a hydrogeologic investigation, evaluation of mitigation wetland water quality, a closed circuit television inspection of a storm sewer pipe, and a topographic survey. The SMU-4 PDI Addendum was implemented in fall and winter 2010, and consisted of geotechnical borings, geotechnical testing, and a hydrogeologic conductivity investigation. The SDI was implemented in fall 2011, and consisted of geotechnical borings, geotechnical test pits, geotechnical testing, a stormwater network investigation, and a topographic survey.

Field activities were conducted in accordance with the Wastebeds 1-8 Remedial Investigation/Feasibility Study Work Plan (O'Brien & Gere 2006) and the Health and Safety Plan (O'Brien & Gere 2003). The results of the initial PDI were documented in the 50% Design Report (O'Brien & Gere 2011b). The Sediment Management Unit (SMU)-4 PDI Addendum results were documented in the 2011 SMU-4 PDI Addendum Summary Letter Report provided to NYSDEC in June 2011 (O'Brien & Gere 2011c). The results of the Supplemental PDI were documented in the Supplemental PDI Summary Report provided to NYSDEC in February 2012 (O'Brien & Gere 2012a). Results of these PDIs have been used in the development of the Integrated IRM remedial design.
3 REMEDIAL DESIGN CHANGES SINCE THE 50% DESIGN REPORT

O’Brien & Gere submitted the 50% Design Report (O’Brien & Gere 2011b) in May 2011. The NYSDEC provided comments to the 50% Design Report on August 24, 2011 (NYSDEC 2011a). Responses to comments were prepared by O’Brien & Gere and submitted on November 16, 2011 (O’Brien & Gere 2011e). Interim submittals were prepared to address specific comments on sections of the 50% Design Report. The interim submittals were submitted by Honeywell on November 4, 2011 (Honeywell 2011), and included the following:

- Groundwater Model and Hydraulic Control System Interim Submittal
- Steep Cliff Interim Submittal
- Storm Water Management Interim Submittal
- Wetlands Interim Submittal

The NYSDEC provided comments on each of the interim submittals. Honeywell submitted responses to comments for the interim submittals on February 10, 2012 (Honeywell 2012). NYSDEC provided comments on the responses on March 7, 2012.

This section highlights substantive design changes that have occurred since the submittal of the 50% Design Report and documents the basis for the change and the resultant design impacts to the 95% Design. Design progression since the 50% Design and 95% Design is reflected in Section 4 and the appendices (minor design changes based on NYSDEC’s June 29, 2012 comments on the 95% Design Report are described in Honeywell’s August 29, 2012 responses and reflected in this 100% Design).

3.1 SHORELINE STABILIZATION

3.1.1 Steep Cliff Stabilization

The design of the Steep Cliff revetment in the 50% Design Report (O’Brien & Gere 2011b) included a preliminary design for revegetating the slopes above the revetment armor stone. Revegetation consisted of seeded cellular confinement with topsoil between elevations 372 feet and 380 feet and seeded Mac-Mat™ with topsoil above elevation 380 feet. Both systems were to be installed on existing grade. A progression of the design for revegetating the slopes was presented in the Steep Cliff Interim Submittal (Honeywell 2011), which called for regrading the bank above the stone revetment to achieve a slope of 1 vertical to 1.5 horizontal (achieved via minor excavation of material from selected locations above the stone revetment), and restoration using Mac-Mat™ with topsoil and seeding. Based on NYSDEC comment A.6 on the interim submittal (NYSDEC 2011b-e), Mac-Mat™ was replaced with North American Green Bionet™ (or equivalent), which is a biodegradable material, as shown on the Design Drawings included in Appendix A.

This change did not result in secondary changes in the overall design approach.

3.2 HYDRAULIC CONTROL SYSTEMS

3.2.1 Eastern Shoreline Groundwater Collection

Groundwater Collection Trench Alignment

The revised lake dredge prisms provided in the March 2012 Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design (Parsons and Anchor QEA 2012) resulted in removal of portions of the existing shoreline. The location of the Eastern Shoreline Groundwater Collection Trench was therefore shifted slightly inland in the area between the Connected Wetland and Remediation Area B. The adjusted trench alignment is depicted on the Design Drawings provided in Appendix A.

This change resulted in a secondary change in the overall design approach. The lengths and orientation of the cleanout access spurs on the access path that are located adjacent to the section of collection trench that was shifted were revised to accommodate the change.
Passive Well Spacing

Passive well spacing along the Eastern Shoreline Groundwater Collection Trench was refined, based on the evaluations documented in an evaluation by SS Papadopoulus and Associates (SSPA) (Exhibit 3 of Appendix J). The passive well spacing in the 50% Design Report was 40 to 50 feet for most of the Eastern Shoreline Groundwater Collection Trench, except in the vicinity of the Connected Wetland, where the passive well spacing was 15 to 20 feet. The spacing has been changed to 30 feet for the Eastern shoreline Groundwater Collection Trench, including the area adjacent to the Connected Wetland, based on the findings of the above-referenced evaluation by SSPA.

This change did not result in secondary changes in the overall design approach.

3.2.2 Remediation Area A Hydraulic Control System

Based on an evaluation of the Remediation Area A Hydraulic Control System and revisions to the dredging design within Remediation Area A Profundal Zone (Parsons and Anchor QEA 2012), the length of the groundwater collection trench in this area was reduced by approximately 1,000 feet to the current length of approximately 1,050 linear feet. The revised trench alignment is depicted on the Design Drawings provided in Appendix A.

Passive well spacing along Remediation Area A Hydraulic Control System was refined, based on the evaluations documented in an evaluation by SS Papadopoulus and Associates (SSPA) (Exhibit 3 of Appendix J). The passive well spacing will be 24 feet for the Remediation Area A Hydraulic Control System based on the findings of the above-referenced evaluation by SSPA.

The collection trench alignment change resulted in a secondary change in the overall design approach. The access pathway configuration was modified to account for the revised groundwater collection trench alignment.

3.2.3 NMC Creek Hydraulic Control System

Passive well spacing within the NMC Creek groundwater collection trench was refined, based on the SSPA evaluations documented in Exhibit-3 of Appendix J. The passive well spacing in the 50% Design Report was 10 to 15 feet for the NMC Creek groundwater collection trench. The spacing has been changed to 40 feet, except for the area of the NMC Creek Deltaic deposits where the spacing is 20 feet.

This change did not result in secondary changes in the overall design approach.

3.3 MITIGATION WETLANDS

3.3.1 Inland Wetlands

Extension of Inland Wetland A

The northwestern boundary of Inland Wetland A was extended further to the northwest, toward the toe of slope of the Wastebed berm. The change was requested by the NYSDEC during a meeting that took place on November 18, 2011, to increase wetland acreage to account for wetland mitigation needs within the Honeywell Syracuse Portfolio. The revised wetland boundary is shown on the Design Drawings included in Appendix A.

This change resulted in a secondary change in the overall design approach. The access pathway for Inland Wetland A, which previously formed a loop around this wetland, was modified to account for the larger wetland footprint. The pathway was changed to consist of two separate spurs with turnarounds at the ends of each spur, as depicted on the Design Drawings included in Appendix A.

Vegetative Corridor and Swale

A vegetative corridor was added between Inland Wetland B and the Connected Wetland, and a vegetated swale was added between Inland Wetland A and the Connected Wetland. The purpose of the additions was to further facilitate wildlife movements among these wetlands.
This change resulted in a secondary change in the overall design approach. The access pathway configuration was modified between Inland Wetland B and Connected Wetland C to accommodate the vegetative corridor.

### 3.3.2 Connected Wetlands

Due to the dredge component of the Connected Wetland construction, the majority of this component of the design will be completed by Parsons. The designs for dredging and grading and the habitat layer are now documented in the Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Lake Final Design (Parsons and Anchor QEA 2012).

### 3.4 DITCH A

#### 3.4.1 Lower Ditch A

**Access Path Culvert Extension**

The 50% Design Report included removal of substrate, placement of a low permeability habitat layer, and installation of a culvert to facilitate site access during and after construction. The existing culvert located beneath the access road to the upper State Fair parking lots was proposed to extend approximately 165 feet toward Onondaga Lake. NYSDEC Comment 3.18 on the 50% Design Report requested that the culvert not be extended (NYSDEC 2011a). O’Brien & Gere’s Responses to Comments (O’Brien & Gere 2011e) indicated that the culvert extension would be revised to a box culvert beneath the proposed access path only, such that open channel could remain between the existing culvert and the proposed culvert.

In support of the proposed revised approach, additional geotechnical investigation was performed in the area of the proposed box culvert. The results of the Supplemental Design Investigation (SDI) are summarized in the Supplemental Design Investigation, Wastebeds 1 through 8 Summary Report prepared by O’Brien & Gere in February 2012 (O’Brien & Gere 2012a). Subsequent correspondence with NYSDEC concluded that the initial culvert expansion approach, as documented in the 50% Design Report, would be progressed.

