Operable Unit 1 of the Solvay Wastebeds 1-8 Site

Subsite of the Onondaga Lake Superfund Site

Geddes, Onondaga County, New York

NYSDEC *September 2014* EPA *Region 2*

PURPOSE OF THIS DOCUMENT

This Proposed Plan describes the remedial alternatives considered for Operable Unit (OU) 1 (soil/fill materials/Solvay waste) of the Solvay Wastebeds 1-8 Site (Site) and identifies the preferred remedial alternative with the rationale for this preference.

This Proposed Plan was developed by the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Health (NYSDOH). NYSDEC and EPA are issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as well as the New York State Environmental Conservation Law (ECL) and Title 6 New York Code of Rules and Regulations (NYCRR) Part 375. The nature and extent of the contamination at the OU1 of the Site and the remedial alternatives summarized in this Proposed Plan are described in *Revised Remedial Investigation Wastebeds 1 through 8 Site* and the *Feasibility Study Report Operable Unit 1 Wastebeds 1 through 8*, contained in the Administrative Record file for OU1. NYSDEC and EPA encourage the public to review these documents to gain a more comprehensive understanding of OU1 and the Site and the Superfund activities that have been conducted at the Site.

This Proposed Plan is being provided as a supplement to the reports listed above to inform the public of NYSDEC and EPA's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative.

NYSDEC and EPA's preferred remedy consists of a cover system that would be protective for current and/or reasonably anticipated future land uses (e.g., active and passive recreational uses). In general, the remedy consists of a two-foot thick soil cover over areas where active recreation is planned or where appropriate to protect ecological resources and a one-foot thick soil cover where passive recreation is planned. Other areas of the site, such as in heavily wooded or steeply sloped areas, would be covered with a vegetation enhancement layer to promote growth of vegetation.

A Site Management Plan and institutional controls would also be included.

The remedy described in this Proposed Plan is the preferred remedy for OU1 of the Site. Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after NYSDEC and EPA have taken into consideration all public comments. NYSDEC and EPA are soliciting public comment on all of the alternatives considered in the Proposed Plan and in the detailed analysis section of the *Feasibility Study* report because NYSDEC and EPA may select a remedy other than the preferred remedy.

MARK YOUR CALENDAR

September 16, 2014 – October 16, 2014*: Public comment period on the Proposed Plan.*

Public Meeting

September 30, 2014 at 6:00 P.M.: Martha Eddy Room in the Art and Home Center at the New York State Fairgrounds

Public Availability Session

September 30, 2014 from 5:00 -6:00 P.M.: Martha Eddy Room in the Art and Home Center at the New York State Fairgrounds

Community Role in the Selection Process

NYSDEC and EPA rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, this Proposed Plan has been made available to the public for a public comment period which begins on September 16, 2014 and concludes on October 16, 2014.

As noted above, a public meeting and a public availability session will be held during the comment period to elaborate on the reasons for recommending the preferred remedy, to answer questions, and to receive public comments. The public meetings will include a formal presentation by NYSDEC of the preferred

remedy and other cleanup options which have been considered for OU1. The availability sessions will be less formal, and provide the public a chance to receive printed information and discuss the cleanup options with NYSDEC and EPA representatives on a one-on-one basis.

Comments received at the public meetings, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document that formalizes the selection of the remedy.

Written comments on this Proposed Plan should be addressed to:

Tracy A. Smith
NYS Department of Environmental Conservation
625 Broadway
Albany, NY 12233
E-mail: tracy.smith@dec.ny.gov

INFORMATION REPOSITORIES

The administrative record file, which contains copies of the Proposed Plan and supporting documentation are available at the following locations:

Onondaga County Public Library
Syracuse Branch at the Galleries
447 South Salina Street
Syracuse, NY 13204
315-435-1800

Solvay Public Library
615 Woods Road
Solvay, NY 13209
315-468-2441

Atlantic States Legal Foundation
658 West Onondaga Street
Syracuse, NY 13204
315-475-1170

New York State Department of Environmental Conservation
615 Erie Boulevard, West
Syracuse, NY 13204
315-426-7400

New York State Department of Environmental Conservation
Attn.: Tracy A. Smith
625 Broadway
Albany, NY 12233
518-402-9676
*(*tracy.smith@dec.ny.gov*)*

SITE BACKGROUND

On June 23, 1989, the Onondaga Lake site was added to the New York State Registry of Inactive Hazardous Waste Disposal Sites. On December 16, 1994, Onondaga Lake, its tributaries, and the upland hazardous waste sites which have contributed or are contributing contamination to the lake (subsites) were added to EPA's National Priorities List (NPL). This NPL listing means that the lake system is among the nation's highest priorities for remedial evaluation and response under the federal Superfund law for sites where there has been a release of hazardous substances, pollutants, or contaminants.

Since many Superfund sites are complex and have multiple contamination problems and/or areas, they are often divided into several operable units for the purpose of managing the site-wide response actions. The NCP (at Section 300.5) defines an operable unit as "a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

The Site, which is a subsite to the Onondaga Lake NPL site, consists of two operable units--OU1, which addresses the Solvay waste and contaminated soil/fill materials and is the subject of this proposed remedy, and OU2, which will address the groundwater and impacted media in a surface water drainage ditch, Ditch A. A Feasibility Study (FS) is currently underway for OU2. A Proposed Plan for OU2 will be released following the development of the FS for OU2.

Site Description and History

Location: The Site, which is located on the southwestern shore of Onondaga Lake in Geddes, New York, is situated between the New York State (NYS) Fairgrounds and the shoreline of Onondaga Lake. The outlet of Ninemile Creek defines the westernmost boundary of the Site, while the eastern end of the Site is generally bounded by roadways. See Figure 1, Site Location.

Site Features: The 404-acre Site includes eight irregularly shaped wastebeds that extend roughly 1.5 miles along the shore, with a maximum width of 0.5 miles. The wastebeds consist primarily of inorganic waste materials (Solvay waste) from the production of soda ash (sodium carbonate) using the Solvay process. Other contaminants (*e.g.,* benzene, toluene,

ethylbenzene, and xylenes [BTEX], naphthalene and assorted polycyclic aromatic hydrocarbons [PAHs], phenolic compounds, polychlorinated biphenyls [PCBs] pesticides, and inorganics), which are not related to soda ash production, are also present at the Site. A surface water drainage feature, Ditch A, runs along the southern and eastern Site boundaries and discharges stormwater from roads, parking areas and the overland surface flow from the Site to Ninemile Creek and Onondaga Lake. Site elevations range from approximately 363 feet above mean sea level (MSL) at the shores of Onondaga Lake, to 430 feet above MSL. A Site Plan is included as Figure 2.

Interstate 690 (I-690) and interchanges associated with NYS Route 695 (NY-695), NYS Fairgrounds parking lots, access roads for the parking lots, and foot bridges are present and in use at the Site. The NYS Fairgrounds parking lots (approximately 77 acres) consist of over two feet of gravel and fill material placed over the Site's soil/fill/Solvay waste material. Other infrastructure and development present include the approximate 2.5-mile Onondaga County West Shore Trail Extension (public recreation trail) and a 20-acre permitted, closed landfill formerly operated by Crucible Specialty Metals (Crucible). An approximate 17-acre Biosolids Area used by the City of Syracuse and Onondaga County for sewage sludge disposal is located near the southeastern end of the Site over portions of Wastebeds 1 and 2. Lakeview Point, which generally comprises Wastebed 6, forms one of the Site's more prominent features--a peninsula that extends into Onondaga Lake near the northern end of the Site.

The portion of the property that is developed as parking lots and roadways is, in general, owned by NYS and there are property easements for highway and stormwater drainage features. The remaining portion of the Site is owned by Onondaga County. The County-owned portion is largely undeveloped, characterized by varying degrees of vegetation ranging from sparsely vegetated areas to stands of mature trees. The County-owned property is deed restricted to "park purposes" use. Figure 2 depicts the approximate property boundaries.

Site Geology and Hydrogeology: The Site geology consists of seven distinct layers including fill/Solvay waste, marl/peat, silt and clay, silt and fine-grained sand, basal sand and gravel, basal till, and bedrock (Vernon Shale). The Site hydrogeology consists of an Upper Groundwater System and a Lower Groundwater System separated by a confining silt and clay layer which is present across much of the site.

The Upper Groundwater System consists of the anthropogenic fill/Solvay waste and the native marl/peat, as well as deltaic deposits associated with the former, buried Ninemile Creek channel in a portion of the site. The Lower Groundwater System consists of the silt and fine grained sand deposits, the basal sand and gravel deposits, and a bedrock zone. The water table is typically 20 to 35 feet below ground surface (bgs) on top of the upper wastebed tiers, and 10 to 18 feet bgs on the lower wastebed tiers adjacent to Ninemile Creek. As mentioned above, Site groundwater will be addressed under a subsequent OU-2 FS.

Shallow groundwater generally flows radially from the wastebeds toward Onondaga Lake, Ninemile Creek, and drainage ditches. Some groundwater flows along the buried, former Ninemile Creek channel deltaic deposits toward Onondaga Lake and Ninemile Creek.

History of the Site: The lowering of the lake level in 1822 to the same level as the Seneca River resulted in the formation of Geddes Marsh. The wastebeds were constructed and operated over the Geddes Marsh by a series of companies, of which Honeywell International Inc. is the successor. The Site is composed primarily of Solvay waste, a material consisting largely of calcium carbonate, calcium silicate, and magnesium hydroxide and which in an unweathered state has elevated pH levels. These wastes were generated at the former Solvay Process Main Plant as part of 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.

In addition to wastes generated from soda ash production, waste materials from other nearby manufacturing facilities were likely disposed of at the Site. Chlorinated benzene production at the nearby Willis Avenue plant occurred 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. The Benzol plant operated from 1915 to 1970. This plant produced benzene, toluene, xylenes, and naphthalene by the fractional distillation of coke "light oil". The Solvay Process Company operated a coke plant from 1892 through 1923. A phenol production plant operated from 1942 to 1946. 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 confirm this.

Wastebeds 1-6 were in use before 1926 and may have become operational as early as 1916, although no definitive construction date is available. Ninemile Creek was rerouted to the north to permit the construction of Wastebeds 5 and 6, and the former creek channel was buried. Wastebeds 7 and 8 were not utilized until after 1939 and remained in use with Wastebeds 1-6 until 1943. The location of each wastebed is included on Figure 2.

Subsequent uses of the Site included construction of a 1.2-mile stretch of I-690 prior to 1958, construction of the I-690 and NY-695 interchange between 1973 and 1978, and the operation of a landfill on a portion of Wastebed 5 by Crucible Specialty Metals from 1973 to 1988. The Crucible Landfill covers an area of approximately 20 acres and contains an estimated 225,100 cubic yards (CY) of non-hazardous and hazardous wastes. NYSDEC approved the 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 utilized a portion of the wastebeds as a biosolids disposal area from 1925 to 1978 for municipal sewage sludge.

The New York State Fair started using a portion of the Site for parking over 50 years ago, and this use continues to the present day. While the parking lots are not paved, they have received gravel and fill over the years, and currently over 2 feet of gravel and fill overlay the Solvay waste in these areas.