The access pathway along the eastern shoreline was shifted and widened to accommodate construction vehicle two-way traffic. The centerline of the pathway was moved northward to avoid conflict with the Onondaga Lake Capping, Dredging, Habitat and Profundal Zone Booster Pump Station #2 facilities. These design revisions resulted in the culvert beneath the access road to the upper State Fair parking lots being extended 225 feet, rather than the 165 feet that was provided for in the 50% Design Report. Other than this culvert length extension/shift in pathway alignment, there is no change in the lower Ditch A access path and culvert extension design from that which was presented in the 50% Design Report.

**Sediment Removal in Culverts**

The 50% Design Drawings included removal of accumulated sediments within existing culverts beneath the access road to the upper State Fair parking lots and I-690 along the lower reach of Ditch A in association with the removal of substrate for habitat restoration. Due to the recent addition of Middle Reach Ditch A IRM efforts and the logistics of sequencing and execution, sediment removal from the aforementioned existing culverts will be completed in conjunction with the Middle Reach Ditch A scope of work. Accordingly, the details of the sediment removal are included in the Middle Ditch A IRM Design Submittal attached as Appendix L.

### 3.5 VEGETATIVE COVER SYSTEM

A small 0.3 ac area of vegetated cover adjacent to Inland Wetland A was added to Wetland A, as shown on the Design Drawings included in Appendix A. This change did not result in secondary changes in the overall design approach.

### 3.6 SITE ACCESS

The NMC access path alignment was revised to accommodate the turnaround area/curve associated with this pathway and avoid conflict with a lake project booster pump station. The resultant access path alignment is now slightly longer and requires additional fill to support the change.

This change resulted in the following secondary changes in the overall design approach.
The NMC pump station location has been relocated as shown on the Design Drawings included in Appendix A.

The length/alignment of the NMC groundwater collection system was revised. This change is reflected on the Design Drawings included in Appendix A.
4 REMEDIAL DESIGN

4.1 IRM OBJECTIVES
In accordance with the RAD, the IRM objectives are to mitigate the following, to the extent necessary and practicable within the scope of the IRM:

- Direct contact with and ingestion of exposed Solvay waste and other contaminated soil along the eastern shoreline
- Discharge of NMC sand and gravel unit and eastern shoreline groundwater to Onondaga Lake and NMC
- Discharge of shallow and intermediate groundwater to Ditch A
- Direct contact with and discharge of NMC bank seep water and eastern and northern shore seep water to Onondaga Lake and NMC
- Erosion of Solvay waste from the eastern shoreline to Onondaga Lake
- Erosion of Solvay waste along the surf zone of Onondaga Lake (SMU-4) due to wind and wave action
- Erosion of Solvay waste substrate and sediment from the lower reach of Ditch A to Onondaga Lake
- Discharge of seep water from the upper reach of Ditch A to NMC

Discharge from the NMC sand and gravel unit to NMC and Onondaga Lake is addressed in this remedial design by the hydraulic control systems for Remediation Area A (described below) and NMC.

In addition, minimization of transport of Solvay waste substrate and sediment from the Middle Reach of Ditch A to NMC and Onondaga Lake are also addressed in this remedial design (described below).

4.2 MITIGATION WETLANDS OBJECTIVE
The objective of the mitigation wetlands is to compensate for the loss of wetland functions and values and open water aquatic habitat disturbed by the Willis Avenue/Semet Tar Beds Sites IRM (Willis/Semet IRM), Wastebed B/Harbor Brook IRM, and Wastebeds 1-8 Integrated IRM by providing a diverse wetland complex comprised of aquatic habitat connected to Onondaga Lake and inland wetlands. This will be accomplished by creating aquatic/wetland habitats consisting of deep and shallow emergent and wet meadow communities. These wetland communities will be complemented by woody species communities established on the adjacent berms and vegetative cover system.

4.3 REMEDIATION AREA A HYDRAULIC CONTROL SYSTEM OBJECTIVE
Based on the PDIs associated with the Lake Dredging and Capping Design, an isolation cap may be placed within Remediation Area A in locations near the Site. Due to the proximity of the cap material to the Site, there is the potential for groundwater upwelling velocities to affect the integrity of the cap. A groundwater hydraulic control system will be implemented adjacent to Remediation Area A to mitigate potentially unacceptable upwelling velocities and to minimize to the extent practicable within the context of IRM the migration of contaminated groundwater (BTX, phenol) from this unit to Ninemile Creek and Onondaga Lake.

4.4 INTEGRATED IRM ELEMENTS
To meet the objectives described above, the Integrated IRM consists of the following major components:

- Shoreline stabilization systems
- Groundwater and seep hydraulic control systems
- Three groundwater pumping stations and associated force main piping
- Mitigation wetlands
Ditch A culvert and manhole installation, culvert and manhole lining, substrate excavation, and installation of a habitat layer

This section of the report presents a summary for each of these elements. Figure 3 depicts a general layout of the Integrated IRM elements. Design drawings depicting the elements of construction are included as Appendix A. Technical Specifications associated with the design are included as Appendix B. Basis-of-design information for individual components of the remedial design is provided in various appendices, which are referenced in the following sections.

4.5 SHORELINE STABILIZATION

Erosion of Solvay waste occurs along the surf zone of the northern and eastern shorelines of the Site due to wind and wave action. Slope stabilization systems will minimize this erosion action. Two areas of the site require stabilization: a steep embankment area (Steep Cliffs) and a shallow sloped shoreline area located along the northern and eastern shorelines of the Site. The location of the Steep Cliffs area to be stabilized is shown on the Appendix A Design Drawings.

The Integrated IRM design provides the design for shoreline stabilization systems above elevation 365 feet. The design for shoreline stabilization systems at elevations below 365 feet is presented in the Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design (Parsons and Anchor QEA 2012).

As shown in the Draft Onondaga Lake Remedial Design Elements for Habitat Restoration (Parsons 2009a), the Habitat Module associated with shoreline stabilization is 8A (shoreline uplands/riparian – successional field). The most relevant Habitat Modules for the revetment (located in Remediation Areas A and B) are 8A and 8B (shoreline uplands/riparian – scrub-shrub). However, because this area is an engineered facility whose primary function is stabilization and, secondarily, habitat, this area will be subject to modified success criteria as presented in Tables H-2 and H-3 in Appendix H.

Bioengineering techniques will be used to stabilize the steep shoreline in SMUs 3 and 4 and provide a transition between the Wastebed 1-8 remediation and in-lake remediation. The design also incorporates habitat features identified in the Draft Habitat Plan (Parsons 2009a).

4.5.1 Steep Cliff Stabilization

A vegetated on-shore revetment will be used to stabilize approximately 1,700 feet of Steep Cliff area adjacent to SMUs 3 and 4. The revetment will consist of stone to provide protection from erosion caused by wind-wave action. Soil and live plant stakes will be added to provide habitat enhancement. A seeded Bionet™ will be used for the upper portion of the Steep Cliff area at elevations above the expected wave action to provide protection from erosion and habitat enhancement. Limited excavation and grading will facilitate stabilization of the upper slope above the revetment. Design details regarding the proposed cuts and fills, placement of the revetment, and habitat features are provided on the Design Drawings included in Appendix A. Technical specifications related to the Steep Cliff Stabilization are included in Appendix B. The revetment will not result in loss of lake surface area.

4.5.2 Shallow Shoreline Stabilization

The lake design will include the shallow slope stabilization system within the lake and extending up to an elevation of 365 feet in both SMUs 3 and 4 to achieve consistency of stabilization and restoration approaches from the lake shore up to this elevation. The stabilization system will consist of 6 inches of graded gravel from elevation 360 to 362.5 ft and 18 inches of native run-of-the-bank material placed above the average lake level of 362.5 ft up to 366 ft. The graded gravel and run-of-the-bank material placed along the shoreline will provide protection from erosion caused by wind-wave action and habitat enhancement. The gravel will provide an improved substrate for benthic macroinvertebrate colonization and fish use (e.g., nest building). Further details on the selection of gravel are provided in the Capping and Dredge Area and Depth Technical Document (Parsons 2009b). Further details for this stabilization system are provided in the Lake Final Design (Parsons and Anchor QEA 2012).
Appendix H includes a species list associated with the planting plan for interfacing with the Onondaga Lake Restoration design (from upper edge of the shoreline stabilization to the top of the access pathway).