In 2004, Honeywell and NYSDEC entered into an Order on Consent (Index #D-7-0002-02-08) to conduct a Preliminary Site Assessment and RI/FS.

Interim Remedial Measure: An Interim Remedial Measure (IRM)[1] is being implemented at the Site in order to prevent the continued migration of contaminants into Ninemile Creek and Onondaga Lake. The basis for the IRM was supported by a Streamlined Risk Evaluation (SRE) conducted as part of a 2010 Focused Feasibility Study (FFS). The FFS evaluated areas of the Site where contaminant migration was documented or likely to occur, and the SRE provided a concise evaluation of potential risks to human and ecological receptors from those limited areas of the Site. Specifically, it was determined in the SRE and the FFS that there is a potential threat to human health and the environment from contaminant migration from eastern shore shallow and intermediate groundwater, as well as from seeps, surface Solvay waste along the eastern shore, and surface water/sediment/Solvay waste in the lower reach of Ditch A (NYSDEC and EPA, 2011). It was concluded, therefore, that an IRM was needed to address migration of contaminants from these media via several measures discussed in more detail below.

Coincident with the planning for the IRM, several additional response elements were identified and added to the scope of the IRM. Specifically, a wetlands mitigation project, a hydraulic groundwater control system along the northern shoreline, and restoration and cleaning in the middle reach of Ditch A were incorporated into the IRM design. The objective of the mitigation wetlands is to compensate for the loss of wetland functions and values related to actions at the Site and the nearby Wastebed B/Harbor Brook subsite, and for the loss of lake surface area resulting from placement of a barrier wall and light weight fill off-shore of the nearby Willis Avenue subsite. An objective for the hydraulic control of groundwater in the area of Onondaga Lake adjacent to the northern shoreline of the Site is to reduce groundwater upwelling velocities that may impact the isolation cap to be placed in that area of the lake as part of the Lake Bottom remedy selected for Onondaga Lake. The objective of sediment removal and maintenance of the Middle Reach of Ditch A is to mitigate transport of soil/fill material substrate and sediment to Onondaga Lake and to Ninemile Creek.

Construction of the IRM began in 2011 and is anticipated to be completed in November 2014. The IRM includes:

- Shoreline stabilization system (*i.e.,* vegetated on-shore revetment) – A shoreline stabilization system was installed along a portion of the Northern and Eastern Shorelines. A vegetated on-shore revetment was installed along the steep cliffs to reduce erosion from wind-wave and ice action, and to provide habitat enhancement.

- Groundwater and seep collection trenches, including pump stations and associated forcemain piping – Groundwater trenches (including passive wells) and seep collection trenches were installed throughout the Site along Ninemile Creek and the Eastern and Northern shorelines. Upon collection, the groundwater and seep water are conveyed to the Willis Avenue Groundwater Treatment Plant (GWTP).

- Ditch A – Work associated with Lower Ditch A included culvert installation, substrate excavation, and installation of a low permeability habitat layer. Additional work within Ditch A included culvert rehabilitation in the upper reach of Ditch A and sediment removal and maintenance in the middle reach of Ditch A.

[1] The use of the term “Interim Remedial Measure” throughout this document is not intended to mean that this removal action is a “remedial action” as that term is defined in the federal law, CERCLA. An IRM is an activity that is necessary to address either emergency or non-emergency site conditions, which in the short-term need to be undertaken to prevent, mitigate, or remedy environmental damage or the consequences of environmental damage attributable to a site. An IRM is equivalent to a non-time critical removal under the CERCLA removal program pursuant to 40 C.F.R. i 300.415(b)(2).

- Mitigation wetlands establishment consisting of aquatic habitat connected to Onondaga Lake and inland wetlands - 9.5 acres of mitigation wetlands are being constructed, of which 2.3 acres will be connected wetlands and 7.2 acres will be inland wetlands, within the low-lying Eastern Shoreline.

- Vegetative Cover - A vegetative cover system is being constructed on the Eastern Shoreline in areas not occupied by other elements of the IRM (*i.e.*, mitigation wetlands, stormwater features, berms, and access pathways).

IRM-related monitoring will be performed to document that success criteria (e.g., vegetation establishment, wildlife observations) are being met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may consist of repair of cover cross-sections in areas of disturbance or re-application of vegetation in areas of non-survivorship. Maintenance of IRM-related access roadways will also be included in the cover system maintenance.

Current Zoning and Land Use: The Site is zoned for commercial use and is bounded by commercial and industrial properties to the south and west, which include the NYS Fairgrounds, the Crucible Specialty Metals facility, and State Fair Boulevard. Current uses of the State-owned lands include overflow parking lots for the NYS Fairgrounds, venues for outdoor events, such as recreational vehicle vendor shows, the approximate 1.2-mile stretch of I-690, and interchanges associated with I-690 and NY-695. County lands feature a public recreation trail and the closed Crucible Landfill. The current and reasonably anticipated future land uses for the Site are commercial and recreational, and to provide areas which are protective of and which can sustain valuable ecological resources.

The anticipated future use of the portion of the Site owned by Onondaga County includes the existing public recreation trail and a proposed amphitheater on the northwestern portion of the Site, near Lakeview Point that, in early 2014, Onondaga County announced it plans to construct. The remainder of the property owned by Onondaga County may be subject to future development as opportunities become available. The anticipated future use for NYS lands is not anticipated to change at this time.

Summary of Existing Soil Covers and Infrastructure

Approximately 224 acres of the Site have cover materials or infrastructure located on it. These areas are:

- Approximately 90 acres of vegetated covers and road beds associated with the I-690/NY-695 corridor and other Site roads/infrastructure.
- Approximately 58 of the 77 acres used as parking lots associated with the NYS Fairgrounds, are already covered with an estimated 2 to 7 feet of imported fill, including at least 1 foot of gravel/fill at the surface.
- Approximately 47 acres of soil/fill/Solvay waste material in the lake shoreline areas where the IRM is being implemented exhibit contaminant concentrations above New York State's 6 NYCRR 375 soil cleanup objectives (SCOs) for the protection of ecological resources. Vegetated covers, seep aprons, shoreline stabilization and constructed wetlands are elements of the IRM. Vegetated covers and constructed wetlands incorporate soil covers and/or liner thicknesses that are 2 feet thick. Seep aprons consist of a total thickness of 18 inches of material (rock and soil), and a liner, which are considered adequate barriers to ecological receptors. This also includes the clean fill staging areas that currently support the IRM, Ninemile Creek, and Onondaga Lake site remediation, and that were constructed using a minimum of 6 inches of crushed stone.
- Approximately 20 acres occupied by the Crucible Landfill, which is a permitted landfill that was closed with a Part 360 cap in 1988. Long-term monitoring is performed annually consistent with the landfill closure requirements.
- Approximately 9 acres of the Onondaga County West Shore Trail Extension (public recreation trail), which is a paved walking and biking trail.

RESULTS OF THE REMEDIAL INVESTIGATION

For the purpose of identifying areas to be addressed and to support the development and evaluation of remedial alternatives, analytical results from the RI sampling were compared to the respective SCOs applicable to each land use type including restricted residential use SCOs (which includes active recreational uses such as lawn seating areas and playing fields), the commercial use SCOs (which includes passive recreational uses, such as walking trails), the SCOs for the protection of ecological resources, and the SCOs for unrestricted use. The unrestricted use SCOs represent the concentration of a contaminant in soil which, when achieved at a site, are sufficiently low so that no use restrictions are required on the site for the protection of public health, groundwater, and ecological resources notwithstanding the presence of contaminants in the soil.

Surface Soil/Fill Material/Solvay Waste (0 to 2 feet bgs)

Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs and inorganics were detected in surface soil/fill material/Solvay waste at OU1.

VOCs detected above unrestricted SCOs in surface soil included acetone, methylene chloride, and xylenes. Detected levels of these VOCs ranged from 2.5 to 400 micrograms per kilogram (µg/kg). SVOCs detected above unrestricted SCOs included benzo(a)pyrene, benzo(a)anthracene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, dibenzofuran, dibenzo(a,h)anthracene, hexachlorobenzene, indeno(1,2,3-CD)pyrene, and napthalene. Detected levels of these SVOCs ranged from 36 to 25,000 µg/kg. Pesticides detected above unrestricted SCOs included 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, alpha-chlordane, and dieldrin. Detected levels of these pesticides ranged from 0.40 to 1,600 µg/kg. PCBs were detected at concentrations above the unrestricted SCO in the upland and lakeshore areas. Detected levels of PCBs ranged from 1.6 to 33,000 µg/kg. The highest levels of PCBs were detected in the Biosolids Area. PCBs were not detected at levels above the SCO for PCBs in the parking lot area. Inorganic contaminants detected above unrestricted SCOs included arsenic, barium, cadmium, chromium, copper, hexavalent chromium, lead, manganese, mercury, nickel, potassium, selenium, silver, and zinc. Detected levels of these inorganic contaminants ranged from 0.01 to 14,000 milligrams per kilogram (mg/kg). There is no evident distribution pattern of inorganic or organic constituents in surface soil within the parking area, the upland area or the lakeshore area of OU1 with the exception of higher concentrations of chromium, nickel, and selenium in the western half of the upper parking lot area adjacent to the Crucible Landfill and higher levels of metals and PCBs in the Biosolids Area relative to other parts of the upland area.

In existing or planned commercial use areas of OU1 (*e.g.,* walking trails, parking lots), data were compared to the SCOs for commercial use (which includes passive recreational use). A total of approximately 24 acres of existing or planned commercial use areas at OU1 exceed commercial use SCOs in the top 2 feet.

In areas of OU1 that include proposed development (*e.g.*, lawn seating areas within the amphitheater footprint), data were compared to the SCOs for restricted residential use (which includes active recreational use). Based on information provided by the County, the amphitheater may be constructed within/proximal to the Lakeview Point portion of OU1. Because the exact location of the amphitheater is unknown, samples within the footprint of Wastebed 6 and areas extending to the shoreline of Onondaga Lake around Wastebed 6 were evaluated using these more stringent SCOs. There were no contaminants of potential concern (COPCs) in surface soils which exceeded the restricted residential use SCOs (applicable for active recreational use) in this area.

In areas of OU1 that are heavily wooded, steeply sloped, or not planned for active or passive uses, surface soil data (within the top 2 feet) were compared to the SCOs for protection of ecological resources. The locations of the majority of ecological protection SCO exceedances, which consisted of metals, pesticides, PCBs and SVOCs, are located within the footprint of the Biosolids Area and within the footprint of the IRM (eastern shoreline, staging areas, and clean fill staging area near the upper parking lot). Approximately 30 acres of the Site that are heavily wooded, steeply sloped, or not planned for active or passive recreational uses exceed ecological use SCOs in surface soil in these areas.

Subsurface Soil/Fill Material/Solvay Waste (at depths greater than 2 feet bgs)

During the RI, subsurface soil samples (deeper than 2 feet) were collected from soil borings and test pits. Based on Site data, VOCs, SVOCs, pesticides, PCBs and/or inorganics were detected in subsurface soil/fill materials/Solvay waste throughout OU1 at levels above the relevant SCOs for unrestricted use. VOCs detected above unrestricted SCOs in subsurface soil included 2-butanone, acetone, benzene, ethylbenzene, methylene chloride, toluene, and xylenes. Detected levels of these VOCs ranged from 0.35 to 500,000 µg/kg. The highest VOC concentrations were found at depths of over 70 feet bgs. SVOCs detected above unrestricted SCOs included 2-methylphenol, 4-methylphenol, benzo(a)pyrene, benzo(a)anthracene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, dibenzofuran, fluorene, indeno(1,2,3-CD)pyrene, naphthalene, and phenol. Detected levels of these SVOCs ranged from 0.74 to 1,700,000 µg/kg. The location and depth of SVOCs vary by individual compound; however, in general, the higher concentrations of SVOCs found at OU1 were located in excess of 40 feet bgs. The samples that exhibit the highest concentrations of organic contaminants are found within a layer of stained Solvay waste that is located within the footprints of Wastebeds 1-4. This stained Solvay waste was typically encountered in a defined layer of orange-brown to dark brown colored Solvay waste, below the white to medium gray unstained Solvay waste. The thickness of the stained material ranges from 3 to 17 feet, and it is located above native material at a depth range of approximately 40 to 70 feet bgs. Pesticides detected above unrestricted SCOs included 4,4'-DDD, alpha-chlordane, and dieldrin. Detected levels of these pesticides ranged from 0.33 to 240 µg/kg. PCBs were detected at concentrations above the unrestricted SCO for PCBs. Detected levels of PCBs ranged from 9.4 to 4,300 µg/kg. Inorganic contaminants detected above unrestricted SCOs included arsenic, barium, cadmium, chromium, copper, hexavalent chromium, cyanide, lead, manganese, mercury, nickel, selenium, silver, and zinc. Detected levels of these inorganics ranged from 0.004 to 7,110 mg/kg.

Transport of Constituents From Soil to Groundwater

Analytical results obtained during the RI and prior investigations suggest that certain constituents are being leached from the soil. Compounds detected in soils and groundwater at the greatest frequency included BTEX, phenolic compounds, PAHs, dieldrin and DDT, and inorganic constituents (*e.g.,* arsenic, barium, chloride, lead, manganese, mercury, selenium, sodium, and sulfate). BTEX, naphthalene and assorted PAHs, phenolic compounds, pesticides, and inorganics (*e.g.,* arsenic, barium, chromium, mercury, and nickel) have been detected at levels in Site groundwater above applicable standards and/or guidance values.

Transport of Constituents From Soil to Surface Water Bodies Via Surface Water

Transport of constituents from soils to surface water bodies via surface water runoff may have occurred from areas in close proximity to Onondaga Lake, Ninemile Creek, and the drainage ditches. Transport potentially occurred in areas where surface water bodies and Site ditches are adjacent to steeply sloped berms with poor vegetative cover, which allowed for runoff down slope to the adjacent Ninemile Creek, Onondaga Lake, and Site ditches. Berms with established vegetation, terraced construction, or both potentially reduced this soil erosion and limited the transport of soils to surface water. Onondaga Lake potentially received soil via runoff from the sparsely vegetated portions of the berms along Wastebeds 3, 4, and 6, with some transport also potentially occurring along the northern berms of Wastebeds 1 and 2. This surface runoff has been addressed by the IRM and is not considered a current transport pathway in these areas. Minimal surface water runoff is expected from the central areas of the Site and areas of flat relief along the wastebed berms because of vegetation and little topographic relief, which reduces runoff and promotes evapotranspiration. Also, the porous fill material associated with the parking lots limits the scouring of soils and promotes infiltration rather than overland flow.

IRM Staging Areas

Excavation spoils (materials excavated from groundwater collection trenches, regrading, etc.) were staged in three designated staging areas on the Site during construction of the IRM. Staging Areas A, B, and C are situated near the northern shoreline, Ninemile Creek shoreline, and within the former County Biosolids area, respectively (see Figure 3). Staging Areas A and B are each approximately 2 acres in size and contain approximately 5,000 and 9,000 CY, respectively, and Staging Area C is approximately 6 acres in size and contains approximately 20,000 CY. Characterization sampling and analysis were performed during the placement of materials within the staging areas to document that materials being placed within these footprints did not exhibit hazardous waste characteristics, as per the IRM design, so that it could potentially be managed consistent with the material below and adjacent to it. Soil/fill material/Solvay waste that was placed within Staging Areas A, B and C contained contaminant concentrations that exceeded the SCOs for protection of ecological resources. These areas are included in the approximately 30 acres of OU1 that exceed the ecological use SCOs in the areas described above.

As addressed above in the discussion of IRMs, Honeywell is constructing a 2.3-acre lake-connected wetland at the Wastebeds 1-8 site. The construction includes the hydraulic dredging of materials from the lakeshore area (see Figure 3). Materials that are hydraulically dredged will be managed at the Sediment Consolidation Area as part of the Onondaga Lake remedy. As needed, materials that cannot be hydraulically dredged (estimated to be approximately 17,500 CY) will be excavated and consolidated in an upland area of the site and a 2-foot vegetated soil cover will be installed. Consistent with what was done under the IRM, prior to covering, characterization sampling and analysis will be performed to ensure that materials that exhibit hazardous waste characteristics are not left on-site. If any materials are determined to be hazardous, they will be disposed of at an off-site permitted facility.

Conclusions

Based on the RI, the following conclusions have been drawn:

- Contaminants include BTEX, naphthalene and other assorted PAHs, PCBs, phenolic compounds, pesticides, and inorganics (*e.g.,* arsenic, barium, chromium, mercury, nickel).

- Two areas of stained materials, which contain organic compounds (e.g. benzene, naphthalene) and have odors, are present along the lakeshore on the eastern side of Lakeview Point and along the southeastern lakeshore of the Site. The stained materials vary in thickness and are generally found within 12 feet of the ground surface. Concentrations of benzene and naphthalene in these materials were reported as high as 20,000 µg/kg and 180,000 µg/kg, respectively. It is important to note that the stained materials are not necessarily representative of the highest contaminant concentrations present in the lakeshore area.

- A layer of stained Solvay waste (described above) is present at the base of Wastebeds 1-4 approximately 60 feet bgs. This deep layer may be the source of BTEX, naphthalene, other PAHs, and phenol concentrations along the lakeshore and southeastern portions of the Site.

- Contaminated soil/fill/Solvay waste, groundwater and surface water from the Site have the potential to directly impact sediment, surface water and fish in the lake.

SCOPE AND ROLE OF ACTION

This Site is one of 11 subsites that, along with a remedy for the Lake itself, need to be addressed as part of the Onondaga Lake NPL site. The scope of this action, OU1 of the Site, is to address the Solvay waste and contaminated soil/fill materials. The ongoing IRM partially addresses these materials. NYSDEC and EPA expect this OU1 remedy to be a final, comprehensive remedy for Solvay waste, soil, and fill material at OU1, either by supplementing the IRM with additional remedial actions, or by selecting an action that supersedes the IRM. Groundwater will be addressed in a separate operable unit, OU2. OU2 is expected to be the final operable unit for this area of the Site.

Summary of Quantitative Site Risk Assessments

As part of the RI process, baseline quantitative risk assessments were conducted for the Site to estimate the risks to human health and the environment (see "What is Risk and How is it Calculated?" box below). Baseline risk assessments, consisting of a human health risk assessment (HHRA), which evaluates potential risks to people, and a baseline ecological risk assessment (BERA), which evaluates potential risks to the environment, analyze the potential for adverse effects caused by hazardous substance releases from a site assuming no further actions to control or mitigate exposure to these hazardous substances are taken.

The HHRA and BERA are applicable to both OU1 and OU2 because the designation of these as two separate operable units, which was done after the completion of the RI and risk assessments, are based on similar cleanup strategies and criteria for the protection of human health and the environment at this one geographic area.

Human Health Risk Assessment

The baseline HHRA considered a number of current and future exposure scenarios for different receptors, including a transient trespasser, lunchtime trespasser, utility worker, commercial worker, all-terrain-vehicle (ATV) rider, construction worker, state fair attendee, ditch maintenance worker, fisherperson, and resident. Exposure media considered in both current and future scenarios include soil, sediment (seep and ditch sediment), surface water (including seep water), groundwater, and ambient air. As discussed previously, fill material and Solvay waste are found throughout the Site; the risk assessment also considered exposure to these materials. Receptors that may be exposed to surface soils (0-2 feet bgs) include trespassers, commercial/industrial workers, state fairgrounds maintenance workers, and state fairgrounds attendees. Construction workers, commercial/industrial workers, and utility/sewer workers may contact upper soils (0-10 feet bgs). Trespassers, utility/sewer workers, construction workers, and ditch maintenance workers may be exposed to surface sediment (0-1 foot bgs). Trespassers, utility workers, construction workers, and ditch maintenance workers may be exposed to surface water. Construction workers, utility/sewer workers, and commercial/industrial workers may contact shallow ground water (0-10 feet bgs).

Potential unacceptable risks related to human exposures to soil/fill material/Solvay waste were limited to non-cancer risks driven by inhalation of metals in dust.

It should be noted that the HHRA found no unacceptable risks for most site visitors and exposure scenarios (e.g., transient trespasser, lunchtime trespasser, State Fair attendee, or fisherperson/trespasser). For site visitors, the only receptors and exposure scenarios for which risks or hazards were potentially unacceptable were for recreational receptors engaging in specific activities (e.g., ATV recreators), or receptors that would be involved in intrusive work such as a construction worker. Specifically, the reasonable maximum exposure (RME) non-cancer human health hazard indices (HIs) are 7 and 2 for the older child trespasser/ATV recreator and young adult trespasser/ATV recreator, respectively. For both receptors, the hazard was primarily driven by inhalation exposure to nickel and manganese in particulate matter in outdoor air.

RME non-cancer hazards exceeded the acceptable threshold for construction workers, with an HI of 4 associated with inhalation of manganese and nickel in dust.

Also, a 2009 EPA human health risk assessment which examined potential risks associated with the bike trail indicated that risks and hazards to receptors using the bike trail as intended were within acceptable regulatory limits, and a 2014

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the COPCs at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk", or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses (RfDs). The key concept for a non-cancer HI is that a threshold (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as COCs in the ROD.

Supplemental Human Health Risk Evaluation conducted by EPA found that risks and hazards associated with amphitheater attendees and maintenance workers were within acceptable risk ranges and targets.