4.6 HYDRAULIC CONTROL SYSTEMS

Site groundwater and seep water currently flow toward Onondaga Lake (Lake Dredging Remediation Areas B and C) and NMC. The hydraulic control systems are designed to control the movement of shallow and intermediate groundwater, thus creating a hydraulic barrier that mitigates contaminated groundwater and seep water from entering NMC and Onondaga Lake. Trenches and passive wells will collect and convey the groundwater and seep water to one of three proposed pump stations that will ultimately convey the water to the Willis/Semet Groundwater Treatment Plant (GWTP). The Integrated IRM objectives for the groundwater collection systems will be met by maintaining the hydraulic head in the shallow (Solvay waste) and intermediate (marl) groundwater zones below the surface water level in the adjacent surface water body (Onondaga Lake or NMC). This means that the hydraulic head in the trench and at locations in the marl between the passive wells would be below the water level of the adjacent surface water body. The collection system operational water level is the water level (drawdown) in the collection trench. The drawdown in the trench controls the hydraulic head in the passive wells and the marl; however, the operational water level for the trench and the hydraulic head objective of the Integrated IRM are not the same. The trenches are designed so that the operational water level (drawdown) in the trench can be varied with changes in the adjacent surface water elevation. Operational water levels in the trench ranging from 0.5 feet to 2 feet below surface water level were modeled in order to calculate the range in anticipated flows that could be required to achieve the Integrated IRM objectives. An operational water level of 0.5 feet in the trench would maintain the hydraulic head below the surface water level with lower flows, but would require closer passive well spacing than an operational water level of 2 feet below surface water level. Passive well spacing is discussed in Appendix J and presented on the Design Drawings included in Appendix A.

Due to the geochemistry of the site water, scaling/precipitation could be expected within the forcemains. Maintenance techniques such as acid addition and physical cleaning of the forcemains will be addressed in the Operations, Maintenance and Monitoring (OM&M) Plan. Monitoring of the success of the groundwater collection systems will be addressed in the OM&M Plan.

A brief description/summary of each of the hydraulic control systems is given below. Additional basis-of-design information is included as Appendix E, Appendix F, Appendix I and Appendix J. A summary of the slope stability analyses is included as Appendix C.

4.6.1 Eastern Shoreline Groundwater Collection System

Shallow and intermediate groundwater migrating toward Onondaga Lake will be collected along approximately 6,700 linear feet of the eastern shoreline as shown on the Design Drawings included in Appendix A. The trench comprises a 12-inch slotted high density polyethylene (HDPE) pipe installed at approximately 8 feet below ground surface (bgs) surrounded by sand backfill and conveys water to the Eastern Shoreline Pump Station. While the trench will intercept and collect shallow groundwater, passive wells installed through the trench and the intermediate groundwater zone will intercept and collect intermediate groundwater. Collected groundwater will be pumped in a 6-inch HDPE pipe from the Eastern Shoreline Pump Station to the GWTP for treatment.

The alignment and design details for the Eastern Shoreline Groundwater Collection System are provided on the Design Drawings included in Appendix A. Technical specifications related to the Eastern Shoreline Groundwater Collection System are included in Appendix B.

4.6.2 Eastern Shoreline Seep Collection System

Seep discharge occurring inland will be intercepted via a seep apron that will divert flow to a collection trench to mitigate discharge to Onondaga Lake and the future mitigation wetlands as shown on the Design Drawings included in Appendix A. The trench comprises a 6-inch perforated HDPE pipe installed at a varying depth (a minimum of 4.5 feet) bgs surrounded by stone backfill. Conveyance of the collected seep water to the Eastern Shoreline Pump Station will be achieved via gravity in a dedicated solid wall 6-inch HDPE pipe.
The alignment and design details for the Eastern Shoreline Seep Collection System are provided on the Design Drawings in Appendix A. Technical specifications related to the Eastern Shoreline Seep Collection System are included in Appendix B.

4.6.3 Remediation Area A Hydraulic Control System

Site shallow and intermediate groundwater migrating to Onondaga Lake will be collected along 1,050 linear feet of the Remediation Area A shoreline to mitigate potentially unacceptable upwelling velocities within Remediation Area A cap limits, as shown on Design Drawings included in Appendix A. It is expected that the trench will also control the seep discharge along the northern shoreline. The trench comprises a 6-inch slotted HDPE pipe installed at approximately 8 feet bgs. While the trench will intercept and collect shallow groundwater and seep discharge, passive wells installed through the trench to the top of the silt and clay unit beneath the deltaic deposits and the intermediate groundwater zone will intercept and collect intermediate groundwater. Recovered groundwater from the trench will be conveyed to the northern shoreline pump station where it will be pumped via forcemain to the Eastern Shoreline Pump Station. Note that localized seep collection originally proposed in the RAD for the Northern Shoreline is also addressed by this groundwater hydraulic control system.

A portion of the collection trench will also provide hydraulic control for groundwater that may migrate to Onondaga Lake through a preferential pathway created by the deltaic deposits adjacent to the lake. Details associated with the deltaic deposit connectivity to Onondaga Lake are provided in Appendix K.

The alignment and design details for the Remediation Area A Hydraulic Control System are provided on Design Drawings included in Appendix A. Technical specifications related to the Remediation Area A Hydraulic Control System are included in Appendix B.

4.6.4 Ninemile Creek Collection System

Hydraulic control of the seeps along NMC will be achieved through construction of seep aprons that will divert seep flow to an approximately 1,800 linear foot collection trench. The trench comprises a 6-inch slotted HDPE pipe surrounded by sand backfill, installed at approximately 13.5 feet bgs. While the trench will intercept and collect shallow groundwater and seep discharge, passive wells installed through the trench and the intermediate groundwater zone will intercept and collect intermediate groundwater. Recovered water will be conveyed to the NMC pump station where it will be pumped via 4-inch HDPE forcemain to the Eastern Shoreline Pump Station.

A portion of the collection trench will also provide hydraulic control for groundwater that may migrate to NMC through a preferential pathway created by the deltaic deposits adjacent to the creek. Details associated with the deltaic deposit connectivity to NMC and Onondaga Lake are provided in Appendix K.

The alignment and design details for the NMC Creek Collection System are provided on the Design Drawings included in Appendix A. Technical specifications related to the NMC Creek Collection System are included in Appendix B.

4.7 GROUNDWATER PUMP STATIONS AND FORCIMAINS

Three pump stations and four forcemains will be installed to convey the collected ground and seep water from the trenches to the GWTP.

*Pump Stations*

» **Northern Shoreline Pump Station** – will convey northern shoreline groundwater to the Eastern Shoreline Pump Station via forcemain

» **NMC Pump Station** – will convey NMC seep water and former NMC Deltaic Deposit groundwater to the Eastern Shoreline Pump Station via forcemain

» **Eastern Shoreline Pump Station** – will convey the collected Site water to the GWTP
Forcemains

- **NMC Forcemain** – will convey water from the NMC Pump Station to the combined forcemain junction.
- **Northern Shoreline Forcemain** - will convey water from the Northern Shoreline Pump Station to the combined forcemain junction.
- **Combined Forcemain** – will convey combined water from the NMC and Northern Shoreline Forcemains to the Eastern Shoreline Pump Station.
- **Eastern Shoreline Forcemain** – will convey the collected Site water to the GWTP

The pumps will operate on a variable frequency drive (VFD), which will allow the pumps to control the water level in the wet wells, and subsequently the groundwater collection trenches, by adjusting the pump speed. This type of operation will allow for real-time adjustments to groundwater collection trench levels as the lake level varies. Lake level data will be downloaded from the United States Geological Survey (USGS) gauging station to the GWTP control system on a regular basis. This data will be used to adjust the set-point water levels within the pump stations.

The general control scheme for operation of the pump stations is as follows:

- The GWTP control system will assign a set point for the collection trenches based upon the USGS lake level data.
- Using that set point, the VFD will automatically adjust the pump speeds to maintain the selected water level in the trench.

Additional details regarding pump station operations and maintenance will be provided in the OM&M plan.

Locations and design details for the Pump Stations and Forcemains are provided on the Design Drawings included in Appendix A. Technical specifications related to the Groundwater Pump Stations and Forcemains are included in Appendix B. A summary of the pump station settlement evaluation is included in Appendix C. Details regarding the pump station and forcemain designs are included in Appendix G.

## 4.8 MITIGATION WETLANDS

Wetland mitigation will include the construction of a minimum of 9.5 acres, of which a minimum of 2.3 acres will be connected wetlands and a minimum of 7.2 acres will be inland wetlands. Mitigation wetlands on the Site will mitigate for wetlands and open water aquatic habitat disturbed by the Willis/Semet IRM (2.3 acres), Wastebed B/Harbor Brook IRM (6.5 acres), and Wastebeds 1-8 Integrated IRM (0.7 acres). The final acreage of the inland wetlands may be revised, if necessary, to be consistent with the mitigation requirements of the Honeywell Syracuse Portfolio.

The wetland mitigation complex is located within the low-lying eastern shoreline of the Site along the southern shoreline of Onondaga Lake. The wetland mitigation design considered habitat components within the areas adjacent to the wetland, including adjacent upland habitat, to complement the wetland and aquatic habitat while affording water quality protection to the mitigation wetlands.