The vapor intrusion pathway was evaluated qualitatively in the HHRA for the commercial/industrial worker. Screening for the indoor air exposure was conducted in one of two ways. First, concentrations of volatile constituents in shallow groundwater were compared to EPA groundwater-to-indoor air criteria to determine if these constituents in groundwater could pose a risk attributable to indoor air vapor intrusion. The maximum concentration of five constituents exceeded screening levels. The ratios of the five retained constituents to the selected screening value are: bis(2-ethylhexyl)phthalate (1016), naphthalene (39), benzene (2800), toluene (6), and vinyl chloride (1). The secondary qualitative line-of-evidence used to assess potential risk to the commercial/industrial worker from the indoor air pathway was to screen the available soil vapor data consistent with EPA Region 2 screening guidance for indoor air. Soil vapor data from the Site suggested the potential for exceedences of the 10^{-6} risk threshold for benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene. Based on the vapor intrusion screening and the high vapor pressure of many of the compounds detected, a vapor intrusion evaluation is warranted prior to the construction of occupied buildings at the Site. Based on the results of the vapor intrusion evaluation, preventative measures may be warranted in the design and construction of buildings at the Site to mitigate the risk of exposure to soil gas. Such measures may include the use of a vapor barrier or the installation of a venting system.

A full discussion of the HHRA evaluation and conclusions is presented in the HHRA Report, the Wastebeds 1-8 Bike Trail Risk Assessment, and the Wastebeds 1-8 Lakeview Amphitheater Supplemental Human Health Risk Evaluation.

Ecological Risk Assessment

The majority of estimated ecological risk at this Site is associated with terrestrial exposure. Potential unacceptable risks to terrestrial ecological receptors (American robin, shrew, Red-tailed hawk and fox) were associated with potential exposures to metals (*e.g.,* chromium, cadmium, vanadium, thallium, and mercury), pesticides, SVOCs, and PCBs in soil/fill/Solvay waste material. The calculated risk estimates (*i.e.,* ecological hazard quotients [HQs]) for ecological receptors were based

on both the no-observed-adverse-effect level (NOAEL), representing the highest chemical of concern (COC) concentration at which no adverse effects are seen, and the lowest-observed-adverse-effect level (LOAEL), representing the lowest COC concentration shown to produce adverse effects. Food chain calculations yielded 56 NOAEL-based ecological HQs and 32 LOAEL-based ecological HQs that were greater than or equal to one, which is the threshold value below which adverse ecological effects would not be anticipated. The majority of the metals contamination is associated with the Biosolids Area. To a lesser extent than metals, organic constituents including BTEX compounds, naphthalene, phenols, and several other compounds detected at low frequencies but retained for their bioaccumulative properties presented potential risk to terrestrial ecological receptors exposed to soil/fill/Solvay waste.

A full discussion of the BERA evaluation and conclusions is presented in the 2011 BERA Report.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific risk-based levels established using the risk assessments. The following RAOs have been established for OU1:

- Prevent, ingestion/direct contact with soil/fill material/Solvay waste in surface and subsurface soil above levels that would result in unacceptable human exposure.
- Prevent or minimize, inhalation of or exposure to contaminants volatilizing from contaminated soil/fill material/Solvay waste that would result in unacceptable human exposure. In the event that buildings are constructed, mitigate impacts to public health resulting from existing, or potential for, soil vapor intrusion into those buildings.
- Prevent or minimize, adverse ecological impacts to biota from ingestion/direct contact with soil/fill material/Solvay waste causing toxicity or impacts from bioaccumulation through the terrestrial food chain.
- Prevent or minimize, the further migration of contaminants that would result in groundwater, sediment, or surface water contamination.

NYSDEC's SCOs have been identified as remediation goals to help address these RAOs. SCOs are risk-based criteria which are protective of human health, ecological exposure or groundwater depending upon the existing and anticipated future use of a site. While the land use of the subsite has historically been industrial/commercial, current and anticipated future Site uses of some areas are recreational, and several areas include valuable ecological resources. Thus, the restricted-residential use, commercial use, and the protection of ecological resources SCOs have been identified to help address the direct-contact RAOs, and the protection of groundwater SCOs have been identified to address the migration RAO.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA § 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4).

Based on anticipated future development of the Site, assumptions of the reasonably anticipated land use, as described above**,** were considered in the FS to facilitate the development and evaluation of remedial alternatives. The remedial alternatives are:

Alternative 1 - No Action

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative does not include any physical remedial measures that address the problem of soil and sediment contamination at OU1.

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 years

Alternative 2 - Cover System

This alternative was developed to be integrated with the IRM actions which address soil, sediment, fill, and Solvay waste in the areas of the Site where the IRM is being implemented (*e.g.*, shoreline stabilization, mitigation wetlands establishment, and associated vegetative cover) and relies on existing cover material where it provides adequate protection on portions of the Site. These IRM actions address direct-contact exposure at 47 acres of the Site. The IRM also addresses the potential for contaminant migration at perimeter boundaries of the Site. Because the potential for contaminant migration is primarily being addressed by the IRM, and protective cover materials which provide adequate protection are already present on other areas of the Site, the additional measures below focus primarily on direct-contact exposures associated with the remaining 171 acres of the Site which were not addressed under the IRM and which presently do not have adequate cover material, and potential vapor intrusion.

Solvay wastes, soils, and fill material (to as deep as 70 feet bgs) would be managed in place.

This alternative includes the placement of several types of vegetated cover systems in discrete areas. The specific cover type for a given area is based on remediation goals (SCOs) in surface soil, and current and reasonably anticipated future land uses at the given Site area. The cover systems would be applied over 171 acres of the Site in areas which do not have existing covers or infrastructure located on them and other areas which need additional cover material, (*e.g.,* the upland staging areas associated with the IRM and a portion of the parking lot areas). The extent and type of covers included in this alternative are shown on Figure 4 and are described below**:**

Cover Types

1 foot thick Vegetated Soil Cover (where commercial use SCOs in surface soil are exceeded) - approximately 5 acres: In areas of anticipated passive recreational use (for OU1 these activities could potentially include walking trails or buffer zones along trails and parking areas) where SCOs for commercial use are exceeded.

2 foot thick Vegetated Soil Cover (where restricted residential use or ecological SCOs in surface soil are exceeded) - approximately 20 acres: In areas of anticipated active recreational use (for OU1 these activities could potentially include lawn seating areas and playing fields) where SCOs for restricted residential use are exceeded or where SCOs for protection of ecological resources would apply and are exceeded.

1.5 foot thick Vegetated Soil Cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover would be applied to the three upland staging areas associated with the IRM. Restoration of these areas under the IRM currently consists of a 6-inch topsoil cover. The additional 1.5 feet of cover material would provide for a 2 foot cover over this area where protection of ecological resources SCOs are exceeded.

1 foot thick Vegetated Structural Fill Cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover would be applied to areas of anticipated NYS Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover would consist of a compacted mixture of aggregate and soil. This cover would be placed directly over existing soil/fill/Solvay waste to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimate purposes) to be 1 foot, the actual thickness and locations where it will be placed would be determined during remedial design.

Vegetation Enhancement Cover (where surface soil SCOs are not exceeded) - approximately 114 acres: This cover would consist of wood fiber mulch/compost and fertilizer mixed with seeds and would be applied to areas where surface soil concentrations are below applicable SCOs. While the thickness of the mulch and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations would be determined during remedial design. The placement of a vegetation enhancement cover would help to stabilize surface soil and reduce the potential for erosion which may result in potential exposure to contaminants in subsurface soil. Based on Site data, VOCs, SVOCs, pesticides, PCBs and/or inorganics were detected in subsurface soil/fill materials/Solvay waste throughout the Site at levels

above SCOs for unrestricted use.

Any fill material brought to the Site would need to meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Native species would be used for the vegetative component of covers. For the purpose of developing cost estimates, the seed application is anticipated to consist of a grassland seed mix native to NYS and selected for its ability to attain relatively high growth rates and ecological function.

Structures, such as buildings, pavement, and sidewalks which may be developed would serve as acceptable substitutes for any of the vegetated soil cover types described above.

Approximately 58 acres (where SCOs for protection of commercial use are not exceeded in surface soil) of the 77 acres of the Site used as parking lots associated with the New York State Fairgrounds are already covered with an estimated 2 to 7 feet of imported fill, including at least 1 foot of gravel/fill at the surface. The existing cover thickness would be confirmed during remedial design, and additional cover would be placed, if needed, to provide for at least a one foot thickness. Existing parking lot surfaces and areas of established vegetation (*e.g.*, I-690/NY-695 corridor) would also be maintained.

Clean fill staging areas, which support the IRM, Ninemile Creek, and Onondaga Lake Site remediation, were constructed using a minimum of 6 inches of crushed stone. Restoration for these areas would consist of placement of 6 inches of vegetated, clean fill over the top of the crushed stone in order to provide for a 1 foot cover over these areas.

Institutional controls in the form of an environmental easement would be used to ensure that any intrusive activities in areas where contamination remains are in accordance with a NYSDEC-approved Site Management Plan, which would include the following:

- Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for OU1 and details the steps and media-specific requirements necessary to ensure the following institutional and engineering controls remain in place and effective:

    - environmental easements and/or restrictive covenants described above;
    - Site cover systems described above;
    - excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
    - descriptions of the provisions of the institutional controls including any land use restrictions;
    - provision that future on-Site construction should include either vapor intrusion sampling and/or installation of mitigation measures, if necessary;
    - provisions for the management and inspection of the identified engineering controls;
    - maintaining Site access controls and Department notification; and
    - steps necessary for periodic reviews and certification of the institutional and/or engineering controls.

- Monitoring Plan to assess the performance and effectiveness of the remedy. The plan would include, but may not be limited to, monitoring for vapor intrusion for any buildings developed on the Site, as may be required by the Institutional and Engineering Control Plan discussed above.

The alternative includes continued monitoring and maintenance associated with IRM elements which pertain to the shoreline stabilization system, mitigation wetlands, the vegetative cover, and Site access roads constructed to support the IRM. Maintenance and monitoring for the IRM mitigation wetlands and cover systems would include monitoring to document that success criteria are met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may consist of cover repair in areas of disturbance or re-application of vegetation in areas of non-survivorship.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

The estimated construction time for this alternative is 6 years.

Capital Cost: $14,500,000

Annual O&M Cost (years 1-5):	$129,000[2]
Annual O&M Cost (years 6-30):	$99,000
Present-Worth Cost:	$16,800,000

Alternative 3 - Enhanced Cover System

This alternative is identical to Alternative 2, except: (a) in areas where the current or planned use is active recreation (*e.g.,* lawn seating areas and playing fields), a 2-foot thick vegetated soil cover would be installed regardless of whether the restricted residential SCOs are exceeded in surface soil or not, and (b) in areas where current or planned use is passive recreation (*e.g.,* walking trails or buffer zones along trails and parking areas) a 1-foot thick vegetated soil cover would be installed, regardless of whether the commercial use SCOs are exceeded in surface soil or not. In active recreation areas where SCOs are not exceeded, the 2-foot cover replaces the vegetated enhancement cover that would be provided under Alternative 2 in these areas and in passive recreation areas where SCOs are not exceeded, the 1-foot cover replaces the vegetated enhancement cover that would have been provided under Alternative 2 in these areas. The thicker covers in these recreational areas where SCOs are not exceeded in surface soil would further reduce potential human exposure to contamination in subsurface soil. The estimated acreages corresponding to the respective cover types are listed below and shown on Figure 5.

1 foot thick Vegetated Soil Cover (for passive recreation areas) - approximately 39 acres: In areas of anticipated passive recreational use (regardless of whether the commercial use SCOs are exceeded or not), a 1 foot thick vegetated soil cover would be installed.

2 foot thick Vegetated Soil Cover (for active recreation areas or where ecological SCOs in surface soil are exceeded) - approximately 27 acres: In areas of anticipated active recreational use (regardless of whether the restricted residential SCOs are exceeded or not) and also where SCOs for protection of ecological resources would apply and are exceeded, a 2 foot thick vegetated soil cover would be installed.

1.5 foot thick Vegetated Soil Cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover would be applied to the three upland staging areas associated with the IRM. Restoration of these areas under the IRM consisted of a 6-inch topsoil cover. The additional 1.5-feet of cover material would provide for a 2-foot cover over this area where protection of ecological resources SCOs are exceeded.

1 foot thick Vegetated Structural Fill Cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover would be applied to areas of anticipated NYS Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover would consist of a compacted mixture of aggregate and soil. This cover would be placed directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimate purposes) to be 1 foot, the actual thickness and locations where it will be placed would be determined during remedial design.

Vegetation Enhancement Cover (over the remaining areas) - approximately 76 acres: This cover would consist of wood fiber mulch/compost and fertilizer mixed with seeds. While the thickness of the mulch and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations would be determined during remedial design.

The estimated construction time for this alternative is 8 years.

Capital Cost:	$17,800,000
Annual O&M Cost (years 1-5):	$128,000
Annual O&M Cost (years 6-30):	$98,000
Present-Worth Cost:	$20,00,000

[2] The annual O&M cost estimates associated with monitoring of the vegetative cover for the first five year period following completion of the IRM were included in the cost estimates developed for the IRM. The annual O&M cost estimates associated with monitoring of the vegetative cover between years 6 to 30, for maintenance of the vegetative cover, and for monitoring and maintenance of the other IRM elements cited here are included in the cost estimates for this alternative.

Alternative 4A – Excavation and Off-Site Disposal/Treatment/Reuse (Full Removal)

Under this alternative, the Site would be restored to pre-disposal conditions through the excavation of all soil/fill/Solvay waste. This would include removal of the portions of I-690 and interchanges associated with NY-695 that traverse the Site in order to access the underlying material.

The estimated volume of soil/fill/Solvay waste that would be excavated is approximately 26 million CY, representing fill material placed on the former Geddes Marsh and deeper contaminated soil, with estimated excavation depths of 5 to 70 feet bgs. It is assumed that a portion of the excavated soil/fill/Solvay waste would require stabilization prior to off-site transport for disposal or beneficial reuse; therefore, the estimated volume of material that would require off-site management is 26.6 million CY. Potential beneficial reuses might include fill material, landfill cover, or as aggregate. Additionally, it is assumed that 1.7 million CY of stained material (indicative of elevated concentrations of VOCs) would require *ex-situ* thermal treatment prior to disposal at an existing non-hazardous waste disposal facility or reuse.

In addition to the 26 million CY of soil/fill/Solvay waste material to be excavated, approximately 70,000 CY of construction and demolition (C&D) material associated with demolition of the existing highways and exchanges would require removal and off-site disposal at a C&D landfill.

The excavated areas would be backfilled and restored as a marsh along Onondaga Lake. This would require the use of an estimated 1.9 million CY of clean backfill soils. The removed portions of I-690 and interchanges associated with NY-695 would be replaced. Long-term maintenance of vegetated areas would be included in this option.

The estimated construction time of this alternative is 30 years.

Capital Cost:	$6,135,000,000
Annual O&M Costs (year 1-5):	$1,360,000
Annual O&M Costs (year 6-30):	$170,000
Present-Worth Cost:	$6,142,000,000

Alternative 4B – Partial Excavation and Off-Site Disposal/Treatment/Reuse (Partial Removal)

Under this alternative, the Site would be restored to pre-disposal conditions through the excavation of all soil/fill/Solvay waste with the exception of the areas underlying the portions of I-690 and interchanges associated with NY-695 that traverse the Site and, as determined by geotechnical analysis, immediately adjacent areas where excavation would result in conditions which would potentially undermine the stability of the roadways. Any immediately adjacent areas which may not be excavated because of stability concerns would receive a cover of suitable type and thickness, as may be appropriate, consistent with surface and subsurface soil conditions and the current and future anticipated land use of the adjacent areas.[3]

The estimated volume of soil/fill/Solvay waste that would be excavated is approximately 23 million CY. It is assumed that a portion of the excavated soil/fill/Solvay waste would require stabilization prior to off-site transport for disposal or beneficial reuse; therefore, the estimated volume of material that would require off-site management is 23.5 million CY. Potential beneficial reuses might include fill material, landfill cover, or as aggregate. Additionally, it is assumed that 1.7 million CY of stained soil (indicative of elevated concentrations of VOCs), would require *ex-situ* thermal treatment prior to disposal at an existing non-hazardous waste disposal facility or reuse.

A Site Management Plan, periodic reviews, and institutional controls would be included in this alternative.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

[3] The cost estimate for this alternative assumes that excavation would occur in areas up to the roadways.

The estimated construction time of this alternative is 27 years.

Capital Cost:	$5,124,000,000
Annual O&M Costs (year 1-5):	$1,170,000
Annual O&M Costs (year 6-30):	$157,000
Present-Worth Cost:	$5,130,000,000

COMPARATIVE ANALYSIS OF ALTERNATIVES

The detailed analysis consists of an assessment of the individual alternatives against each of the nine evaluation criteria (see box below) and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

A comparative analysis of these alternatives based upon the evaluation criteria noted below follows.

NINE EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall protection of human health and the environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative would meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and other requirements that pertain to the site, or provide grounds for invoking a waiver.
Long-term effectiveness and permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies an alternative may employ.
Short-term effectiveness considers the period of time needed to implement an alternative and the risks the alternative may pose to workers, residents, and the environment during implementation.
Implementability is the technical and administrative feasibility of implementing the alternative, including the availability of materials and services.
Cost includes estimated capital and annual operation and maintenance costs, as well as present-worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State acceptance considers whether New York State concurs with, opposes, or has no comments on the preferred remedy.
Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Comments received on the Proposed Plan are an important indicator of community acceptance.

Overall Protection of Human Health and the Environment

Alternative 1 would not provide protection of human health and the environment, whereas Alternatives 2, 3, 4A and 4B would each be protective of human health and the environment. Alternative 4A provides protectiveness through full removal of the soil/fill/Solvay waste and Alternative 4B provides protectiveness through a combination of removal and site management of remaining soil/fill/Solvay waste. Alternatives 2 and 3 provide protectiveness through covering the soil/fill/Solvay waste and site management in order to prevent exposures/reduce risks.

Alternative 1 does not meet the RAOs. Alternatives 2, 3, 4A, and 4B meet the RAOs. Alternative 3 provides added protectiveness as compared to Alternative 2 through added thickness of vegetated covers for areas of OU1 reasonably anticipated to be used for active or passive recreational uses.

Compliance with ARARS

Chemical-, location-, and action-specific ARARs/TBCs identified for consideration are summarized in Table 3-1 of the FS report. Alternative 1 does not achieve chemical-specific ARARs/TBCs (SCOs). Exposures to soil/fill/Solvay waste exceeding chemical-specific ARARs/TBCs would be managed through the cover systems and institutional controls in Alternatives 2 and 3. Under Alternatives 4A and 4B, exposures to soil/fill/Solvay waste exceeding chemical-specific ARARs/TBCs would be managed through excavation of soil/fill/Solvay waste or partial excavation in conjunction with a Site Management Plan and institutional controls. The substantive requirements of Title 6 NYCRR Part 360 that would apply to

Alternatives 2 and 3 would be met by the cover systems. The more robust cover system under Alternative 3 (in areas where the reasonably anticipated land uses are active or passive recreation) would more reliably contain and prevent exposure to the underlying Solvay waste.

Construction methods would be implemented to adhere to the location- and action-specific ARARs/TBCs identified for Alternatives 2, 3, 4A and 4B. No action- or location-specific ARARs/TBCs were identified for Alternative 1, the no action alternative. Alternatives 2, 3, and 4B would comply with the action-specific ARARs/TBCs. Specifically, institutional controls would be implemented under Alternatives 2, 3, and 4B in conformance with NYSDEC's guidance DER-33, *Institutional Controls: A Guide to Drafting and Recording Institutional Controls*. Additionally, the cover systems in Alternatives 2 and 3 would prevent erosion and exposure to soil/fill/Solvay waste. Cover systems would be implemented in conformance with NYSDEC's guidance DER-10, *Technical Guidance for Site Investigation and Remediation*. Construction and O&M activities in Alternatives 2, 3, 4A and 4B would be conducted in compliance with Occupational Safety and Health Administration requirements.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence, whereas Alternatives 2, 3, 4A and 4B would. Alternative 4A provides for the most reliable long-term effectiveness and permanence through removal of soil/fill/Solvay waste. Alternative 4B provides a similar degree of long term effectiveness and permanence except that the soil/fill/Solvay waste that would not be excavated would rely upon site management and the institutional controls in order to ensure effectiveness and permanence for the soil/fill/Solvay waste that would not be excavated. Alternatives 2 and 3 also rely on site management and institutional controls to ensure long-term effectiveness, but the less robust cover provided under Alternative 2 in areas where the reasonably anticipated uses are active or passive recreation would be expected to need repair/replacement more frequently over the long term compared to Alternative 3.

Reduction in Toxicity, Mobility, or Volume Through Treatment

There would be no reduction in toxicity, mobility, or volume provided in Alternative 1. Alternatives 2 and 3 would reduce mobility associated with erosion and infiltration of contaminants in soil/fill/Solvay waste through vegetated cover systems but involve no treatment. Alternative 3 does not include treatment but would provide for greater reduction in mobility of soil/fill/Solvay waste constituents as compared to Alternative 2 because of placement of a cover in portions of OU1 where only vegetation enhancement is included in Alternative 2. Alternatives 4A and 4B would reduce toxicity, mobility, and volume of contaminants in soil/fill/Solvay waste through the excavation, treatment (of a portion of the excavated materials) and off-site management of materials.

Short-Term Effectiveness

Alternative 1 does not include any physical measures in any areas of contamination and, therefore, would not present any potential adverse impacts to remediation workers or the community as a result of its implementation. Alternatives 2, 3, 4A and 4B would be constructed using proper protective equipment to manage potential risks to on-site workers, and proper precautions and monitoring would be utilized to be protective of the general public and the environment. Alternatives 2 and 3 would meet the RAOs related to preventing direct contact exposures once the cover is placed. Placement of cover materials over the entire Site under Alternative 2 is estimated to take 6 years and for Alternative 3, placement of cover materials is estimated to take 8 years. Alternatives 4A and 4B would require a significantly longer timeframe to implement as excavation is estimated to take place over approximately 30 and 27 years, respectively. Because of the volume of soil/fill/Solvay waste requiring excavation and off-site management and the estimated construction duration, Alternatives 4A and 4B would result in substantially greater impacts to the community and the environment associated with transporting, via truck, excavated materials for off-site disposal and/or beneficial reuse, and there would be significant adverse traffic impacts related to temporary relocations and restrictions of the impacted section of I-690 and interchanges associated with NY-695.