Inland wetland areas A (2.92 acres), B (3.85 acres) and C (0.82 acres), as shown on the Design Drawings in Appendix A, will be located between the existing 365 foot and 370 foot contours. Inland Wetlands A and B will be between the groundwater and seep collection systems, while Inland Wetland C will be located inboard of both the groundwater and seep collection systems. The inland wetlands will be constructed to have typical mid-season surface water depths ranging from -0.5 feet to 3 feet with varied micro-topography and will transition to wetland fringe (i.e., successional old field). Constructed berms will be used to contain the inland wetlands in concert with a low permeability liner to maintain wetland hydrology. A cross section showing the proposed liner system is included on the Design Drawings in Appendix A. Inland wetland microtopography is shown on the Design Drawings included in Appendix A and described in Appendix H. Liner contingency and inspection details will be presented in the OM&M Plan, as necessary.
The Connected Wetland area (minimum of 2.3 acres) shown on the Design Drawings in Appendix A will be constructed between Inland Wetlands A and B. The Connected Wetland will be located between the lakeshore and 368-foot contour and will include wet meadow, shallow emergent and deep emergent zones. The groundwater collection system will be routed inland of the Connected Wetland. Construction of the Connected Wetland will include removal of material above and below the water table, construction of an isolation cap, as necessary, and habitat restoration. The removal of material and later installation of the cap and habitat will be completed as part of implementation of the Lake Final Design (Parsons and Anchor QEA 2012). Installation of the vegetation seeding and planting will be carried out as part of this Integrated IRM.

Wetland planting zones are shown on the Design Drawings in Appendix A and Technical Specifications included in Appendix B. Additional basis of design details and criteria are included as Appendix H.

4.8.1 Gas Venting Layer

The subsurface soils in the proposed inland wetland area consist of Solvay waste that is 5 to 10 feet thick. The Solvay Waste is underlain by a 5- to 25-foot thick marl layer. The marl layer consists of organic materials mixed with shells and is likely producing limited amounts of gas such as methane and hydrogen sulfide as it continues its natural process of decomposition. Based on boring log descriptions from borings along the lakeshore, a strong sulfur odor was present as the borehole encountered the marl layer in at least nine boreholes, indicating the presence of hydrogen sulfide gas. In two other areas not along the lakeshore, an odorless gas was released from the borehole at depths of 34 (boring SB-109) and 52 feet (boring SB-238).

Installation of the inland wetland low permeable layer could potentially alter or eliminate the natural gas migration pathways. Without the installation of a gas venting layer, the gas that is produced by the marl layer could build up under the inland wetland liner system and develop a gas pressure bubble. The amount of gas required to produce a gas bubble under the inland wetland liner is minimal due to the limited thickness and weight of the cover system. In order to maintain the integrity of the proposed liner system, a gas venting layer will be installed to safely vent the gas that is produced. The gas venting layer consists of a pervious granular material that will transmit gas to the ground surface, which also will serve as the puncture protection layer for the liner above it. The details of the gas venting layer are presented on the Design Drawings in Appendix A.

4.9 DITCH A

4.9.1 Lower Ditch A

The existing substrate of the lower reach of Ditch A, approximately 380 feet spanning from the I-690 culvert to the confluence with Onondaga Lake, consists mostly of Solvay waste and accumulated sediments. Within the existing channel cross section, the existing substrate will be removed as part of the Integrated IRM such that a low permeability habitat cover can be placed and the existing culvert extended. The minimum removal depth of the existing substrate is 2-ft. This depth was selected to provide a habitat layer of sufficient thickness as specified in the Draft Onondaga Lake Remedial Design Elements for Habitat Restoration and to provide sufficient scour protection, while allowing for installation of the geomembrane liner system. The existing and proposed channel bottom elevation would vary between 359.4-ft and 360.0-ft, which is below the ice scour elevation of 360.5-ft. The habitat cover will consist of stone lining on the channel bottom and lower portion of the channel side slopes below elevation 362.5-ft. Above that elevation, the habitat cover will consist of 18-inches of stone lining and 6-inches of topsoil planted with successional shrubland covertype.

The low permeability habitat cover will form a barrier between Ditch A water and the underlying Solvay waste substrate, mitigate erosion of underlying Solvay waste substrate, and provide a suitable habitat layer area for plants and wildlife. After placement of the liner, the ditch (including the embayment) will be returned to the existing geometry and grade after restoration with a clean stone layer and native species restored on the banks of the area (Appendix A and Section 3.7 of Appendix H. The culvert under the access road to the state fair parking area will be extended approximately 225 feet toward Onondaga Lake. Details regarding the depth of excavation are provided on the Design Drawings in Appendix A.

The culvert extension is being proposed to facilitate site access during and after construction is complete. The current access pathway alignment does not promote the anticipated traffic patterns and the improvements
required for the pathway would result in a decrease in slope stability. Reducing traffic in this area will help maintain slope stability during and after construction.

Based on the results of the modeling described below, the existing culvert is adequately designed to handle flow for a 50-year storm event. The contributing area to the culvert was delineated and analyzed using the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Technical Release (TR) No. 55 methodology and Autodesk Storm and Sanitary Analysis software to model the runoff generated during the 1-, 5-, 10-, 25-, 50-, and 100-year storms. This analysis also indicated that the portion of lower Ditch A that is downstream from the existing culvert has adequate capacity to convey the 100-year storm event.

4.9.2 Upper Ditch A
Approximately 320 linear feet of the culvert, originating in the upper portion of Ditch A and terminating at NMC, will be rehabilitated as part of the Integrated IRM. The culvert extent is provided on the Design Drawings in Appendix A. Details on the rehabilitation are specified in the Appendix B.

4.9.3 Middle Ditch A
Maintenance of the Middle Reach of Ditch A to mitigate transport of Solvay waste substrate and sediment to Onondaga Lake and to Ninemile Creek is included as part of the IRM. This will be accomplished by promoting the controlled settlement of sediment and calcium carbonate precipitate, accompanied by OM&M activities, as necessary, to remove accumulated sediment from the Middle Reach of Ditch A.

Accumulated Solvay waste, sediments, and precipitates will be excavated from Middle Ditch A. Construction of stormwater flow management features in select areas will promote settlement of entrained solids. OM&M activities will periodically remove accumulated solids deposited upstream of the flow management features. The Basis of Design and associated 100% Design Contract Drawings are provided in Appendix L.

4.10 VEGETATIVE COVER SYSTEM
The vegetative cover system was selected for areas of the eastern shoreline not occupied by inland wetlands, the connected wetland, stormwater features, berms, area of integration with the shoreline stabilization, and access pathways. The location of this cover was also selected to provide a transitional area for wildlife that may migrate or otherwise inhabit areas between the mitigation wetlands, lake, and upland portions of the Wastebeds 1 through 8 Site. The vegetative cover system will be largely consistent with the Draft Habitat Plan (Parsons 2009a), as indicated by Appendix H. The cover will comprise approximately 3.76 acres of a habitat layer and a plant species mix in a 24-inch habitat layer consisting of 12 inches of habitat subgrade and 12 inches of topsoil, as specified in Appendix B Woody species (Table 7 of Topsoil, Seeding, and Planting specification in Appendix B) will comprise the majority of the plant species mix, complementing the mostly herbaceous species proposed for installation within the adjacent mitigation wetland complex (see Appendix H).

The vegetative cover system will provide the means to minimize direct contact with, and ingestion and erosion of exposed Solvay waste along the eastern shoreline of the Site. The vegetative cover system will also provide ecological value to the Site by providing habitat diversity complementary to the mitigation wetlands and by introducing locally native species. The limits of vegetative cover are shown on the Design Drawings included in Appendix A. A typical cross section of the vegetative cover is provided on the Design Drawings included in Appendix A. Plantings are specified in Appendix B.

4.11 SITE ACCESS
A network of pathways will be required for site access, for operations, and maintenance activities. The pathways will be constructed of geosynthetics and stone and will be allowed to revert to a natural vegetated state. The proposed alignment of the access pathways is shown on the Design Drawings in Appendix A. Profiles and details for the access pathways are also shown on the Design Drawings in Appendix A and Technical Specifications in Appendix B.
4.12 GROUNDWATER MODELING

Groundwater modeling was completed to estimate the volume of groundwater currently discharging from the Site and to estimate the volume of groundwater that can be expected to discharge from the Integrated IRM groundwater and seep collection systems. The Honeywell Groundwater Flow Model (Version 3.01) was used for this evaluation. Details of the modeling are discussed in Appendix I.

Groundwater modeling was also completed to evaluate the spacing of the passive wells for the Integrated IRM groundwater and seep collection systems. Groundwater flow modeling was used to evaluate passive well spacing for various hydraulic scenarios that reflect various site conditions. Details of the passive well modeling are discussed in Appendix J.

4.13 WEIR BOX ABANDONMENT

Weir boxes and associated piping that were left in place after the closure of the wastebeds have been identified at various locations around the Site and may present a preferred pathway for potentially impacted groundwater and surface water to migrate to Onondaga Lake. As part of the IRM, the weir boxes will be filled with flowable fill or other suitable material and the pipes will be plugged to mitigate water migration. Weir box and pipe locations, closure specifications, and details are shown on the Design Drawings provided in Appendix A.

4.14 ELECTRICAL INSTALLATION

Power for the Site pump stations and associated controls will be provided from two new services from Solvay Electric to be obtained from the vicinity of slurry pipeline booster pump stations #2 and #3, which are located along the southern and southeastern edges of the site, respectively. Electrical conduits follow the same alignment as the forcemains, as shown on the Design Drawings in Appendix A. Design details for the electrical and control systems are also shown on the Design Drawings in Appendix A.

4.15 MANAGEMENT OF EXCAVATED MATERIAL

Following excavation, excavated material will be stockpiled and allowed to dewater, as necessary. Dewatered excavated material will be managed on Site. Staging areas and management procedures for construction water from dewatering will be provided in the Construction Work Plan. The final disposition of the excavated soils will be included as part of the final remedy. If the excavated material is characteristically hazardous it will be disposed of at an offsite permitted facility. Visibly contaminated material (e.g., NAPL, grossly stained soils) will be segregated and placed upon, and covered with, poly as quickly as possible to reduce volatilization from the excavated material. This material will be disposed of at an offsite permitted facility.

As part of the connected wetland construction, material will be dredged and will be managed at the sediment consolidation area on Wastebed 13 along with other lake dredging materials.

4.16 STORMWATER MANAGEMENT

Permanent stormwater management measures will be constructed as part of the Integrated IRM. These measures will minimize the potential for eroded Solvay waste to enter NMC and Onondaga Lake and the mitigation wetlands prior to construction of the final site remedy. In addition, these measures will convey stormwater runoff with minimal impact to proposed Integrated IRM facilities. Permanent means of erosion and sediment control will consist of stabilizing upland areas using vegetation and constructing stormwater management features prior to discharge to NMC and Onondaga Lake.

Stormwater management measures will be implemented within four distinct areas of the Integrated IRM project extent: Eastern Shoreline Area, NMC Area, and Northern Shoreline Area (Appendix A) and Middle Ditch A Area (Appendix L). The approach to stormwater management at each area is summarized as follows:

**Eastern Shoreline Area** – This area includes a significant portion of the Integrated IRM project area adjacent to Onondaga Lake and includes an ultimate design objective of using stormwater runoff, as necessary, as a long-term supplemental water source for the inland mitigation wetlands, as direct precipitation is considered to be sufficient for maintaining wetland hydrology. The approach to stormwater management in the Eastern Shoreline Areas is as follows:
- Strategic plantings and bioengineering techniques will be used within the upland area to reduce erosion and sedimentation.

- Capture of stormwater in stormwater conveyance wet swales. Wet swales would manage the water quality treatment volume while diverting stormwater from larger storm events around the mitigation wetlands to Onondaga Lake (during construction) or through mitigation wetlands (following construction). Water levels within the mitigation wetlands would be controlled with outlet structures.

- Portions of the eastern shoreline areas will also be stabilized as part of seep collection apron construction.

**NMC Shoreline Area** – This area includes the portion of the project adjacent to NMC. Methods of stormwater management for the NMC area will consist of stabilization measures within the upland area due to space limitations along the NMC shoreline. The stormwater management design of the NMC area includes a roadside swale with conveyance of stormwater runoff across the proposed access road to NMC. The approach to stormwater management in the NMC Area is as follows:

- Strategic plantings and bioengineering techniques will be used within the upland area to reduce erosion and sedimentation (see Appendix H).

- Stormwater will be captured in stormwater conveyance wet swales at the top of slope above the NMC Access Pathway. Wet swales would manage the water quality treatment volume while diverting stormwater from larger storm events from the steep slopes above to riprap lined channels, inlets and pipes that would discharge to NMC.

- Stormwater from the NMC Access Pathway will be captured in conveyance wet swales, with riprap lined channels to minimize erosion on steep slopes and convey stormwater to inlets and pipes that would discharge to NMC.

**Northern Shoreline Area** – Similar to the eastern shoreline area, this area is located adjacent to Onondaga Lake. Methods of stormwater management for the Northern Shoreline area will consist of stabilization measures within the upland area due to space limitations along the shoreline. The stormwater management design of the Northern Shoreline area includes a roadside swale with conveyance of stormwater runoff across the proposed access road to Onondaga Lake. The approach to stormwater management in the Northern Shoreline Area is as follows:

- Strategic plantings and bioengineering techniques will be used within portions of the upland area to reduce erosion and sedimentation. Stormwater will be captured in stormwater conveyance wet swales at the toe of slope, adjacent to the Remediation Areas A Hydraulic Control System. Wet swales would manage the water quality treatment volume while diverting stormwater from larger storm events from the steep slopes to riprap lined channels, inlets and pipes that would discharge to Onondaga Lake.

- Stormwater from the Remediation Area A Hydraulic Control System Access Pathway will be captured in conveyance wet swales, with riprap lined channels to minimize erosion on steep slopes and convey stormwater to inlets and pipes that would discharge to Onondaga Lake.

**Middle Reach Ditch A Area** - This area includes the portion within the Middle Reach of Ditch A. Methods of stormwater management for the Middle Ditch A area will consist of restoring the ditch to its original design geometry, installing stone aprons at pipe outfalls discharging to the ditch, and installing stone check dams within the ditch. Additional description of these facilities is provided in Appendix L.

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2 The water quality volume is a term from the New York State Stormwater Management Design Manual (NYSDEC 2010). This project is located in the Onondaga Lake watershed, and within this watershed stormwater discharges are required by the New York State Stormwater Management Design Manual to be treated for enhanced phosphorous removal. To provide enhanced phosphorous removal, the water quality volume is defined as the estimated runoff volume resulting from the 1-year, 24-hour design storm.
These stormwater systems were designed to meet performance criteria of the New York State Pollutant Discharge Elimination System and National Pollutant Discharge Elimination System for discharge to wetlands and surface water resources.

The design of stormwater management features to be constructed as part of the Integrated IRM will be coordinated with future and adjacent projects planned for the Site, to the extent practicable. Construction of the future Onondaga Lake Canalways Trail is planned to occur on the upper portion of the Wastebeds 1-8 site. In addition, the final site remedy will be constructed. Each of these projects is anticipated to impact the quantity and routing of stormwater runoff. The Integrated IRM is being designed in accordance with the following assumptions and methodologies:

- Contributing drainage areas boundaries to the proposed swales adjacent to the mitigation wetlands were delineated based on existing and proposed topography. The upper boundary for these areas was assumed to be the mid-point of the proposed Onondaga Lake Canalways Trail. Runoff rates are being estimated using the NRCS TR-55 methodology. It is assumed that the Wastebeds 1-8 site will have a runoff curve number of 58 upon construction of the final remedy. Prior to construction of the final site remedy, the cover type of the drainage areas tributary to the Integrated IRM area will exist as they do today. The curve number associated with these drainage areas is 77.

- Drainage area characteristics and characteristics of proposed Integrated IRM stormwater management features are being modeled using Autodesk Storm and Sanitary Analysis™ software. This software was used to analyze alternatives in the sizing of proposed swales and pipes being considered for the Integrated IRM.

- Stormwater runoff and conveyance modeling associated with the final design considered both the interim site condition (i.e., prior to construction of the final site remedy) and the final site condition (i.e., after construction of the Onondaga Lake Canalways Trail and the final site remedy).

In addition to permanent stormwater management facilities, stormwater management will include management of stormwater during construction. A Stormwater Pollution Prevention Plan (SWPPP) has been developed and is provided under separate cover (O’Brien & Gere 2012c). This plan addresses management of runoff from areas of soil disturbed during Integrated IRM construction activities and management of runoff from upland areas during construction. Design calculations associated with the design of the stormwater facilities described above will be provided as part of the SWPPP.

4.17 RESTORATION OF SURFACES

Areas disturbed during construction, that are not within specific restoration treatment areas (e.g., mitigation wetlands, vegetative cover areas, access pathways), will be restored. Details of the restoration are provided in Appendix H and Appendix L (for Middle Reach Ditch A).

4.18 COORDINATION WITH OTHER REMEDIES

The project goal is to perform construction associated with the Integrated IRM in a timely manner to maintain the Onondaga Lake remediation schedule. To achieve this goal, significant coordination with other Honeywell Portfolio projects was performed and will continue as follows:

- Onondaga Lake Capping, Dredging, and Habitat Design (specifically dredge prisms associated with the capping and dredging limits and shallow shoreline stabilization):
  - Eastern shore collection trench and access road alignment
  - Mitigation wetland extent, berm design and location, and outfall structures
  - Tie-in with lake bathymetry for connected wetland and white cliff revetment
  - Extent of Ditch A excavation and liner near Onondaga Lake
  - Removal of sediment and installation of stormwater control structures in portion the of Middle Reach Ditch A draining to Onondaga Lake
- NMC remedy (specifically the excavation limits):
  - NMC seep collection trench and access road alignment
  - Tie-in between creek bathymetry and upland topography
  - Removal of sediment and installation of stormwater control structures in portion of Middle Reach Ditch A draining to NMC
  - Installation of CIPP liner in Upper Reach Ditch A culvert draining to NMC
- Slurry pipeline alignment, booster pump station locations, and electrical design
  - Control and electrical conduit alignment
  - Grading and extent of Ditch A culvert extension
### 5 REGULATORY/PERMIT REQUIREMENTS

O’Brien & Gere prepared the design to substantively comply with regulatory requirements consistent with 6 New York Codes, Rules and Regulations (NYCRR) § 375-1.7 (Permitting Remedial Activities) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Potentially applicable regulatory programs, including substantive requirements, are summarized in the table below.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Permit/Requirement</th>
<th>Regulated Activity</th>
<th>Substantive Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEDERAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USACE³</td>
<td>Section 404 of the Clean Water Act (CWA); Section 10 of the Rivers and Harbors Act of 1899</td>
<td>▪ Dredging or filling in waters of the US (including federal wetlands) ▪ Activities in navigable waters</td>
<td>▪ Wetland delineation ▪ Mitigation plan for type and function of impacted resource ▪ USEPA responsible for coordination with USACE due to consent order</td>
</tr>
<tr>
<td>USEPA</td>
<td>Executive Order 11990 “Protection of Wetlands”</td>
<td>▪ Review of federally approved actions within federal wetlands</td>
<td>▪ Wetland delineation and assessment</td>
</tr>
<tr>
<td>USFWS</td>
<td>Endangered Species Act</td>
<td>▪ Potential impacts to rare, threatened, and endangered species</td>
<td>▪ Agency consultation (USFWS and NYSDEC NHP)</td>
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<tr>
<td>STATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NYSDEC</td>
<td>6 NYCRR 608 “Protection of Waters”</td>
<td>▪ Activities within State-protected or navigable waters</td>
<td>▪ The proposal will not cause unreasonable, uncontrolled, or unnecessary damage to the natural resources of the state including soil, forests, water, fish, shellfish, crustaceans, and aquatic and land-related environment ▪ The proposal is reasonable and necessary ▪ The proposal will not endanger the health, safety or welfare of the people of the State of New York ▪ Mitigate for type and function of impacted resource</td>
</tr>
<tr>
<td>NYSDEC</td>
<td>Section 401 of CWA “Water Quality Certification”</td>
<td>▪ State review to ensure Federally approved activities do not contravene State water quality standards</td>
<td>▪ Agency coordination</td>
</tr>
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</table>

³ USACE – United States Army Corps of Engineers
### Table 1 - Potentially Applicable Regulatory Programs and Substantive Requirements

<table>
<thead>
<tr>
<th>Agency</th>
<th>Program/Permit Description</th>
<th>Description</th>
<th>Requirement</th>
</tr>
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<tr>
<td>NYSDEC</td>
<td>GP-0-10-001 “General Permit for Storm Water Discharges From Construction Activities”</td>
<td>Stormwater runoff from site disturbances 1-acre or &gt;.</td>
<td>SWPPP and E&amp;SC Plan</td>
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<tr>
<td>NYSOPRHP</td>
<td>Federal &amp; State Preservation Laws (9 NYCCR 428, 36 CFR 800, Section 106 of the NHPA)</td>
<td>Activities affecting historic, architectural, archaeological or cultural resources</td>
<td>Compliance with NHPA of 1966 and State Historic Preservation Act.</td>
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<td>NYSDOT</td>
<td>Highway Work Permit (for non-utility work, PERM 33)</td>
<td>Possible installation of access road adjacent to existing road</td>
<td>Permit Required</td>
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<tr>
<td>NYSDOT</td>
<td>Highway Work Permit (for Utility Work, PERM 32m)</td>
<td>Installation of within NYSDOT ROW</td>
<td>Permit Required</td>
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<tr>
<td>NYSDOT</td>
<td>Use &amp; Occupancy Permit</td>
<td>Installation of permanent forcemain within NYSDOT ROW and across NYSDOT land</td>
<td>Permit Required</td>
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<tr>
<td>COUNTY</td>
<td></td>
<td></td>
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<tr>
<td>Onondaga</td>
<td>Industrial Wastewater Discharge Permit</td>
<td>Discharge of wastewater to the publicly-owned treatment works (via GWTP)</td>
<td>Covered under existing Willis/Semet GWTP permit</td>
</tr>
<tr>
<td>Onondaga</td>
<td>Occupancy Permit</td>
<td>Long-term use of County Parks and Recreation land</td>
<td>Permit Required</td>
</tr>
</tbody>
</table>
6 CITIZEN PARTICIPATION PLAN

A Citizen Participation Plan (O’Brien & Gere 2007) has been developed in accordance with the NYSDEC Citizen Participation in *New York’s Hazardous Waste Site Remediation Program: A Guidebook*, dated June 1998.
7 PROJECT SCHEDULE

A preliminary project schedule has been developed and is included as Figure 4. This preliminary schedule has been developed for project planning purposes and will be further refined prior to commencement of construction.

It is estimated that construction of the majority of the IRM components will be completed to allow for dredging and capping to be conducted in Remediation Areas A and B in 2014. The estimated time for construction of this design is based on experience on similar projects, production rates, and estimates of the time required for the various major construction components.

The estimated schedule does not include time resulting from delays associated with prolonged periods of inclement weather or other unforeseen conditions.
8 HEALTH AND SAFETY PLAN

Before construction activities begin, a site-specific Health and Safety Plan will be prepared and implemented according to Honeywell's General Requirements – Safety, Health and Emergency Response, as well as 26 CFR1910.120. This plan will include:

- Organizational structure, including a list of site and emergency contact information
- Identification of the nearest emergency facility
- Map and directions to the emergency facility
- Hazard analysis
- Training program details
- Medical surveillance program details
- Site control and security details
- Personal protective equipment requirements
- Environmental monitoring plan
- Spill response, containment and control plan
- Decontamination procedures
- Emergency response plan
- Confined space entry procedures
9 COMMUNITY AIR MONITORING PLAN

A Community Air Monitoring Plan (CAMP) has been developed and is provided as a separate document (O’Brien & Gere 2012b). The CAMP describes the air monitoring program to address potential project air emissions into the off-site community.

Specifically, the CAMP describes the following components of the project’s air monitoring program:

- Objectives and needs
- Community receptors
- Approach and duration
- Parameters, methods, and action limits
- Quality assurance and quality control
- Data management and reporting

The air monitoring program was designed using the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (NYSDOH 2000) guidance for evaluation of potential airborne contaminant releases as a direct result of investigative and remedial work activities. The air monitoring program generally consists of continuous monitoring upwind and downwind either at or within the remedial worksite perimeter for dust, total volatile organic compounds, and odors. If warranted, hydrogen sulfide may also be measured at or within the downwind perimeter.
10 SUSTAINABILITY

Evaluations were conducted during the design phase to identify opportunities to incorporate sustainability concepts into the Wastebeds 1-8 Integrated IRM, including those presented in the *Clean and Green Policy* (USEPA 2009) and the NYSDEC DER-31/Green Remediation program policy. To the extent practicable, use of renewable energy sources and locally produced/sourced materials and supplies, reduction/elimination of waste, efficient use of resources and energy, and other practices were specified in the remedial design, and will be implemented during remedial construction.
REFERENCES


This document was developed in color. Reproduction in B/W may not represent the data as intended.
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<th>Finish</th>
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<td>42 days</td>
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<td>Operations, Maintenance, and Monitoring (OM&amp;M) Plan (See Note 1)</td>
<td>81 days</td>
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<td>0 days</td>
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<td>Fri 1/4/13</td>
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<td>0 days</td>
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<td>Submit FINAL CWP and IFC Drawings to NYSDEC for Approval</td>
<td>0 days</td>
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</tbody>
</table>

**Note 1:** Additional details for the OM&M Schedule will be provided during construction.

Non-Binding Working Draft Schedule for Discussion
APPENDICES ON CD

A  Design Drawings
B  Technical Specifications
C  Slope Stability and Settlement Basis of Design
D  Revetment Design
E  Groundwater Collection Basis of Design
F  Seeps Collection Basis of Design
G  Pump Station and Forcemain Basis of Design
H  Mitigation Wetlands and Upland Restoration Basis of Design
I  Groundwater Modeling
J  Passive Well Spacing Basis of Design
K  Ninemile Creek Deltaic Deposit Evaluation
L  Middle Reach Ditch A Basis of Design
February 13, 2013

Mr. John P. McAuliffe, P.E.
Honeywell International, Inc.
301 Plainfield Road
Suite 330
Syracuse, NY 13212

Re: Wastebeds 1-8 Integrated IRM 100% Design

Dear Mr. McAuliffe:

The New York State Department of Environmental Conservation has reviewed the “Wastebeds 1-8 Integrated IRM 100% Design” (design) dated October 2012 and the revised pages submitted on February 1, 2013.

Based on our review the design is approved conditioned on the revised pages to the design referenced above and the revised Table H-3 (attached) being inserted into all copies of the design that are distributed by Honeywell, to its agents (including all contractors working on the work plan), and to the public, if any. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith
Project Manager

ecc: J. Gregg, NYSDEC
     H. Kuhl
     T. Joyal, Esq.
     C. Waterman
     D. Crawford, OBG
     R. Nunes, USEPA
     J. Shenandoah
     A. Lowry
     D. Hesler, NYSDEC
     R. Quail, NYSDEC
     M. Sergott, NYSDOH
     J. Heath, Esq.
     T. Biel, NYSDEC
     F. Kirshner
     M. Spera, AECOM
RE: Wastebeds 1-8 Integrated IRM 100% Design
Town of Geddes, Onondaga County, New York
Order on Consent: Index # D-7-0002-02-08

Dear Mr. Smith:

The purpose of this letter is to provide responses and replacement pages for the Wastebeds 1-8 Integrated Interim Remedial Measure, Mitigation Wetlands, and Remediation Area A Hydraulic Control System (Integrated IRM) Project for the Department’s review, in response to the Department’s Comment letter dated November 21, 2012.

Included in this submission are the following documents that were prepared by O’Brien & Gere:

- **Wastebeds 1-8 Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulc Control System – 100% Design Responses to Comments** dated January 2013

- **Wastebeds 1-8 Integrated IRM 100% Design Replacement Pages** dated January 2013. The replacement pages are to reflect changes noted in the responses to comments document. A summary document of other minor changes to the 100% Design Drawings, which are not attributed to a specific response, is also included. In addition, hard copies of the Sections 7 through 10 and the references are being provided, as they were excluded in the October 2012 submission.

- **Wastebeds 1-8 Integrated IRM Construction Quality Assurance Project Plan Replacement Pages** dated January 2013. These replacement pages are to reflect changes noted in the responses to comments document.

Please contact Doug Crawford at O’Brien & Gere (315-956-6442; doug.crawford@obg.com) or me should you have any questions regarding these documents.

Sincerely,

[Signature]

John P. McAuliffe, P.E.
Program Director, Syracuse

Enc. (2 copies, 1 CD)
<table>
<thead>
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<td>Argie Cirillo, Esq.</td>
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<td>Douglas M. Crawford</td>
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<tr>
<td></td>
<td>Christopher C. Calkins</td>
<td>O'Brien &amp; Gere (ec or ec ltl only)</td>
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This document summarizes revisions to the 100% Design resultant from responses to the Department’s November 21, 2012 comment letter on the Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 100% Design Report, Wastebeds 1-8 and minor revisions that have occurred since submission of the 100% Design Report.

**100% DESIGN REPORT**

Page 1 – Revised text to address NYSDEC comment #1.
Page 15 – Revised text to address NYSDEC comment #11 regarding materials management.
Figure 4 – Revised to address NYSDEC comment #4.

**APPENDIX A – DESIGN DRAWINGS**

Drawing C-10 – The proposed locations of MH-117 and CO-116 have been revised. The drawing has been revised to reflect revisions to Alignment I and an additional pathway to access CO-116.

Drawing C-14 - The (2) 15" HDPE stormwater pipes have been changed to 16" HDPE to conform to typical HDPE pipe sizes.

Drawing C-22 - The proposed locations of MH-117 and CO-116 have been revised. The drawing has been revised to reflect revisions to Alignment I and an additional pathway to access CO-116.

Drawing C-30 - The drawing has been revised to reflect an additional pathway to access CO-116.

Drawing C-42 - The drawing has been revised to reflect an additional pathway to access CO-116.

Drawing C-50 - The drawing has been revised to reflect an additional pathway to access CO-116 with restoration limits.

Drawing C-50B. – The notes referencing habitat features have been revised to only reference drawing C-90 since the habitat notes were moved from C-43 to that drawing. This is in response to Comment 5 from the NYSDEC.

Drawing C-55. - Rip-rap has been shown in the swale (as shown on C-38) in response to Comment 7 from the NYSDEC.

Drawing C-56. - Rip-rap has been shown in the swale (as shown on C-39) in response to Comment 7 from the NYSDEC.

Drawing C-58 – Locations and bottom elevations of passive wells and piezometers have been revised.

Drawing C-59 - Locations and bottom elevations of passive wells and piezometers have been revised.

Drawing C-60 - Locations and bottom elevations of passive wells and piezometers have been revised.

Drawing C-64 - Bottom elevations of passive wells and piezometers have been revised.

Drawing C-65 - Locations and bottom elevations of passive wells and piezometers have been revised.

Drawing C-66 - The location of MH-117 has been revised, therefore the piping profile for Alignment K has been updated and revisions to the location of manual air relief have been made. Manual air relief is now proposed at MH-K02.

Drawing C-67 - The (2) 15" HDPE stormwater pipes have been changed to 16" HDPE to conform to typical HDPE pipe sizes. The location of MH-117 has been revised, therefore the piping profile for Alignment M has been
updated and revisions to the location of manual air relief have been made. Manual air relief is now proposed at MH-M04.

Drawing C-67C – The location of MH-I17 has been revised, therefore the piping profile for Alignment I has been updated and revisions to the location of manual air relief have been made.

Drawing C-72 – The proposed grade elevations have been revised along the bottom of the profile grid to correspond to the proposed grade line shown on the profile.

Drawing C-73 - The (2) 15” HDPE Stormwater Pipes have been changed to 16” HDPE to conform to typical HDPE pipe sizes.

Drawing C-81 – The typical anchor bolt geomembrane connection detail has been revised and moved to sheet C-82.

Drawing C-82 – A Typical Geomembrane Batten Strip Connection Detail has been added to this sheet. This detail is referenced in the notes for the wet swale outlet structure and inland wetland outlet structure details. A note about the manhole exterior coating has also been added to the Wet Swale Outlet Structure and Inland Wetland Outlet Structure details. In addition, several dimensions have been added to these details for clarification.

Drawing C-83 - The permanent stone check dam detail has been revised to provide clarification.

Drawing C-85 – The forcemain cleanout manhole and MH-I17 details have been updated to reflect a 24” diameter cover. The arrangement and flow direction of the connecting piping on the MH-I17 detail has been revised, and the air relief piping is no longer shown. The air relief piping will be installed at MH-K02 and MH-M04 instead of MH-I17 due to a revised location of MH-I17 being selected.

Drawing C-86 – A note has been added to the typical catch basin and outlet structure details to reference the typical geomembrane batten strip connection detail on sheet C-82.

**APPENDIX B – TECHNICAL SPECIFICATIONS**

Specification 31 01 01 Earthwork – Revised to address NYSDEC comment 11 related to materials management.

Specification 31 05 14 Select Fill – Revised to address NYSDEC comment 12 for ‘Type H” material gradation.

Specification 02622 Cured in Place Pipe – Revised to remove specific resin product reference and added text requesting material compatibility certification from manufacture with Site groundwater.

Attachment A to Specifications 02622, 03901, 09800 – Updated Groundwater constituents and concentrations

**APPENDIX H – MITIGATION WETLANDS AND UPLAND RESTORATION BASIS OF DESIGN**

Page 3 – Revised to address NYSDEC comment 13

Table H-3 – Revised to address NYSDEC comment 14 related to water quality testing

**APPENDIX J - PASSIVE WELL SPACING BASIS OF DESIGN**

Page 1 and 2 – Revised to address NYSDEC comment 2, 3, 8, and 9 by revising text and adding reference to new figures and tables.

**CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN**

Page 3 and 5 – Revised to address NYSDEC comment 15 regarding adding text back into document regarding CQI inspector for LLDPE geomembrane.

Page 28 – Table 3-14 revised to address NYSDEC comment 12 for “Type H” material gradation.
This document provides responses to the Department's November 21, 2012 comment letter on the Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 100% Design Report, Wastebeds 1-8. For ease of review, the Department's comments are provided below in italicized font, followed by responses in bold font. The response includes an explanation of how details will be incorporated into the 100% Design, as applicable.

100% DESIGN REPORT

Comment 1. Page 1, Paragraph 2 and Response to Comment 2. Based on where in the revised text the comment was addressed, the sentence should state: "...and also reduce upwelling velocities for cap effectiveness in adjacent Remediation Area B and a portion of Remediation Areas A and C." Also, the sentence in the fourth paragraph should be revised accordingly.

Response 1. The text will be revised accordingly.

Comment 2. Page 4, Section 3.2 and Response to Comment 34. As stated in my 10/25/12 email to Brad Kubiak sampling will need to be "...performed to determine that the passive wells are installed into the silt and clay unit. We would recommend performing continuous split spoons (beginning in the marl unit near the expected clay surface and extending into the silt and clay unit) to ensure that the top of the silt and clay is identified. A statement that this will be modified with DEC concurrence based on observations in the field can be included so we can make changes if the clay surface is found to be uniform or at expected depths so not all wells may need sampling can be included." The 100% Design should be revised to incorporate this.

Response 2. As discussed with NYSDEC, a combination of revising passive well depths and implementing a boring program, as detailed in work plan submitted to NYSDEC on January 18, 2013, to verify the depth of the silt and clay unit will be performed. Figures depicting geologic units and passive well depths (Figures J-1 through J-6) and revised passive well depth summary tables will be included in Appendix J (Tables J-1, J-2, and J-3). Passive well depths will also be revised on applicable Contract Drawings.

Comment 3. Page 5, Section 3.2.2 (Remediation Area A Hydraulic Control System), Table 3 of Response to Comment 34, Drawing C-65. Although the estimated elevations of the top of silt and clay for the Remediation Area A hydraulic system are generally in agreement with the boring logs presented in the June 2011 PD1 Addendum Summary Report, the estimated elevations of the top of the silt and clay at the eastern end of the system in Table 3 (ranging from 292 to 297 ft) are higher than the estimated elevation of the top of the silt and clay based on the boring log for SB-250, which is at approximately 285 ft. Therefore, the passive wells may need to extend deeper in this area.

Response 3. The passive wells depths at the eastern end of the hydraulic system will be revised on applicable Contract Drawings. In addition, as discussed with NYSDEC, a boring program, as detailed in work plan submitted to NYSDEC on January 18, 2013, to verify the depth of the silt and clay unit will be performed. Figures depicting geologic units and passive well depths (Figures J-1 through J-6), along with revised passive well depth summary tables will be included in Appendix J as Tables J-1, J-2, and J-3.

Comment 4. Figure 4. The schedule will need to be updated.

Response 4. Comment noted.
Comment 5.  Appendix A, Drawing C-50B. Remove Note 1 because habitat feature notes are no longer located on Drawing C-43.

Response 5.  The drawing note will be revised to reference Drawing C-90, as the habitat features are now located there.

Comment 6.  Appendix A, Response to Comment 25 (Drawings C-44 to C-50). It is not clear that the design drawings were revised to address this comment (i.e., the limits of the finer grained Type H material along the wetland side slopes do not appear to be shown).

Response 6.  The limits of the finer grained Type H material were not shown on Drawings C-44 to C-50, as this information could be more clearly shown on a detail drawing. The Typical Inland Wetland Berm and Vent Detail on Drawing C-84 was revised to address this comment.

Comment 7.  Appendix A, Drawing C-56. The swale shown on the figure should include rip rap (as shown in the swale on Drawing C-39).

Response 7.  Drawing C-56 and Drawing C-55 will be updated to show the rip-rap limits.

Comment 8.  Appendix A, Drawing C-60, Piezometers. The piezometers used to monitor hydraulic capture should also be keyed into the silt and clay as shown on the detail on Drawing C-86. However, the bottom of PZ-38 is shown as 333 ft whereas the bottoms of the adjacent passive wells are 317 to 318 ft. Please adjust the bottom of this piezometer and confirm that the bottoms of the remaining piezometers in all three systems are correct.

Response 8.  Based on discussions with NYSDEC, piezometer depths have been adjusted, where necessary. Appendix A Contract Drawings will be revised as appropriate, as well as Tables 3, 4, and 5 of Response to Comment 34. These tables have been incorporated into Appendix J as Tables J-4, J-5, and J-6.

Comment 9.  Appendix A, Drawing C-64 and Table 2 of Response to Comment 34. To maintain approximately 20 ft spacing in the area of the historic Ninemile Creek channel deposits, a passive well should be added at Station J1+10, otherwise spacing between RW-228 and RW-230 is 40 ft not 20 ft as in the rest of the reach in this area from RW-224 to RW-240. Also, a piezometer should be included in this area as was included in the 95% design. In addition, although the locations of certain piezometers used to monitor hydraulic capture have been moved from the 95% design, please confirm that the number of piezometers in all three systems has not been reduced from the 95% design.

Response 9.  Along the eastern end of this hydraulic system the spacing of the passive wells is designed to be 20 ft perpendicular to the direction of groundwater flow. As discussed with NYSDEC, the additional passive well is not required because the passive well spacing perpendicular to the direction of groundwater flow is 20 ft. A section of the hydraulic system in this area is aligned parallel to the direction of groundwater flow (perpendicular to Ninemile Creek) and as such is aligned along a single groundwater flow path.

The number of piezometers in all three hydraulic systems has not been reduced from the 95% design. The locations of some piezometers have been modified to avoid conflict with other design...
features. The locations and depths of piezometers are included as Tables J-4, J-5, and J-6 in Appendix J.

Comment 10. Appendix B, Specifications 26 05 43, 26 05 53, 31 01 01, and 31 23 00. In the hard copy I received, these specifications are included twice.

Response 10. Comment noted for future distributed copies.

Comment 11. Appendix B, Specification 31 01 01, Section 3.4. The specification will need to be consistent with Section 4.15 of the 100% Design report (page 15) and should state "If the excavated material is characteristically hazardous or is grossly contaminated (e.g., contains non-aqueous phase liquid), it will be disposed off-site."

Response 11. The specification and Section 4.15 will be updated for consistency to reflect that if visibly contaminated material (e.g., contains non-aqueous phase liquid, grossly stained materials) will be segregated. This material will be disposed of at an offsite permitted facility, after required waste characterization samples have been collected and analyzed.

Comment 12. Appendix B, Specification 31 05 14, Select Fill. For consistency with Comment 17 on the Wetland Interim Submittal and the revised response provided with this submission, the habitat subgrade material (Type H) should have 100% passing the 4-inch sieve rather than 80 to 100%. This should also be adjusted in the CQAPP.

Response 12. The specification and CQAPP will be revised accordingly.

Comment 13. Appendix H, Page 1, Paragraph 3. The text should also reference the follow-up responses to comments dated 10/16/12.

Response 13. The text of Appendix H will be revised accordingly.

Comment 14. Appendix H, Table H-3. Annual water quality testing for toxicity to amphibian eggs and larva must be retained for the success criteria for the wetlands as approval of the mitigation wetland was contingent on this measure of success.

Response 14. As discussed with NYSDEC on January 16, 2013, the last row in Table H-3 of the Appendix H has been revised to incorporate additional details concerning the approach to be followed in the event that evidence of successful amphibian reproduction is not occurring within the Inland Wetlands following the third annual monitoring event.

Comment 15. CQAPP. Text was added in Section 2.2 for the CQA Manager to address Comment 101. However, it not clear why text for the CQC Inspector was removed. ("CQC Inspector. The CQC Inspector shall be from an engineering firm or certified testing laboratory experienced in the installation and testing of LLDPE geomembrane. The CQC Inspector shall be required to demonstrate qualification by having previous experience in inspecting at least two million square feet of LLDPE geomembrane. The CQC Inspector's qualifications will be submitted and reviewed by the Engineer."). please clarify.

Response 15. Text will be re-incorporated into the report.
Mr. Tracy A. Smith  
Project Manager  
NYSDEC Div. of Environmental Remediation  
Remedial Bureau D  
625 Broadway, 12th Floor  
Albany, NY 12233-7016

RE: Wastebeds 1-8 Integrated IRM 100% Design  
Town of Geddes, Onondaga County, New York  
Order on Consent: Index # D-7-0002-02-08

Dear Mr. Smith:

The purpose of this letter is to provide documents for the Wastebeds 1-8 Integrated Interim Remedial Measure, Mitigation Wetlands, and Remediation Area A Hydraulic Control System (Integrated IRM) Project for the Department’s review.

Included in this submission are the following documents that were prepared by O’Brien & Gere:

- Wastebeds 1-8 Integrated IRM 100% Design Report dated October 2012, which includes design drawings
- Wastebeds 1-8 Integrated IRM Community Air Monitoring Plan dated October 2012
- Wastebeds 1-8 Integrated IRM Construction Quality Assurance Project Plan dated October 2012

These documents incorporate revisions to the previously submitted 95% Design Documents, based on comments presented in the Department’s June 26, 2012 letter and subsequent correspondence. Please contact Doug Crawford at O’Brien & Gere (315-956-6442; doug.crawford@obg.com) or me should you have any questions regarding these documents.

Sincerely,

John P. McAuliffe, P.E.
Program Director, Syracuse

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