Impacts to the community resulting from the construction of Alternatives 2, 3, 4A and 4B would primarily be due to increased truck traffic and noise for the duration of construction. Because of the increased quantity of materials and enhanced cover associated with Alternative 3, there could be slightly increased impacts to the community relative to truck traffic and noise during the construction of Alternative 3 as compared to Alternative 2. Construction of Alternative 4A and 4B would result in substantial, long-term community impacts because of construction-related noise, odors, dust, and most notably traffic. As it relates to traffic, transportation of excavated materials under Alternatives 4A and 4B is anticipated to require 1.3 to 1.5 million truck trips over 27 to 30 years to and from the Site as compared to 9,000 to 12,000 large trucks necessary for construction of Alternatives 2 and 3. The increased traffic associated with Alternatives 4A and 4B would present a more significant risk to worker and community safety than would Alternatives 2 and 3.

Dust, emissions and surface water runoff controls would be implemented during construction phase activities associated with each of the active remedial alternatives. Only limited clearing and grubbing would be required under Alternative 2, while Alternative 3 would some require additional clearing and grubbing of existing vegetation to support the implementation of the soil cover systems. Comparatively, Alternatives 4A and 4B would require clearing and grubbing of existing vegetation for nearly the entire Site to support excavation activities. Installation of cover systems in Alternatives 2 and 3 and replacement of the pre-existing marshes (that existed prior to the creation of Wastebeds 1-8) in Alternatives 4A and 4B, would result in enhancements to existing ecological habitats.

Short-term environmental impacts resulting from construction of Alternatives 2 and 3 would be minimal; however, because of the increased quantity of materials and increased acreage of surfaces requiring clearing under Alternative 3, there is a slightly increased environmental footprint associated with Alternative 3 as compared to Alternative 2. Substantial negative short-term environmental impacts would result from soil/fill/Solvay waste excavation, transportation and off-site management activities associated with Alternatives 4A and 4B, compared to cover system construction activities associated with Alternatives 2 and 3. Alternative 4A would result in a greater environmental impact as compared to Alternative 4B because of the additional removals and reconstruction of portions of I-690 and NYS Route 695.

The cover system included in Alternatives 2 and 3 would be consistent with current and reasonably anticipated future land use of the Site. Alternatives 1, 4A and 4B would not be consistent with the current and reasonably anticipated future land use. Alternatives 4A and 4B would require removal of land mass at the location of the existing NYS Fairgrounds parking lots and public recreation trail and at the site of the proposed amphitheater and related facilities.

While the excavation and removal of soil/fill/Solvay waste included in Alternatives 4A and 4B would attain RAOs, the impacts to the community and environment, current and anticipated future land use, and the duration of these alternatives as compared to Alternatives 2 and 3 render them highly disadvantageous in relation to short-term impacts.

Implementability

Alternatives 2 and 3 can be readily constructed and operated and the materials necessary for their construction are reasonably available. The cover systems in Alternatives 2 and 3 would incorporate constructible and reliable technologies. Monitoring the effectiveness of Alternatives 2 and 3 would be accomplished through cover system inspections and maintenance to verify continued cover integrity, visual signs of erosion, and condition of the cover.

The excavation and off-site management of 23 to 26 million CY of soil/fill/Solvay waste associated with Alternatives 4A and 4B would be much more difficult to implement than Alternatives 2 and 3. Specifically, there are significant implementability limitations associated with excavation, transportation, disposal, and reuse capacity of this volume of material. These include:

- Excavation of anticipated volumes would be very difficult. Excavation considerations that limit the implementability of Alternatives 4A and 4B includes construction water management, air quality concerns, and odors. Construction water management is anticipated to be significant during the excavation of the approximately 5 to 70-foot thick area of 280 to 340 acres (including excavation below the groundwater table) anticipated in Alternatives 4A and 4B. The treatment capacity is assumed to be available through repurposing of the Lake Bottom Sediment Containment Area treatment plant. However, the viability of this option would require further evaluation. Air quality and odors would be controlled during construction. However, given the elevated concentrations of VOCs in the stained material, volatilization of VOCs and generation of odors may hinder productivity and, thus, may result in significant delays to the implementation timeframe of this alternative.

- Transportation of anticipated volumes presents significant hazards and disruption to the community. Transportation considerations that severely limit the implementability of Alternatives 4A and 4B include significantly increased traffic, fuel usage and adverse effects on air quality and community safety. It is estimated that approximately 896,000 CY of material would be shipped off-site each year in 50,000 truckloads (180 truckloads per day). During an 8-hour work day, this would equate to approximately 1 truck entering or leaving the Site every 3 minutes. In addition to the potentially significant effects on local air quality and community traffic patterns, traffic of this magnitude is anticipated to result in significant effects on conditions of roadways.

- Sufficient capacity for the disposal of the anticipated volumes of waste may not exist. Because of the volume anticipated to be excavated, off-site disposal capacity for excavated materials would be a critical factor and may significantly limit the implementability of this alternative. An estimated 26.6 and 23.4 million CY (estimated to be approximately 32.0 and 28.1 million tons) would require off-site disposal. Given the magnitude of this volume, multiple commercial landfill facilities would be necessary. While disposal within 200 miles of the Site has been assumed for cost estimation purposes, given the timeframe of approximately 30 and 27 years to implement

Alternatives 4A and 4B, respectively, it is not possible to reliably predict that disposal capacity for this volume of material would exist within the assumed distance from the Site. Lack of landfill capacity would result in significant delays to the implementation timeframe of this alternative.

- Because of the volume anticipated to be excavated, reuse opportunities for excavated materials are anticipated to be a critical factor for Alternatives 4A and 4B and may significantly limit their implementability. It should be noted that the physical and geotechnical characteristics of this material would restrict potential options for its reuse. Notwithstanding these limitations based on physical characteristics and given the magnitude of this volume, it is anticipated that multiple end-use facilities would be necessary. While reuse within 400 miles of the Site has been assumed for cost estimation purposes, it is unlikely that reuse capacity for this volume of material would exist given the timeframe of approximately 27 to 30 years to implement these alternatives. Lack of reuse capacity may result in an even longer timeframe for implementation of this alternative.

Each alternative would require coordination with other agencies, including NYSDOH, New York State Department of Transportation, New York State Department of Agriculture and Markets (NYS Fairgrounds), Onondaga County, and the Town of Geddes. The necessary equipment and specialists would be available for each alternative. Cover system construction materials are anticipated to be available; however, material sources and availability of cover system materials would be further evaluated during the design. Because of the temporary relocations and restrictions of the existing highways and interchanges, Alternative 4A would be even more difficult to implement than Alternative 4B.

Cost

The present-worth costs were calculated using a discount rate of seven percent and a thirty-year time interval for post-construction monitoring and maintenance period.

The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below. The estimated costs for the action alternatives are directly related to the given alternative's corresponding total volumes of soil and sediments to be excavated.

Alternatives	Capital	Annual O&M[4]	Total Present Worth
1 – No Action	$0	$0	$0
2 – Cover System	$14.5 Million	$99,000-$129,000	$16.8 Million
3 – Enhanced Cover System	$17.8 Million	$98,000-$128,000	$20 Million
4A – Full Removal	$6,135 Million (6.1 Billion)	$170,000-$1,362,000	$6,142 Million (6.1 Billion)
4B – Partial Excavation	$5,124 Million (5.1 Billion)	$157,000-$1,117,000	$5,130 Million (5.1 Billion)

Support Agency Acceptance

NYSDOH has reviewed this Proposed Plan and concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated in the ROD following review of the public comments received on this Proposed Plan.

PREFERRED REMEDY

Based upon an evaluation of the various alternatives, NYSDEC and EPA recommend Alternative 3 - Enhanced Cover System as the preferred alternative. The preferred alternative includes several types of cover systems. The specific cover type for a given area will be based on the current and reasonably anticipated future land use, and corresponding SCOs. The cover systems would be applied over 171 acres of the Site. The estimated acreages corresponding to the respective cover types are described below and shown on Figure 6.

[4] The higher end of the range of Annual O&M cost estimates represent the cost estimates in years 1-5, and the lower end of the range of Annual O&M cost estimates represent the cost estimates in years 6-30.

1 foot thick Vegetated Soil Cover (for passive recreation areas) - approximately 39 acres: In areas of anticipated passive recreational use (regardless of whether the commercial use SCOs are exceeded or not), a 1 foot thick vegetated soil cover would be installed.

2 foot thick Vegetated Soil Cover (for active recreation areas or where ecological SCOs in surface soil are exceeded) - approximately 27 acres: In areas of anticipated active recreational use (regardless of whether the restricted residential SCOs are exceeded or not) and also where SCOs for protection of ecological resources would apply and are exceeded, a 2 foot thick vegetated soil cover would be installed.

1.5 foot thick Vegetated Soil Cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover would be applied to the three upland staging areas associated with the IRM. Restoration of these areas under the IRM consisted of a 6-inch topsoil cover. The additional 1.5-foot of cover material would provide for a 2-foot cover over this area where protection of ecological resources SCOs are exceeded

1 foot thick Vegetated Structural Fill Cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover would be applied to areas of anticipated NYS Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover would consist of a compacted mixture of aggregate and soil. This cover would be placed directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimate purposes) to be 1 foot, the actual thickness and locations where it will be placed would be determined during remedial design.

Vegetation Enhancement Cover (over the remaining areas) - approximately 76 acres: This cover would consist of wood fiber mulch/compost and fertilizer mixed with seeds and would be applied to areas where surface soil concentrations are below applicable SCOs. While the thickness of the mulch and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations would be determined during remedial design.

Any fill material brought to the Site would need to meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Native species would be used for the vegetative component of covers. For the purpose of developing cost estimates, the seed application is anticipated to consist of a grassland seed mix native to NYS and selected for its ability to attain relatively high growth rates and ecological function.

Structures, such as buildings, pavement, or sidewalks, as part of the future development at OU1 could serve as acceptable substitutes for any of the vegetated cover types described above.

Approximately 58 acres (where SCOs for protection of commercial use are not exceeded in surface soil) of the 77 acres of the Site used as parking lots associated with the New York State Fairgrounds are already covered with an estimated 2 to 7 feet of imported fill, including at least 1 foot of gravel/fill at the surface. The existing cover thickness would be confirmed during remedial design and additional cover would be placed, if needed, to provide for at least a one foot thickness. Existing parking lot surfaces and areas of established vegetation (*e.g.*, I-690/NY-695 corridor) would also be maintained under the preferred alternative.

Clean fill staging areas, which support the IRM, Ninemile Creek, and Onondaga Lake site remediations, were constructed using a minimum of 6 inches of crushed stone. Restoration of the clean fill staging areas would consist of placement of 6 inches of vegetated, clean fill over the top of the crushed stone in order to provide for a 1 foot cover over these areas.

Institutional controls in the form of an environmental easements would be used to ensure that any intrusive activities in areas where contamination remains are in accordance with a NYSDEC-approved Site Management Plan, which would include the following:

- Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the remedy and details the steps and media-specific requirements necessary to ensure the following institutional and engineering controls remain in place and effective:
    - environmental easements and/or restrictive covenants described above;
    - Site cover systems described above;
    - excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
    - descriptions of the provisions of the institutional controls including any land use restrictions;
    - provision that future on-Site construction should include either vapor intrusion sampling and/or installation

of mitigation measures, if necessary;
  - provisions for the management and inspection of the identified engineering controls;
  - maintaining site access controls and Department notification; and
  - steps necessary for periodic reviews and certification of the institutional and/or engineering controls.

- Monitoring Plan to assess the performance and effectiveness of the remedy. The plan would include, but may not be limited to, monitoring for vapor intrusion for any buildings developed on the Site, as may be required by the Institutional and Engineering Control Plan discussed above.

The preferred remedy includes continued monitoring and maintenance associated with the IRM components relating to soil, sediment, fill, and Solvay waste (*e.g.*, shoreline stabilization system, mitigation wetlands, the vegetative cover, and access roads constructed to support the IRM). Maintenance and monitoring for the IRM mitigation wetlands and cover systems would include monitoring to document that success criteria are met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may include repair of cover cross-sections in areas of disturbance or re-application of vegetation in areas of non-survivorship.

A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. The need for a demarcation layer would be evaluated during design.

Green remediation techniques, as detailed in NYSDEC's Green Remediation Program Policy - DER-31,[5] and EPA Region 2's Clean and Green policy[6] would be considered for the preferred alternative to reduce short-term environmental impacts. Green remediation best practices such as the following may be considered:

- Use of renewable energy and/or purchase of renewable energy credits to power energy needs during construction and/or operation and maintenance of the remedy.
- Reduction in vehicle idling, including both on and off road vehicles and construction equipment during construction and/or operation and maintenance of the remedy.
- Design of cover systems, to the extent possible, to be usable for alternate uses, require minimal maintenance (*e.g.*, less mowing), allow for infiltration of storm water and/or be integrated with the planned use of the property. For example, the use of vegetated structural fill to create parkable surfaces as identified in both Alternatives 2 and 3, would address storm water management in these areas, while resulting in a surface usable for current and intended land use in these areas.
- Beneficial reuse of material that would otherwise be considered a waste.
- Use of Ultra Low Sulfur Diesel (ULSD).

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, remedial actions may be evaluated to remove, treat, or contain the contaminated soils remaining at OU1.

BASIS FOR PREFERRED REMEDY

Alternatives 2, 3, 4A, and 4B (the action alternatives) would each be protective of human health and the environment and would address the RAOs. However, Alternatives 4A and 4B would be extremely difficult to implement, present significant short-term impacts to the surrounding community during the lengthy construction phase, result in substantial environmental impacts, would not be consistent with current and reasonably anticipated future land uses, and would take significantly longer to implement as compared to Alternatives 2 and 3. Alternatives 4A and 4B would also be less sustainable than would Alternatives 2 and 3 because of the long-term consumption of fuel (and associated emissions) associated with excavation, management, and transportation of extremely large volumes of soil/fill/Solvay waste.

While Alternatives 2 and 3 would both achieve protectiveness of human health and the environment and achieve the RAOs, and are consistent with current and reasonably anticipated future use of the Site, Alternative 3 would provide increased cover thicknesses relative to Alternative 2 in approximately 41 acres of the Site where visitors would attend events at the planned amphitheater facilities and/or engage in other recreational activities. The additional cover thicknesses prescribed under Alternative 3 in these areas would provide added protectiveness relative to that offered by the cover system

[5] See http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf

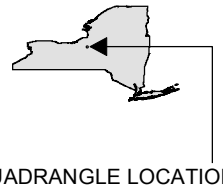
[6] See http://epa.gov/region2/superfund/green_remediation

associated with Alternative 2 by further reducing potential human exposure to contamination in subsurface soil. Based on information currently available, the NYSDEC and EPA believe that the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The NYSDEC and EPA expect the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element (or justify not meeting the preference).

This document was developed in color. Reproduction in B/W may not represent the data as intended.

ADAPTED FROM: SYRACUSE WEST, NY USGS QUADRANGLE.

HONEYWELL
WASTEBEDS 1 - 8
OU-1 FEASIBILITY STUDY
WASTEBEDS 1-8
GEDDES, NEW YORK



QUADRANGLE LOCATION

N

SITE LOCATION

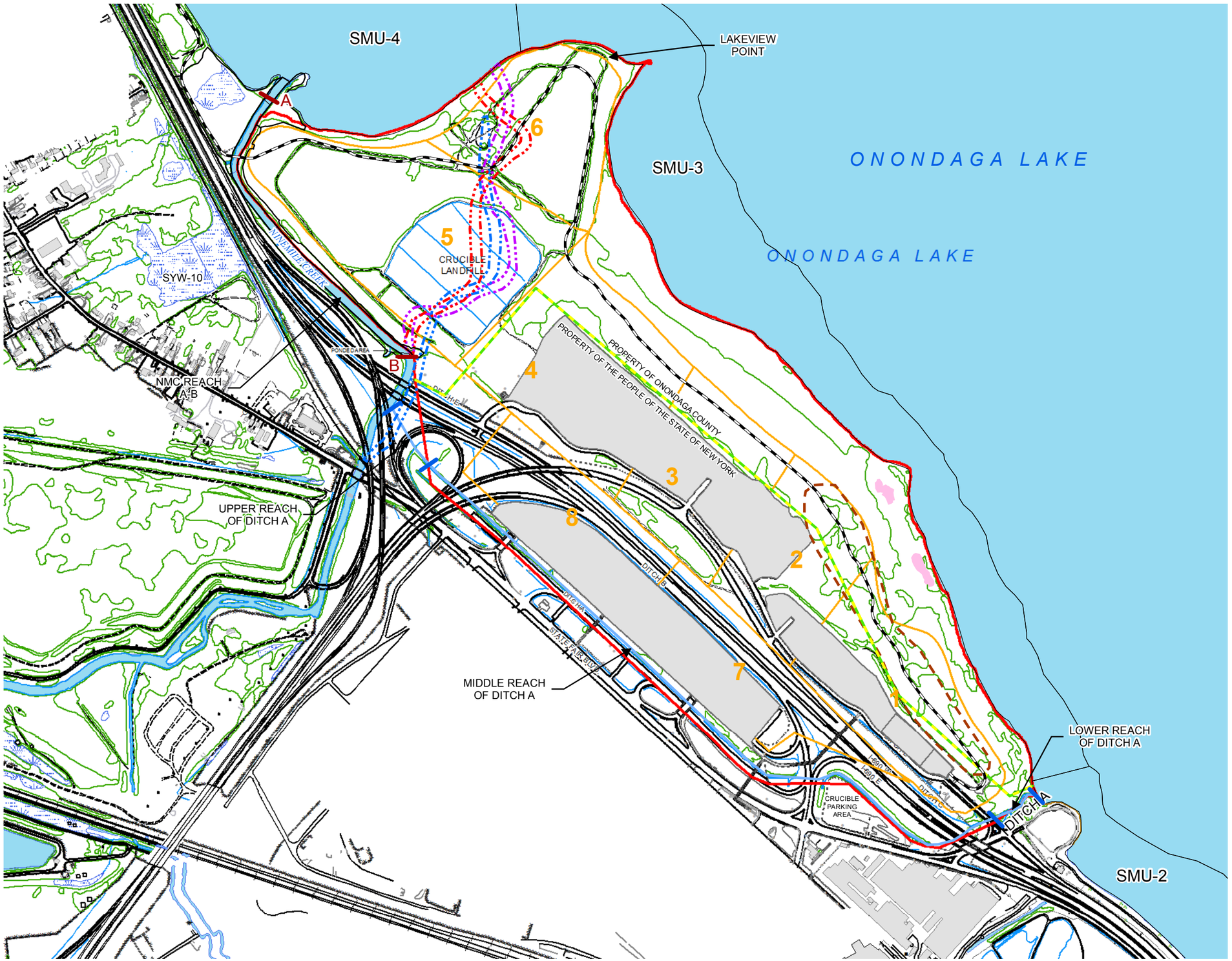
0 1,000 2,000 4,000 6,000 8,000

Feet

JULY 2014
1163.45176

1:24,000

O'BRIEN & GERE



This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 2

N

LEGEND

- ONONDAGA COUNTY WEST SHORE TRAIL
- SMU-2 — ONONDAGA LAKE SEDIMENT MANAGEMENT UNIT BOUNDARY
- DELINEATED WETLANDS
- PARKING LOT
- WASTEBEDS 1-8 PROPERTY BOUNDARY (PEOPLE OF THE STATE OF NY AND ONONDAGA COUNTY)
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE
- BIOSOLIDS AREA FOOTPRINT

FORMER NINEMILE CREEK CHANNEL

- USGS TOPO MAP 1898
- THOMSEN ASSOCIATES 1982
- ALLIED DRAWING 1937

HONEYWELL
INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

SITE PLAN

0 400 800 1,600
Feet

JULY 2014
1163.45176

O'BRIEN & GERE

FIGURE 3

LEGEND

- SEEP COLLECTION TRENCH
- GROUNDWATER COLLECTION TRENCH
- DITCH A
- ACCESS PATHWAYS
- REVETMENT
- SEEP APRON
- VEGETATIVE COVER / RESTORED AREA / SHORELINE STABILIZATION / WET SWALE
- MITIGATION WETLAND
- BIOSOLIDS
- WASTEBEDS 1-8 SITE

HONEYWELL INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

INTEGRATED IRM COMPONENTS

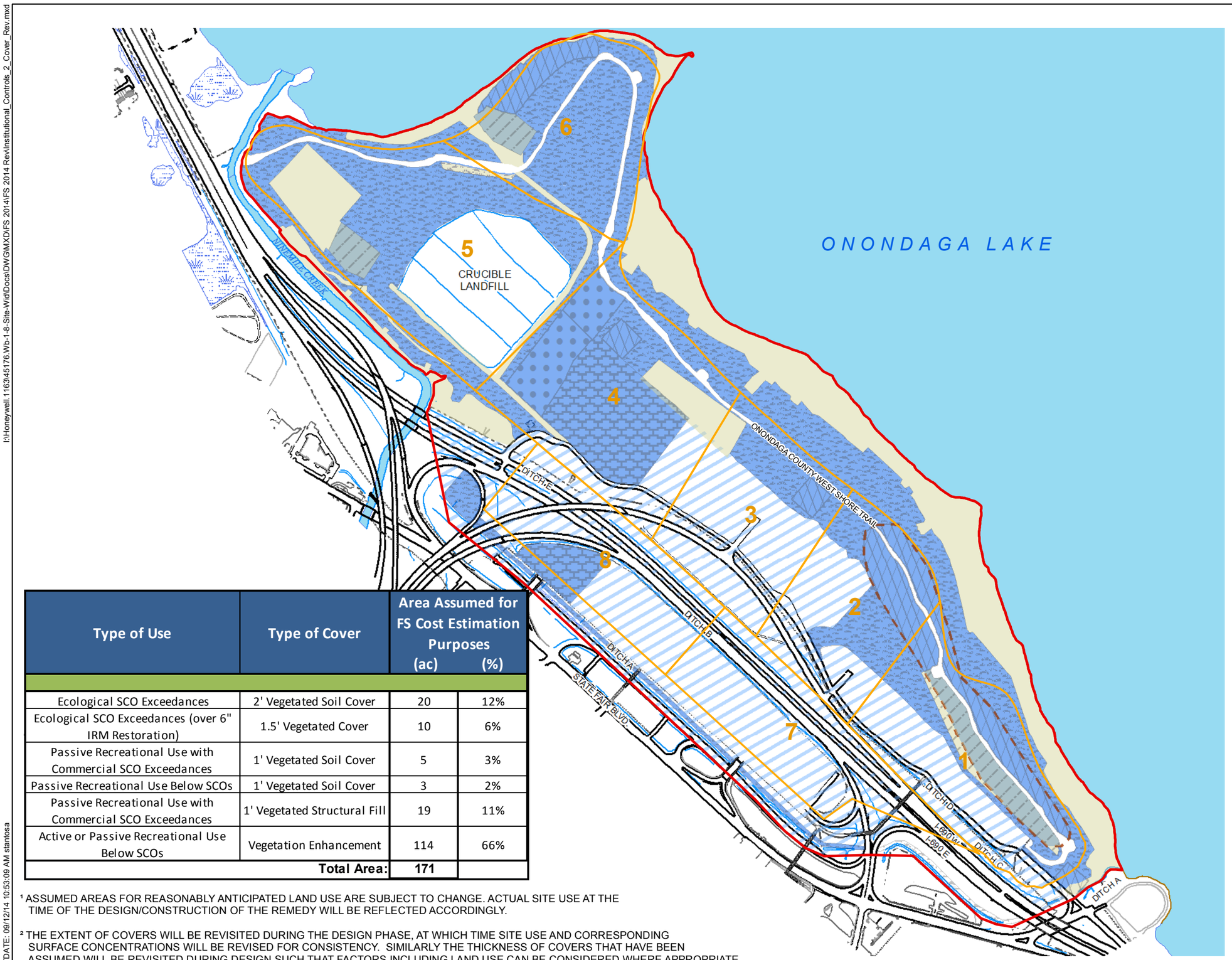
0 350 700 1,400
Feet

AUGUST 2014
1163.45176

O'BRIEN & GERE

This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 4



Type of Use	Type of Cover	Area Assumed for FS Cost Estimation Purposes (ac)	(%)
Ecological SCO Exceedances	2' Vegetated Soil Cover	20	12%
Ecological SCO Exceedances (over 6" IRM Restoration)	1.5' Vegetated Cover	10	6%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Soil Cover	5	3%
Passive Recreational Use Below SCOs	1' Vegetated Soil Cover	3	2%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Structural Fill	19	11%
Active or Passive Recreational Use Below SCOs	Vegetation Enhancement	114	66%
	Total Area:	**171**	

[1] ASSUMED AREAS FOR REASONABLY ANTICIPATED LAND USE ARE SUBJECT TO CHANGE. ACTUAL SITE USE AT THE TIME OF THE DESIGN/CONSTRUCTION OF THE REMEDY WILL BE REFLECTED ACCORDINGLY.

[2] THE EXTENT OF COVERS WILL BE REVISITED DURING THE DESIGN PHASE, AT WHICH TIME SITE USE AND CORRESPONDING SURFACE CONCENTRATIONS WILL BE REVISED FOR CONSISTENCY. SIMILARLY THE THICKNESS OF COVERS THAT HAVE BEEN ASSUMED WILL BE REVISITED DURING DESIGN SUCH THAT FACTORS INCLUDING LAND USE CAN BE CONSIDERED WHERE APPROPRIATE.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

N

LEGEND

- NO FURTHER ACTION AREAS (EXISTING FILL) TO BE CONFIRMED AS PART OF OU-1 FS DESIGN[2] (118 ac)
- ALTERNATIVE 2 FOOTPRINT (171 ac)
- AREAS ADDRESSED AS PART OF INTEGRATED IRM (71 ac)
- STAGING AREAS ADDRESSED AS PART OF INTEGRATED IRM AND OU-1 FS
- EXISTING VEGETATION ENHANCEMENT
- BIOSOLIDS AREA FOOTPRINT
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE

TYPE OF COVER[1,2]

- 1' VEGETATED SOIL COVER[1,2]
- 1' VEGETATED STRUCTURAL FILL[1,2]
- 1.5' VEGETATED SOIL COVER[1,2]
- 2' VEGETATED SOIL COVER[1,2]
- VEGETATION ENHANCEMENT[1,2]

HONEYWELL INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

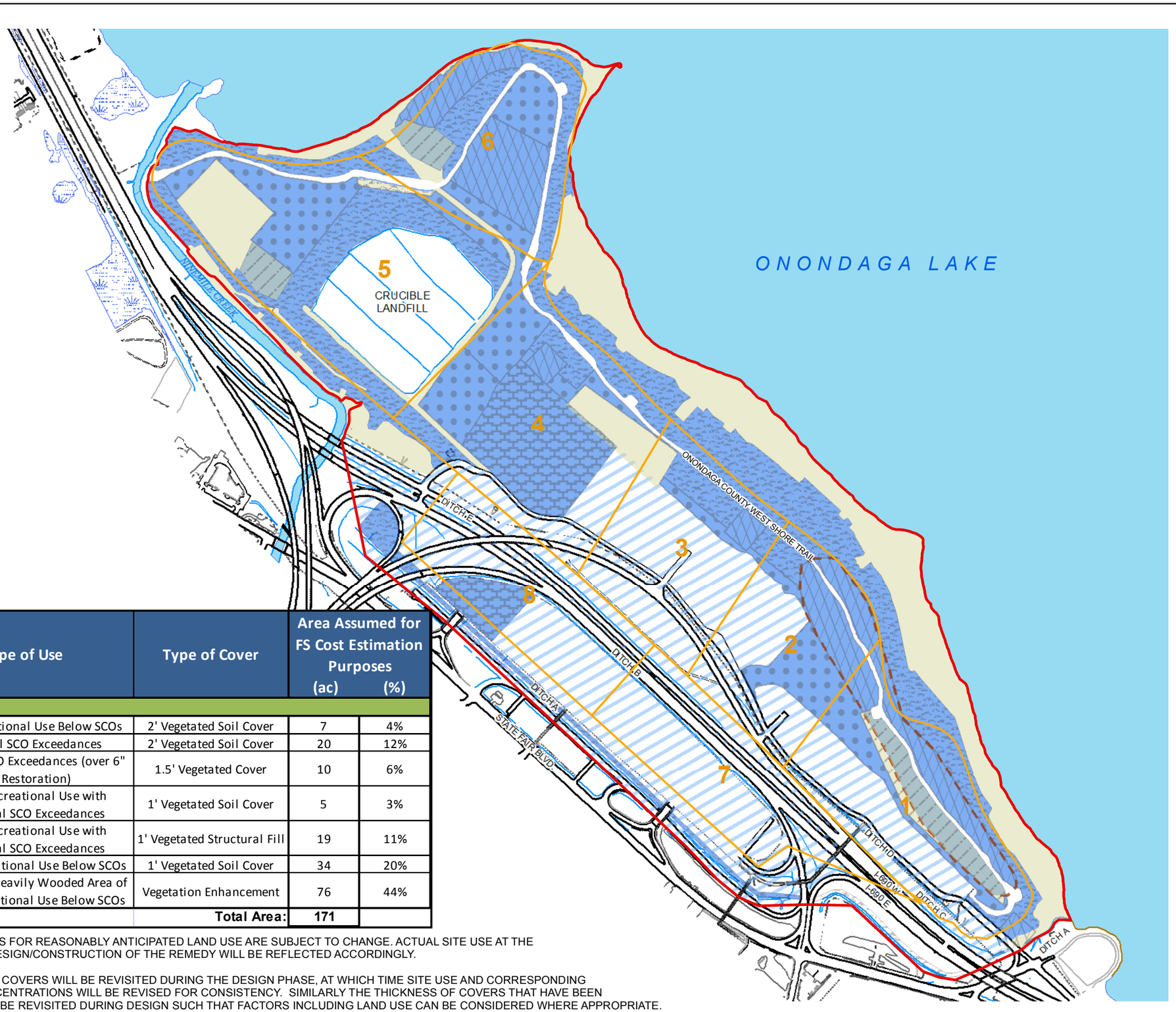
ALTERNATIVE 2 - VEGETATED COVER SYSTEM

0 350 700 1,400
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE

FIGURE 5



Type of Use	Type of Cover	Area Assumed for FS Cost Estimation Purposes (ac)	(%)
Active Recreational Use Below SCOs	2' Vegetated Soil Cover	7	4%
Ecological SCO Exceedances	2' Vegetated Soil Cover	20	12%
Ecological SCO Exceedances (over 6" IRM Restoration)	1.5' Vegetated Cover	10	6%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Soil Cover	5	3%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Structural Fill	19	11%
Passive Recreational Use Below SCOs	1' Vegetated Soil Cover	34	20%
Steep Slopes/Heavily Wooded Area of Limited Recreational Use Below SCOs	Vegetation Enhancement	76	44%
	Total Area:	**171**	

[1] ASSUMED AREAS FOR REASONABLY ANTICIPATED LAND USE ARE SUBJECT TO CHANGE. ACTUAL SITE USE AT THE TIME OF THE DESIGN/CONSTRUCTION OF THE REMEDY WILL BE REFLECTED ACCORDINGLY.

[2] THE EXTENT OF COVERS WILL BE REVISITED DURING THE DESIGN PHASE, AT WHICH TIME SITE USE AND CORRESPONDING SURFACE CONCENTRATIONS WILL BE REVISED FOR CONSISTENCY. SIMILARLY THE THICKNESS OF COVERS THAT HAVE BEEN ASSUMED WILL BE REVISITED DURING DESIGN SUCH THAT FACTORS INCLUDING LAND USE CAN BE CONSIDERED WHERE APPROPRIATE.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

LEGEND

- NO FURTHER ACTION AREAS (EXISTING FILL) TO BE CONFIRMED AS PART OF OU-1 FS DESIGN[2] (118 ac)
- ALTERNATIVE 2 FOOTPRINT (171 ac)
- AREAS RESTORED AS PART OF INTEGRATED IRM (71 ac)
- STAGING AREAS ADDRESSED AS PART OF INTEGRATED IRM AND OU-1 FS
- EXISTING VEGETATION ENHANCEMENT
- BIOSOLIDS AREA FOOTPRINT
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE

TYPE OF COVER[1,2]

- 1' VEGETATED SOIL COVER[1,2]
- 1' VEGETATED STRUCTURAL FILL[1,2]
- 1.5' VEGETATED SOIL COVER[1,2]
- 2' VEGETATED SOIL COVER[1,2]
- VEGETATION ENHANCEMENT[1,2]

HONEYWELL
INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

ALTERNATIVE 3 - ENHANCED VEGETATED COVER SYSTEM

0 350 700 1,400
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE