APPENDIX F

DREDGE AND CAP DESIGN PLANS

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TECHNICAL MEMORANDUM

То:	Ed Glaza, P.E., Parsons	Date:	January 11, 2011
From:	Walter Dinicola, Kimberly Powell, P.E., John	Project:	090139-01
	Verduin, P.E., and Ram Mohan, P.E., Ph.D.,		
	Anchor QEA, LLC		
Cc:			
Re:	Dredge Prism Development		
	Onondaga Lake Capping, Dredging and Habitat I	ntermedia	te Design Report

When preparing an engineering design for removing sediment, a major component of the design is to define the dredge prism (horizontal and vertical extents of required dredging). This memorandum describes the procedures used to define the dredge prism (see draft Dredging Plan drawings) for the Onondaga Lake (Lake) remediation project. The draft Dredging Plan drawings herein consist of the dredge prism for Remediation Areas A, B, C, D, and E. A summary description of these remediation areas is provided below (see Drawing D-1 for remediation area locations):

- Remediation Area A Mouth of Ninemile Creek (Sediment Management Unit [SMU] 4 and adjacent impacted areas in SMU 3 and SMU 5)
- Remediation Area B Offshore of Wastebeds 1 through 8 (SMU 3)
- Remediation Area C Offshore of the New York State Department of Transportation (NYSDOT) Turnaround Area and the Willis/Semet Interim Remedial Measure (IRM) barrier wall exclusive of in-lake waste deposit (ILWD) (SMU 2 exclusive of the ILWD)
- Remediation Area D ILWD (SMU 1 and adjacent portions of SMU 2 and SMU 7 where ILWD is present)
- Remediation Area E Southwestern end of the Lake (SMU 6 and SMU 7 exclusive of the ILWD)

The remainder of this memorandum discusses how the dredge prisms were developed assuming mean cap placement tolerances; assumptions and procedures used to develop the dredge prisms; and concludes with a specific discussion on each of the five remediation areas.

This lake design submittal includes portions of the designs for three areas along the shoreline that are being remediated in addition to the lake: the spits at the mouth of Ninemile Creek, the connected wetlands and shoreline stabilization at Wastebeds 1 through 8, and the Wastebed B/Harbor Brook (WBB/HB) Outboard Area. Due to similarities in remedial approaches and the connectivity with the adjacent lake dredging, capping and habitat designs, remediation of these areas will occur at about the same time as the remediation of the adjacent lake area, as detailed in Section 3.4 of this design report. Remediation in these areas will include removal of material above and below the water table, construction of an isolation cap, and habitat restoration. The removal area and depth and cap construction details for these areas are being developed as part of this design due to the similarities in design and the connectivity between the lake remediation and these areas. The material removal approach and associated material management strategy associated with these areas is being advanced as part of documentation associated with those sites.

DEVELOPMENT OF ELEVATION-BASED DREDGE PRISM BOUNDARIES

The lateral extents of the remediation areas (including both dredging and capping remedial action) were established using data obtained from individual cores (Parsons 2007; Parsons 2008; Parsons 2009a; Parsons 2009b; Parsons 2010). Specifically, the remediation area boundaries were drawn from core to core based on the analytical results from pre-design investigation (PDI) sampling locations (Phases I through VI) where the sediment cleanup criteria (i.e., mean probable effects concentration quotient [PECQ] of less than 1 and a mercury concentration of less than 2.2 milligrams per kilogram [mg/kg]) were not exceeded at any depth. Section 3 and Appendix A of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report provide additional details pertaining to development of the remediation area boundaries.

Within the remediation areas, the remedy was subdivided into two categories, only one of which includes dredging:

1. Elevation-based dredging, which will be followed by capping

2. Capping without prior dredging to isolate impacted sediments (i.e., "capping only")

Elevation-based dredging will be performed in select areas to prevent loss of lake surface area after the cap is placed and/or to meet a specific post-capping elevation based on habitat considerations. Elevation-based dredging will be performed in Remediation Area D to achieve the 2-meter average removal and 1-meter hotspot removal.

The lateral and vertical extents of elevation-based dredging areas in Remediation Areas A, B, C, and E are largely driven by habitat considerations. The Remedial Design Elements for Habitat Restoration (Parsons 2009d; Habitat Plan) identifies 11 habitat modules targeted for inclusion in the restoration of Onondaga Lake. Habitat modules are areas with specific physical characteristics suitable for various representative species, and are defined by three basic habitat parameters: water depth, substrate type, and water energy as described in the Habitat Plan. Habitat modules presented in the Habitat Plan (including module name, target water depth, and substrate type) within the Lake are summarized below (Parsons 2009d).

- Module 1 Deep water (20 30 feet water depth). Sand substrate. Low to medium energy.
- Module 2A Mid-water depth (7 20 feet). Sand/fine gravel substrate. Low to medium energy.
- Module 2B Mid-water depth (7 20 feet). Coarse gravel/cobble substrate. High energy
- Module 3A Shallow water (2 7 feet). Sand/fine gravel substrate. Low energy.
- Module 3B Shallow water (2 7 feet). Sand/coarse gravel substrate. High energy.
- Module 4A Floating aquatics wetland (1 3 feet). Organics/fines/sand substrate.
 Very low energy.
- Module 5A Non-persistent emergent wetland (¹/₂ 2 feet). Organics/fines/sand substrate. Low energy.
- Module 5B Shoreline shallows/limited emergent wetland (½ 2 feet). Gravel substrate. High energy.
- Module 6A Persistent emergent wetland (1 foot above water to 1-foot deep). Organics/fines/sand substrate. Low energy.

- Module 6B On shore to shallows/limited emergent wetland (1 foot above water to 1-foot deep). Coarse gravel/sand substrate. High energy.
- Module 7A Mudflats/unvegetated shoreline (0.7 feet above water to 0.7-feet deep). Fines/sand/gravel substrate. High energy or fluctuating water levels.

The vertical extent of dredging (e.g., dredging elevation [E]) was computed for the elevationbased dredging areas using the equation below.

 $E = WL - T_c - WD + \Delta H$

Each of the equation parameters is described below.

- **Project water level (WL)** The project water level was set at 362.5 feet North American Vertical Datum of 1988 (NAVD 88) to meet habitat objectives focused on the sensitivity of plant communities in the nearshore areas of the Lake. This elevation of 362.5 feet NAVD 88 was selected for the design, as it represents the average lake level during the aquatic plant growing season (see Section 3.3 of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report).
- Estimated mean cap thickness (T_c) The estimated mean cap thickness consists of the sum of the minimum thicknesses for up to four layers of the cap (mixing layer, chemical isolation layer, erosion protection layer, and habitat layer), plus a mean over-placement for each layer (Tables 1 through 5). The mean capping over-placement was utilized to account for the remedial contractor's demonstrated cap placement experience (see Section 4.3.4). The capping over-placement will be further evaluated as part of the constructability and value engineering reviews in the Final Design.
- Mixing layer thickness is conservatively 0.25 feet.
- Chemical isolation layer thickness is a minimum of 1 foot (in accordance with the ROD). In some portions of the Lake, cap amendments including pH amendment (e.g., siderite) and/or activated carbon will be integrated into the caps to meet ROD objectives, as detailed in Appendix B and Section 4.1.4 of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report.

- Erosion protection layer thickness is sized according to the results of Appendix D of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report. The minimum stable particle size and thickness are typically based on the wind-induced waves during a 100-year event.
- Habitat layer thickness is based on a minimum habitat layer for a specific water depth, as defined in the Habitat Plan and Section 4.3 of this design report.
- Target water depth (WD) In general, the target water depth was set at the shallowest water depth within a habitat module (excluding habitat module 6 where the water depth was set to zero), as defined in the Habitat Plan, and summarized in Tables 1 through 5. For example, Module 5A has a target water depth ranging from 0.5 to 2 feet (Tables 1 through 5). The dredging elevation was developed based on the shallowest water depth in this habitat module (0.5 feet).
- **Settlement** (Δ **H**) Settlement refers to the compressing of sediments due to an increase in the stress (i.e., the added weight of a cap) on those sediments. The change in stress is a function of the thickness/load removed by initial dredging (if any) and the thickness/load of the applied cap. If the sediment is subjected to a net increase in stress/load (e.g., the increase in load resulting from the placement of the cap more than offsets the reduction in load from the removal of dredge material), some settlement could occur. The amount and rate of settlement are dependent on the compressibility and permeability of the sediments. For finegrained sediments like those in Onondaga Lake, this settlement typically occurs over a period of several too many years and will gradually slow over time. Appendix E of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design provides additional details of long-term settlement predictions. Although settlement was accounted for in estimating long-term, post-construction surface elevations for habitat planning, it was conservatively assumed to be zero ($\Delta H = 0$) when determining dredging elevations; this way, dredge depths could be planned deep enough to meet habitat elevation goals, without relying on predicted settlements.

Cross-sections in Remediation Areas A, B, C, D, and E, illustrate the development of the dredging elevation by including the existing ground surface, removal limit, and proposed cap elevations at construction (see Dredging Plan). The proposed cap surface illustrates

placement of the mean cap thickness without settlement. In general, the elevation at construction for all modules deeper than 3 feet will be between the minimum and mean cap surface at construction, prior to the effects of settlement.

GENERAL DREDGE PRISM DEVELOPMENT ASSUMPTIONS AND PROCEDURES

In addition to defining the lateral and vertical extents of the dredge prism, general assumptions or procedures that were globally applied during dredge prism development include:

- **Project datums** Horizontal survey information is referenced to the New York State Plane Feet North American Datum of 1983 (NAD 83), Central Zone. All elevations are referenced to the NAVD 88 vertical datum.
- **Shoreline** The project boundary along the shoreline was defined by the project water level of 362.5 feet NAVD 88.
- Bathymetry (e.g., existing ground) A bathymetric survey was conducted by CR Environmental, Inc. in 2005 and is documented in *Lake Phase I Pre-design Investigation Geophysical Survey Report* (CR Environmental, Inc. 2007). This bathymetric survey formed the basis of the existing bathymetry presented in the dredge plans. The existing bathymetry will be adjusted in future designs based on pre-dredge surveys.
- Transition between shoreline and dredging Sufficient dredging will be completed up to the shoreline to allow placement of the mean cap thickness without losing lake surface area (see Figure 1). In areas not contiguous with adjacent wetland remediation the dredge prism was designed with a 5 horizontal to 1 vertical (5H:1V) slope from the bottom of the dredge cut (e.g., toe of slope) to the daylight line along the upland of the shoreline. Minor exceptions to this approach are identified under the discussion pertaining to individual remediation areas. A slope of 5H:1V was conservatively chosen based on available offshore vane shear test data, professional experience, and judgment in the absence of nearshore geotechnical data. Nearshore geotechnical data, including in situ vane shear testing and laboratory strength testing, was collected as part of the Phase V PDI. This Phase V data indicates that steeper slopes (steeper than 5H:1V) may be stable in some shoreline areas. Therefore, additional evaluations and/or adaptive

management may be used during construction to refine shoreline dredge slopes such that they are stable, yet minimize upland disturbance.

- **Transition between dredging elevations/cuts** A slope of 5H:1V was designed to transition between two different target dredging elevations/cuts (see Figure 1).
- Transition between elevation-based dredging areas and sediments outside remediation area boundary – In areas where elevation-based dredging occurs away from the shoreline, the bottom of the dredging prism was set at the required elevation along the remediation area boundary (see Figure 1). The slope of the dredge cut was extended into the sediment outside of the remediation area boundary, thus addressing the contaminated sediment through removal and/or with a cap.
- Transition between elevation-based dredging and cap-only areas In areas where the elevation-based dredging boundary is planned to abut the cap-only boundary, the dredge prism was set at the required elevation within the elevation-based dredging area, and the slope of the dredge cut was extended into the cap-only area, thus addressing the contaminated sediment through removal and/or with a cap (see Figure 1).
- Minimum dredge cut A minimum dredge cut of 0.5 feet was used within the dredge prism to maintain efficient production rates and minimize low solids contents in the dredge slurry.

Volumes associated with the design of the dredges prism were calculated using Auto Desk's Land Development Desktop (LDD) software. A three-dimensional surface was created in AutoCAD v. 2008 for both the existing bathymetry and the required dredge prism, accounting for design side slopes. These surfaces each consisted of a set of contiguous, non-overlapping triangles known as a triangulated irregular network (TIN). Using LDD, the volume between these two TINs was calculated to represent the required dredge volume. An allowable over-dredge surface was developed by lowering the required dredge prism by 0.5 feet in elevation, and over-dredge allowance volume was computed using this surface.

REMEDIATION AREA-SPECIFIC DREDGE PRISM DEVELOPMENT

In addition to the general assumptions and procedures outlined above, each remediation area contained dredge prism development nuances (e.g., dredge cut thickness, habitat

considerations) that are specific to that remediation area. In light of the complex design, Tables 1 through 5 were developed in conjunction with the habitat work group as a tool to guide the dredging and capping design for each remediation area. Each remediation areaspecific table includes:

- Targeted habitat modules
- Location inside or outside of the surf zone (as defined as the approximate depth of the breaking wave during a 100-year event [see Appendix D of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report])
- Proposed remediation (elevation-based dredging, or capping only)
- Chemical isolation components, including a mixing layer, chemical isolation layer including pH and/or activated carbon amendments where indicated, an assumed mean over-placement allowance, and the mean total layer thickness
- Erosion protection/habitat layer components, including a minimum erosion protection/habitat layer based on the results of Appendix D of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report, an assumed mean over-placement allowance, and the mean total layer thickness. For constructability concerns, the minimum erosion protection/habitat layer depth was set at 0.5 feet
- Additional habitat layer components, including a dedicated minimum habitat layer (in addition to the erosion protection layer), an assumed mean overplacement allowance, and the mean total layer thickness
- Total minimum cap thickness
- Assumed total mean over-placement allowance for all layers
- Total mean cap thickness
- Assumed total maximum over-placement allowance for all layers
- Total maximum cap thickness
- Top of cap elevation
- Water depth from cap surface
- Dredging volume computations including total area, dredge volume based on the dredge prism, over-dredge volume estimate (assuming 6 inches across the total dredge area), and total dredge volume

The dredge depths and volumes were largely developed to achieve the desired postconstruction habitat objectives and elevations. It is Honeywell's objective to conduct comprehensive constructability and value engineering reviews during the Final Design stage. These reviews will allow the cap and dredge tolerances to be reviewed further with Sevenson Environmental and the Honeywell team resulting in an optimized dredge and cap plan that incorporates reasonably efficient construction tolerances. In addition to the constructability reviews, Honeywell will continually monitor the progress of the construction, allowing continued project implementation enhancement. This continuous monitoring can lead to design assumption revisions, allowing the project construction schedule and final effectiveness to be optimized. As such, adaptive management will be used during the remedial construction to refine components of the dredge prism design with an overall objective of continuous optimization of the project.

An area-by-area summary of unique dredge prism components is provided below.

Remediation Area A

Remediation Area A is approximately 86 acres and is located off the mouth of Ninemile Creek (Drawings D-2 to D-3 and D-11 to D-13 show plan views and cross-sections of Remediation Area A). Remediation Area A contains both elevation-based dredging and capping only remedies. Additionally, the conceptual removal prism for the adjacent spits along the mouth of Ninemile Creek and the removal of the connected emergent wetlands have been integrated into the Remediation Area A dredge prism.

The shoreline area just east of the mouth of Ninemile Creek will be updated as part of the draft Final Design, based on slope stability analyses near the Wastebeds 1 through 8 and the removal of the spits.

Remediation Area A contains five habitat modules where elevation-based dredging will occur (Module 6A, 5A, 4A, 3A, and 2A). Target dredge elevations were assigned based on target water depths, presence of amended cap material, and mean cap thickness, as shown in Table 1.

A vertical dredge cut is shown along the shoreline west of Ninemile Creek. The sediment removal at this location will be integrated with the SW-10 as part of the draft Final Design.

Remediation Area B

Remediation Area B is approximately 17 acres and is located offshore of Wastebeds 1 through 8 (Drawings D-4 and D-14 show plan views and cross-sections of Remediation Area B). Within Remediation Area B, there are two elevation-based dredging areas (Module 5A & 3A). The target dredge elevations are shown in Table 2.

Nearshore sediment dredging in this area is relatively shallow, and no sensitive structures are located along the shoreline. However, as discussed in Section 3.4, a groundwater collection trench will be installed along the shoreline as part of the Wastebeds 1 through 8 IRM. The groundwater collection trench will be located outside of the Remediation Area B dredge boundary.

The conceptual removal prism for the Wastebeds 1 through 8 connected wetland area was developed adjacent to the Remediation Area B dredge prism. The integration between the Remediation Area B dredge prism and the Wastebeds 1 through 8 removal prism will be incorporated in the draft Final Design. A vertical line represents the demarcation between the two prisms.

Remediation Area C

Remediation Area C is approximately 24 acres and is located offshore of the NYSDOT Turnaround area and the Willis/Semet IRM barrier wall exclusive of ILWD (Drawings D-5 and D-15 to D-16 show plan views and cross-sections of Remediation Area C). Remediation Area C contains three habitat modules (Module 6B, 5B, and 3B) where elevation-based dredging will occur near the shoreline. Target dredge elevations were assigned based on target water depths and mean cap thickness as shown in Table 3.

Shoreline stability in this area is of particular concern due to the proximity of shoreline utilities and existing steep slopes. The dredge prism along the shoreline east of the NYSDOT turnaround was modified to prevent dredging into the existing utilities along the shoreline. The NYSDOT turnaround area is located on top of hard slag waste material, which was deposited in the lake by industrial processes not associated with Honeywell or its predecessors. Removal of shoreline material is not included due to the extremely hard nature of this material and to facilitate future development of this area as a boat launch. The remainder of the shoreline in this area consists of rip-rap leading up to a gravel access road leading to Wastebed B that is located between the lake and the highway.

Remediation Area D

Remediation Area D is approximately 99 acres and is comprised of SMU 1 and the ILWD portions of SMUs 2 and 7 (see Drawings D-6 to D-8, and D-17 to D-20). The dredging requirements in Remediation Area D are based on the ROD-required, 2-meter-average dredge cut per former SMUs 1, 2, and 7. Additional dredging (beyond the 2-meter average dredge cut) of 3.3 feet (1 meter) is proposed at 7 hot spot locations (A through G) where remaining sediment concentrations exceeded the hot spot criteria. The details pertaining to the development of the general dredge depths in each SMU and hot spot areas is presented in Appendix G of the Onondaga Lake Capping, Dredging and Habitat Intermediate Design Report. Remediation Area D contains three habitat modules (Module 6B, 5B, and 3B). Table 4 presents the targeted habitat modules that will be incorporated into the dredge prism.

A vertical dredge cut is shown along the shoreline in SMU 1/Wastebed B where the remedy abuts the Outboard Area remediation. The shoreline of the western third of Remediation Area D consists of the exposed sheet pile barrier wall installed in 2008 as part of the Willis/Semet IRM. Dredging design and implementation in this area will consider potential stability issues associated with the wall, as well as ensuring dredging operations and shoreline support activities do not subject the sheet pile wall to excessive stress and compromise structural integrity that could lead to potential damage and safety risks. The dredge prism for Remediation Area D will include a 10-feet offset along the barrier wall, with a 5:1 slope extending from the toe of the dredge prism up to the barrier wall.

Remediation Area E

Remediation Area E is approximately 181 acres and is located at the southwestern end of the lake (Drawings D-7 to D-10 and D-21 to D-27 show plan views and cross-sections of Remediation Area E). Remediation Area E contains three habitat modules (Module 6B, 5B, and 3B) where elevation-based dredging will occur near the shoreline. Target dredge

elevations were assigned based on target water depths and mean cap thickness, as shown in Table 5.

A fourth elevation-based dredging area has been designed for the navigation channel that extends from Onondaga Creek into Onondaga Lake (see Drawing D-8). The navigation channel is authorized by the State of New York. Based on information from the New York State Canal Corporation (NYSCC), the dredge prism was developed with a water depth of 16 feet (an authorized depth of 14 feet plus 2 feet below authorized dredge depth to prevent dredge-induced damage to the cap associated with future navigational dredging), a channel width of 100 feet, and a 5H:1V side slope. An erosion protection layer consisting of 3-inch stone with a minimum erosion layer thickness of 6 inches was assumed for two purposes: 1) the larger stone would serve as an indicator layer for future navigational dredging; and 2) to protect the side slopes inside the surf zone (e.g., approximately 7 feet). Although the bottom of the channel is outside of the surf zone. Therefore, the larger stone size to resist wind-waves was applied to the entire channel.

The shoreline adjacent to the southern portion of Remediation Area E is dominated by an active rail line which is directly adjacent to the shoreline. Design and implementation of dredging and capping in this area will consider potential stability limitations associated with the presence of the rail line. A 150-feet offset from the shoreline was incorporated into the dredge prism design to indicate the area that is being evaluated due to the potential stability concerns in this area during dredging. Capping and dredging plans will be developed for this area as part of the draft Final Design.

REFERENCES

- CR Environmental, Inc. 2007. *Onondaga Lake Phase I Pre-design Investigation Geophysical Survey Report*. Prepared for Honeywell.
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- Parsons. 2010. Preliminary Draft Onondaga Lake Pre-Design Investigation Phase VI Data Summary Report. December 2010

TABLES

Table 1 Summary of Cap Thicknesses and Dredge Volume Remediation Area A (SMU 4)

			Chemical Isolation Layer										Erosion Protection/Habitat Layer Additional Habitat Layer					tat Layer	٦						
Habitat Module	Location Surf Zon (3.4 feet	of Remediation Area t)	Mixing Layer (ft)	pH Amended Cl (ft)	Mean pH Amended Over- Placement (ft)	GAC Amended Cl (ft)	Mean GAC Amended Over- Placement (ft)	Sand Only Cl (ft)	Mean Sand Only Over- Placement (ft)	Minimum Chemical Isolation Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Erosion Protection Habitat Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Additional Habitat Material (ft)	Assumed Mean Over-Placement (ft)	Mean Total Layer Thickness (ft) Material Type	Total Minimum Cap Thickness (ft)	Assumed Total Mean Over Placement (ft)	Total Mean Cap Thickness (ft)	Assumed Total Maximum Over Placement (ft)	Total Maximum Cap Thickness (ft)
1 (-20 to -30 ft)	Outside	Cap Only	0.25					0.50		0.50	0.00	0.75	Medium Sand	1.00	0.25	1.25	Medium Sand				1.75	0.25	2.00	0.50	2.25
2A (-10 to -20 ft)	Outside	Cap Only	0.25					1.00		1.00	0.00	1.25	Medium Sand	1.00	0.25	1.25	Medium Sand				2.25	0.25	2.50	0.50	2.75
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand				2.25	0.75	3.00	1.50	3.75
2A (-7 to -10 ft)	Outside	Cap Only	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	1.00	0.25	1.25	Fine Gravel				2.25	0.50	2.75	1.00	3.25
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Fine Gravel				2.25	0.75	3.00	1.50	3.75
3A (-3 to -7 ft)	Outside	Elevation-Based Dredging & Cap	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	1.50	0.25	1.75	Fine Gravel				2.75	0.50	3.25	1.00	3.75
3A (-3 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	1.50	0.25	1.75	Fine Gravel			ll	2.75	0.75	3.50	1.50	4.25
3A (-2 to -3 ft)	Inside	Elevation-Based Dredging & Cap	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	0.875	4.125	1.75	5.00
3A (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	1.125	4.375	2.25	5.50
4A (-1 to -3 ft)	Inside	Elevation-Based Dredging & Cap	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	0.875	4.125	1.75	5.00
5A (-0.5 to -2 ft)	Inside	Elevation-Based Dredging & Cap	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	0.875	4.125	1.75	5.00
5A (-0.5 to -2 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	1.125	4.375	2.25	5.50
6A (+1 to -1 ft)	Inside	Elevation-Based Dredging & Cap	0.25					1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	0.875	4.125	1.75	5.00
6A (+1 to -1 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25			1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75 Medium Sand	3.25	1.125	4.375	2.25	5.50

Habitat Module	Location of Surf Zone (3.4 feet)	Remediation Area	Dredging Elevation (ft)	Top Cap Elevation (ft)	Water Depth from Cap Surface (ft)	Mean Cap Thickness (ft)
1 (-20 to -30 ft)	Outside	Cap Only	NA	342.50	20.0	2.00
2A (-10 to -20 ft)	Outside	Cap Only	NA	352.50	10.0	2.50
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	NA	352.50	10.0	3.00
2A (-7 to -10 ft)	Outside	Cap Only	NA	355.50	7.0	2.75
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	NA	355.50	7.0	3.00
3A (-3 to -7 ft)	Outside	Elevation-Based Dredging & Cap	356.25	359.50	3.0	3.25
3A (-3 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	356.00	359.50	3.0	3.50
3A (-2 to -3 ft)	Inside	Elevation-Based Dredging & Cap	356.375	360.50	2.0	4.125
3A (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	356.125	360.50	2.0	4.375
4A (-1 to -3 ft)	Inside	Elevation-Based Dredging & Cap	357.375	361.50	1.0	4.125
5A (-0.5 to -2 ft)	Inside	Elevation-Based Dredging & Cap	357.875	362.00	0.5	4.125
5A (-0.5 to -2 ft) AC	Inside	Elevation-Based Dredging & AC	357.625	362.00	0.5	4.375
6A (+1 to -1 ft)	Inside	Elevation-Based Dredging & Cap	358.375	362.50	0.0	4.125
6A (+1 to -1 ft) AC	Inside	Elevation-Based Dredging & AC	358.125	362.50	0.0	4.375

Notes and Assumptions:

GENERAL

GAC = granular activated carbon Cl = chemical isolation AC = amended cap

DREDGING

Shoreline elevation: 362.5 ft

CAPPING

Mixing layer is 0.25 feet to be conservative. Assumed thin layer cap in 6-9 meter zone. AC is amended cap area

EROSION PROTECTION

Surf zone is at 3.4 feet based on wind/wave analysis by Anchor QEA. Erosion protection requirements are as follows (based on 50:1 slope): 0-3.3 feet = coarse gravel (0.13 ft stone 0.25 ft thick)

3.3-10.5 feet = fine gravel

10.5-30.5 feet = fine sand

Assumed potential for ice scour to 1.5 feet of water depth. Habitat layer will be a minimum of 24 inches in 0 to 2 ft water depth habitat modules that have an isolation cap.

Total	Total	Dredge	OD	Total Dredg
Area	Area	Volume	Volume	Volume
(ft ²)	(acre)	(cy)	(cy)	(cy)
969,226	22.25	90,588	17,949	108,537

Total	Dredge	OD	Total Dredge
Area	Volume	Volume	Volume
(acre)	(cy)	(cy)	(cy)
7 188.2	1,673,413	80,266	1,753,679

Overdredge (OD) volume includes 6 inches of dredged material

HABITAT LAYER

Assumed chemical isolation and habitat layer are the same material in Modules 1 and 2 (without amendment), which results in only one layer of over placement. Grainsize for water depths 3 to 30 ft are based on a 100 yr wind/wave analysis by Anchor QEA. Grainsize for water depths less than 3 ft are based on Habitat Modules and include habitat/erosion protection material that is based on a 100 yr wind/wave analysis by Anchor QEA.

OVER PLACEMENT

Assumed a 0..25 ft mean over placement for pH amendment, GAC amendment, sand-only chemical isolation, habitat/erosion protection outside the surf zone, and additional habitat material. Assumed a 0..375 ft mean over placement for the habitat/erosion protection inside the surf zone due to constructability issues with coarse grained material. Assumed one layer of over placement for Modules 1 and 2 without amendment and three layers of over placement for Modules 1 and 2 with amendments.

Assumed two to four layers of over placement (depending on amendments) for Modules 3, 4, 5 and 6. Assumed mean overplacement was used for dredged material volume calculation. Minimum cap thickness assumes no over placement.

SETTLEMENT

No settlement was conservatively assumed for determining dredging elevations.

Table 2 Summary of Cap Thicknesses and Dredge Volume Remediation Area B (SMU 3)

				Chemical Isolation Layer								Erosion Protection/Habitat Layer					Addition	al Habitat Layer							
Habitat Module	Location of Surf Zone (3.6 feet)	Remediation Area	Mixing Layer (ft)	pH Amended Cl (ft)	Mean pH Amended Over- Placement (ft)	GAC Amended Cl (ft)	Mean GAC Amended Over- Placement (ft)	Minimum Chemical Isolation Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Erosion Protection/ Habitat Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Additional Habitat Material (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Total Minimum Cap Thickness (ft)	Assumed Total Mean Over Placement (ft)	Total Mean Cap Thickness (ft)	Assumed Total Maximum Over Placement (ft)	Total Maximum Cap Thickness (ft)	
1 (-20 to -30 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75	
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75	
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Coarse Sand					2.25	0.75	3.00	1.50	3.75	
3A (-4 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.50	0.25	1.75	Fine Gravel					2.75	0.75	3.50	1.50	4.25	
3A (-3 to -4 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.00	0.25	1.25	Fine Gravel	2.75	1.125	3.875	2.25	5.00	
3A (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Fine Gravel	3.25	1.125	4.375	2.25	5.50	
5A (-0.5 to -2 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Fine Gravel	3.25	1.125	4.375	2.25	5.50	

Habitat Module	Location of Surf Zone (3.6 feet)	Remediation Area	Dredging Elevation (ft)	Top Cap Elevation (ft)	Water Depth from Cap Surface (ft)	Mean Cap Thickness (ft)
1 (-20 to -30 ft) AC	Outside	Amended Cap Only	NA	342.50	20.0	3.00
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	NA	352.50	10.0	3.00
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	NA	355.50	7.0	3.00
3A (-4 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	355.00	358.50	4.0	3.50
3A (-3 to -4 ft) AC	Inside	Elevation-Based Dredging & AC	355.625	359.50	3.0	3.875
3A (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	356.125	360.50	2.0	4.375
5A (-0.5 to -2 ft) AC	Inside	Elevation-Based Dredging & AC	357.625	362.00	0.5	4.375

Notes and Assumptions:

GENERAL

GAC = granular activated carbon Cl = chemical isolation AC = amended cap

DREDGING Shoreline elevation: 362.5 ft

CAPPING

Mixing layer is 0.25 feet to be conservative. AC is amended cap area

EROSION PROTECTION

Surf zone is at 3.6 feet based on wind/wave analysis by AnchorQEA. Erosion protection requirements are as follows (based on 50:1 slope): 0-3.6 feet = coarse gravel (0.15 ft stone 0.3 ft thick)

- 3.6-8.5 ft = fine gravel
- 8.5-10.5 ft = coarse sand
- 10.5-15.5 feet = medium sand

15.5-30.5 feet = fine sand

Assumed potential for ice scour to 1.5 feet of water depth. Habitat layer will be a minimum of 24 inches in 0 to 2 ft water depth habitat modules that have an isolation cap.

SHORELINE STABILIZATION

SHORELINE STABILIZATION Based on low water elevation of 362 ft and high water elevation of 365 ft. Extends from 2.5 feet of water depth (360.0 ft) to 365 ft (NAVD 88) to address this issue during high and low lake level conditions. Assumed 2 year storm event from wind/wave analysis by Anchor QEA to define water depth to address ongoing resuspension of Solvay Waste nearshore. Assumed 100 year storm event from wind/wave analysis by Anchor QEA to define more robust grain size to address resuspenion issues.

HABITAT LAYER

Grainsize for water depths 4 to 30 ft are based on a 100 yr wind/wave analysis by Anchor QEA.

Grainsize for water depths less than 4 ft are based on habitat modules and include habitat/erosion protection material based on a 100 yr wind/wave analysis by Anchor QEA.

OVER PLACEMENT

Assumed a 0.25 ft mean over placement for pH amendment, GAC amendment, habitat/erosion protection material, and additional habitat in water depths of 7 ft or greater. Assumed a 0.375 ft mean over placement for habitat/erosion protection material in modules 3A and 5A due to constructability issues with coarse grained material. Assumed three layers of over placement for Modules 1, 2A, and 3A (-4 to -7 ft). Assumed four layers of over placement for Modules 5A and 3A (-2 to -4 ft).

Assumed mean overplacement was used for dredged material volume calculation.

Minimum cap thickness assumes no over placement.

SETTLEMENT

No settlement was conservatively assumed for determining dredging elevations.

AnchorDre	dgeDevelonmentTable	ΜΕΔΝ	0111111 viso
/ archorbre	ugebevelopment tuble.		_011111.0.55

	Remediation	Area B Dredge Vo	olume Estimate	
Total	Total	Dredge	OD	Total Dredge
Area	Area	Volume	Volume	Volume
(ft ²)	(acre)	(cy)	(cy)	(cy)
118,586	2.7	15,489	2,196	17,685
		Lotal		
Total	Total	Dradga	OD	Total Drodge
Total	Total	Dredge	OD	Total Dredge
Total Area	Total Area	Dredge Volume	OD Volume	Total Dredge Volume
Total Area (ft ²)	Total Area (acre)	Iotal Dredge Volume (cy)	OD Volume (cy)	Total Dredge Volume (cy)

		Total	
Total	Total	Dredge	OD
Area	Area	Volume	Volum
(ft ²)	(acre)	(cy)	(cy)
8,198,487	188.2	1,673,413	80,266

Overdredge (OD) volume includes 6 inches of dredged material

Table 3 Summary of Cap Thicknesses and Dredge Volume Remediation Area C (SMU 2)

	Chemical Isolation Layer										Erosion Protection/Habitat Layer Additional Habitat Layer					1								
Habitat Module	Location of Surf Zone (4.2 feet)	Remediation Area	Mixing Layer (ft)	pH Amended CI (ft)	Mean pH Amended Over- Placement (ft)	GAC Amended C (ft)	Mean GAC Amended Over- Placement (ft)	Minimum Chemical Isolation Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Erosion Protection/ Habitat Laye (ft)	Assumed Mean Over- r Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Additional Habitat Material (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Total Minimum Cap Thickness (ft)	Assumed Tota Mean Over Placement (ft)	^{II} Total Mean Cap Thickness (ft)	Assumed Total Maximum Over Placement (ft)	Total Maximum Cap Thickness (ft)
1 (-20 to -30 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Fine Gravel					2.25	0.75	3.00	1.50	3.75
3B (-4 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.50	0.25	1.75	Fine Gravel					2.75	0.75	3.50	1.50	4.25
3B (-3 to -4 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.00	0.25	1.25	Fine Gravel	2.75	1.125	3.875	2.25	5.00
3B (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Fine Gravel	3.25	1.125	4.375	2.25	5.50
5B (-0.5-2 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Fine Gravel	3.25	1.125	4.375	2.25	5.50
6B (+1 to -1 ft) AC	Inside	Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Fine Gravel	3.25	1.125	4.375	2.25	5.50

Habitat Module	Location of Surf Zone (4.2 feet)	Remediation Area	Dredging Elevation (ft)	Top Cap Elevation (ft)	Water Depth from Cap Surface (ft)	Mean Cap Thickness (ft)
1 (-20 to -30 ft) AC	Outside	Amended Cap Only	NA	342.50	20.0	3.00
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	NA	352.50	10.0	3.00
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	NA	355.50	7.0	3.00
3B (-4 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	355.00	358.50	4.0	3.50
3B (-3 to -4 ft) AC	Inside	Elevation-Based Dredging & AC	355.625	359.50	3.0	3.875
3B (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	356.125	360.50	2.0	4.375
5B (-0.5-2 ft) AC	Inside	Elevation-Based Dredging & AC	357.625	362.00	0.5	4.375
6B (+1 to -1 ft) AC	Inside	Elevation-Based Dredging & AC	358.125	362.50	0.0	4.375

Notes and Assumptions:

GENERAL GAC = granular activated carbon CI = chemical isolation AC = amended cap

DREDGING Shoreline elevation:

362.5 ft Dredging in shallow water areas off Semet wall to provide adequate water depth for placement of an isolation cap.

CAPPING

Mixing layer is 0.25 feet to be conservative. AC is amended cap area

EROSION PROTECTION

This area was assumed to be medium energy based on the results of the wind/wave analysis from Anchor QEA. Surf zone is at 4.2 feet based on wind/wave analysis by Anchor QEA. Erosion protection requirements are as follows (based on 50:1 slope): 0-4.2 feet = coarse gravel (0.16 ft stone 0.3 ft thick) 4.2-10.5 feet = fine gravel 10.5-20.5 feet = medium sand

20.5-30.5 feet = fine sand

Assumed potential for ice scour to 1.5 feet of water depth. Habitat layer will be a minimum of 24 inches in 0 to 2 ft water depth habitat modules that have an isolation

cap.

	Remediation Area C Dredge Volume Estimate												
Total	Total	Dredge	OD										
Area	Area	Volume	Volume										
(ft ²)	(acre)	(cy)	(cy)										
217,635	5.0	32,434	4,030										

	Total							
Total	Total	Dredge	OD					
Area	Area	Volume	Volume					
(ft ²)	(acre)	(cy)	(cy)					
8,198,487	188.2	1,673,413	80,266					
Quandra das (QD) values	- in almala a Clin ale an af al	and any discovery start						

Overdredge (OD) volume includes 6 inches of dredged material

HABITAT LAYER

RABITAL LATER Grainsize for water depths 4 to 30 ft are based on a 100 yr wind/wave analysis by Anchor QEA. Grainsize for water depths less than 4 ft are based on habitat modules and include erosion protection/habitat material based on a 100 yr wind/wave analysis by Anchor QEA.

OVER PLACEMENT

Assumed a 0.25 ft mean over placement for pH amendment, GAC amendment, and habitat/erosion protection in water depths greater than 4 ft and additional habitat material. Assumed a 0.375 ft mean over placement for habitat/erosion protection material in water depths shallower than 7 ft due to constructability issues with coarse grained material. Assumed three layers of over placement for Modules 1, 2A, and 3B (-4 to -7 ft).

Assumed four layers of over placement for Modules 6B, 5B and 3B (-2 to -4 ft).

Assumed mean overplacement was used for dredged material volume calculation.

Minimum cap thickness assumes no over placement.

SETTLEMENT

No settlement was conservatively assumed for determining dredging elevations.

Total Dredge
Volume
(cy)
36,464

Total Dredge
Volume
(cy)
1,753,679

Table 4 Summary of Cap Thicknesses and Dredge Volume Remediation Area D (SMU 7, 1 2 [ILWD]))

					(Chemical Isolati	ion Layer					Erosion Protectio	n/Habitat Layer			Additional H	labitat Layer						
Habitat Module	Location of Surf Zone (4.2 feet)	Mixing Layer (ft)	pH Amendec CI (ft)	Mean pH Amended Over- Placement (ft)	GAC Amended CI (ft)	Mean GAC Amended Over- Placement (ft)	Minimum Chemical Isolation Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Erosion Protection/ Habitat Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Additional Habitat Material (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Total Minimum Cap Thickness (ft)	Assumed Total Mean Over Placement (ft)	Total Mean Cap Thickness (ft)	Assumed Total Maximum Over Placement (ft)	Total Maximum Cap Thickness (ft)
1 (-20 to -30 ft) AC	Outside Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75
2A (-10 to -20 ft) AC	Outside Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	1.00	0.25	1.25	Medium Sand					2.25	0.75	3.00	1.50	3.75
2A (-7 to -10 ft) AC	Outside Amended Cap Only	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.25	0.75	Fine Gravel	0.50	0.25	0.75	Medium Sand	2.25	1.00	3.25	2.00	4.25
3B (-4 to -7 ft) AC	Outside Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.25	0.75	Fine Gravel	1.00	0.25	1.25	Medium Sand	2.75	1.00	3.75	2.00	4.75
3B (-3 to -4 ft) AC	Inside Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.00	0.25	1.25	Medium Sand	2.75	1.125	3.875	2.25	5.00
3B (-2 to -3 ft) AC	Inside Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Medium Sand	3.25	1.125	4.375	2.25	5.50
5B (-0.5 to -2 ft) AC	Inside Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Medium Sand	3.25	1.125	4.375	2.25	5.50
6B (+1 to -1 ft) AC	Inside Elevation-Based Dredging & AC	0.25	0.25	0.25	0.75	0.25	1.00	0.50	1.75	Medium Sand	0.50	0.375	0.875	Coarse Gravel	1.50	0.25	1.75	Medium Sand	3.25	1.125	4.375	2.25	5.50

Habitat Module	Location of Surf Zone (4.2 feet)	Remediation Area	Dredging Elevation (ft)	Top Cap Elevation (ft)	Water Depth from Cap Surface (ft)	Mean Cap Thickness (ft)
1 (-20 to -30 ft) AC	Outside	Amended Cap Only	NA	342.50	20.0	3.00
2A (-10 to -20 ft) AC	Outside	Amended Cap Only	NA	352.50	10.0	3.00
2A (-7 to -10 ft) AC	Outside	Amended Cap Only	NA	355.50	7.0	3.25
3B (-4 to -7 ft) AC	Outside	Elevation-Based Dredging & AC	Varies	358.50	4.0	3.75
3B (-3 to -4 ft) AC	Inside	Elevation-Based Dredging & AC	Varies	359.50	3.0	3.875
3B (-2 to -3 ft) AC	Inside	Elevation-Based Dredging & AC	Varies	360.50	2.0	4.375
5B (-0.5 to -2 ft) AC	Inside	Elevation-Based Dredging & AC	Varies	362.00	0.5	4.375
6B (+1 to -1 ft) AC	Inside	Elevation-Based Dredging & AC	Varies	362.50	0.0	4.375

Notes and Assumptions:

GENERAL GAC = granular activated carbon CI = chemical isolation AC = amended cap

DREDGING

Shoreline elevation: 362.5 ft ILWD Removal approach to address average 2 meters plus hotspots.

CAPPING

Mixing layer is 0.25 feet to be conservative. AC is amended cap area

EROSION PROTECTION

Surf zone is at 4.2 feet based on wind/wave analysis conducted by Anchor QEA. ILWD assumed to be medium energy based on wind/wave analysis conducted by Anchor QEA. Erosion protection requirements are as follows (based on 50:1 slope):

0-4.2 feet = coarse gravel (0.17 ft stone 0.3 ft thick)

4.2-10.5 ft = fine gravel 10.5-20.5 feet = medium sand

20.5-30.5 feet = fine sand

Assumed potential for ice scour to 1.5 feet of water depth. Habitat layer will be a minimum of 24 inches in 0 to 2 ft water depth habitat modules that have

an isolation cap.

Assumed 4:1 slope for backfill off western portion of the Willis IRM Barrier wall.

HABITAT LAYER Grainsize for water depths 4 to 30 ft are based on a 100 yr wind/wave analysis by Anchor QEA.

Grainisze for water depth 4 to be fair of the area of the down and the analysis of the down and the down and

OVER PLACEMENT Assumed a 0.25 ft mean over placement for pH amendment, GAC amendment, habitat/erosion protection outside the surf zone, and additional habitat material. Assumed a 0.375 ft mean over placement for habitat/erosion protection material inside the surf zone due to constructability issues with coarse grained material. Assumed two layers of over placement for Modules 1 and 2A (-10 to -20 ft).

Assumed three layers of over placement for Modules 6B, 5B, 3B (-2 to -4 ft) and 2A (-7 to -10 ft).

Two meter average removal per SMU was used for dredged material volume calculation

Minimum cap thickness assumes no over placement.

SETTLEMENT

No settlement was conservatively assumed for determining dredging elevations.

OVERDREDGE VOLUME

Overdredge volume is for module 5 & 6, which is approximately 2.7 acres.

AnchorDredgeDevelopmentTable_MEAN_01	11111.xls

Remediation Ar	Remediation Area D Dredge Volume Estimate												
Total	Dredge	OD	Total Dredge										
Area	Volume	Volume	Volume										
(acre)	(cy)	(cy)	(cy)										
91.4	1,179,767	2,202	1,181,969										

		Total								
Total	Total	Dredge	OD	Total Dredge						
Area	Area	Volume	Volume	Volume						
(ft ²)	(acre)	(cy)	(cy)	(cy)						
8,198,487	188.2	1,673,413	80,266	1,753,679						
Overdredge (OD) volume includes 6 inches of dredged material										

1,179,767 Total

Total

Area

(ft²)

3,983,018

Table 5 Summary of Cap Thicknesses and Dredge Volume Remediation Area E (SMU 6/7)

							Chemical Isol	ation Layer					Erosion Pr	otection/Habitat Laye	r		Additional	Habitat Layer		1				
Habitat Module	Location of Surf Zone (6.7 feet)	Remediation Area	Mixing Layer (ft)	GAC Amended Cl (ft)	Mean GAC Amended Over- Placemen t	Sand Only Cl (ft)	Mean Sand Only Over- Placement (ft)	Minimum Chemical Isolation Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Erosion Protection/ Habitat Layer (ft)	Assumed Mean Over- Placement (ft)	Mean Total Layer Thickness (ft)	Material Type	Minimum Additional Habitat Material (ft)	Assumed Mean Over- Placement (ft)	Mean Total Laye Thickness (ft)	r Material Type	Total Minimum Cap Thickness (ft)	Assumed Total Mean Over Placement (ft)	Total Mean Cap Thickness (ft)	Assumed Total Maximum Over Placement (ft)	Total Maximum Cap Thickness (ft)
1 (-20 to -30 ft)	Outside	Cap Only	0.25			0.50	0.25	0.50	0.25	1.00	Medium Sand	1.00	0.25	1.25	Coarse Sand					1.75	0.50	2.25	1.00	2.75
1 (-20 to -30 ft) GAC	Outside	GAC Cap Only	0.25	0.50	0.25			0.50	0.25	1.00	Medium Sand	1.00	0.25	1.25	Coarse Sand					1.75	0.50	2.25	1.00	2.75
2A (-10 to -20 ft)	Outside	Cap Only	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	1.00	0.25	1.25	Fine Gravel					2.25	0.50	2.75	1.00	3.25
2A (-10 to -20 ft) GAC	Outside	GAC Cap Only	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	1.00	0.25	1.25	Fine Gravel					2.25	0.50	2.75	1.00	3.25
2A (Nav Channel) (-10 to -20 ft)	Outside	Elevation-Based Dredging & Cap	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	1.00	0.50	1.50	Cobble					2.25	0.75	3.00	1.50	3.75
2A (Nav Channel) (-10 to -20 ft) GAC	Outside	Elevation-Based Dredging & GAC Cap	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	1.00	0.50	1.50	Cobble					2.25	0.75	3.00	1.50	3.75
2B (-7 to -10 ft)	Outside	Cap Only	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	1.00	0.375	1.375	Coarse Gravel					2.25	0.625	2.875	1.25	3.50
2B (-7 to -10 ft) GAC	Outside	GAC Cap Only	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	1.00	0.375	1.375	Coarse Gravel					2.25	0.625	2.875	1.25	3.50
3B (-3 to -7 ft)	Inside	Elevation-Based Dredging & Cap	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.00	0.375	1.375	Coarse Grave	2.75	1.125	3.875	2.25	5.00
3B (-3 to -7 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.00	0.375	1.375	Coarse Grave	2.75	1.125	3.875	2.25	5.00
3B (-2 to -3 ft)	Inside	Elevation-Based Dredging & Cap	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50
3B (-2 to -3 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50
5B (-0.5 to -2 ft)	Inside	Elevation-Based Dredging & Cap	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50
5B (-0.5 to -2 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50
6B (+1 to -1 ft)	Inside	Elevation-Based Dredging & Cap	0.25			1.00	0.25	1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50
6B (+1 to -1 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	0.25	1.00	0.25			1.00	0.25	1.50	Medium Sand	0.50	0.50	1.00	C.Grav/Cobble	1.50	0.375	1.875	Coarse Grave	3.25	1.125	4.375	2.25	5.50

Habitat Module	Location of Surf Zone (6.7 feet)	Remediation Area	Dredging Elevation (ft)	Top Cap Elevation (ft)	Water Depth from Cap Surface (ft)	Mean Cap Thickness (ft)
1 (-20 to -30 ft)	Outside	Cap Only	NA	342.50	20.0	2.25
1 (-20 to -30 ft) GAC	Outside	GAC Cap Only	NA	342.50	20.0	2.25
2A (-10 to -20 ft)	Outside	Cap Only	NA	352.50	10.0	2.75
2A (-10 to -20 ft) GAC	Outside	GAC Cap Only	NA	352.50	10.0	2.75
2A (Nav Channel) (-10 to -20 ft)	Outside	Elevation-Based Dredging & Cap	343.50	346.50	16.0	3.00
2A (Nav Channel) (-10 to -20 ft) GAC	Outside	Elevation-Based Dredging & GAC Cap	343.50	346.50	16.0	3.00
2B (-7 to -10 ft)	Outside	Cap Only	NA	355.50	7.0	2.875
2B (-7 to -10 ft) GAC	Outside	GAC Cap Only	NA	355.50	7.0	2.875
3B (-3 to -7 ft)	Inside	Elevation-Based Dredging & Cap	355.625	359.50	3.0	3.875
3B (-3 to -7 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	355.625	359.50	3.0	3.875
3B (-2 to -3 ft)	Inside	Elevation-Based Dredging & Cap	356.125	360.50	2.0	4.375
3B (-2 to -3 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	356.125	360.50	2.0	4.375
5B (-0.5 to -2 ft)	Inside	Elevation-Based Dredging & Cap	357.625	362.00	0.5	4.375
5B (-0.5 to -2 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	357.625	362.00	0.5	4.375
6B (+1 to -1 ft)	Inside	Elevation-Based Dredging & Cap	358.125	362.50	0.0	4.375
6B (+1 to -1 ft) GAC	Inside	Elevation-Based Dredging & GAC Cap	358.125	362.50	0.0	4.375

Notes and Assumptions:

GENERAL

CAC = granular activated carbon CI = chemical isolation No work is assumed for a 150-ft nearshore area where stability due to the presence of the railroad tracks is being evaluated.

DREDGING

Shoreline elevation: 362.5 ft

Dredging in shallow water depths to meet objectives for habitat and navigation.

Removals to 16 feet water depth (344.25 feet NAVD 88) may be required in navigational channel to meet post remedy 14 ft water depth (elevation 347.5 ft) assuming a 3.25-foot thick cap in this area. Assumed the channel is 100 feet wide at the bottom with a 5H:1V slope back to the cap surface.

CAPPING

Mixing layer is 0.25 feet to be conservative. Assumed thin layer cap in 6 to 9 meter zone.

EROSION PROTECTION

Surf zone is at 6.8 feet based on wind/wave analysis by Anchor QEA. Erosion protection requirements are as follows (based on 50:1 slope): 0-6.8 feet = cobbles (0.25 ft stone 0.5 ft thick)

- 6.8-10.5 ft = coarse gravel
- 10.5-20.5 feet = fine gravel
- 20.5-30.5 feet = medium sand

Assumed potential for ice scour to 1.5 feet of water depth. Habitat layer will be a minimum of 24 inches in 0 to 2 ft water depth habitat modules that have an isolation cap. Coarser grained material may be required at the mouth of Harbor Brook based on tributary analysis. Coarser grained material will be placed in the navigation channel at the mouth of Onondaga Creek to: 1) serve as an indicator layer for

future navigation dredging; and 2) protect the side slopes inside of the surf zone.

HABITAT LAYER

Assumed only habitat/erosion protection layer in the navigation channel. Grainsize for water depths 7 to 30 ft are based on a 100 yr wind/wave analysis by Anchor QEA. Grainsize for water depths less than 7 ft are based on habitat modules and include habitat/erosion protection material based on a 100 yr wind/wave analysis by Anchor QEA.

OVER PLACEMENT

Assumed a 0.25 ft mean over placement for GAC amendment, sand-only chemical isolation, habitat/erosion protection in waters deeper than 7 ft, and additional habitat material. Assumed a 0.375 ft mean over placement for habitat/erosion protection material inside the surf zone due to constructability issues with coarse grained material.

Total

Area

(ft²)

2,910,022

Total

Area

(ft²)

8,198,487

Total

Area

(acre)

66.8

Total

Area

(acre)

188.2

Overdredge (OD) volume includes 6 inches of dredged material

Remediation Area E Dredge Volume Estimate

Dredge Volume

(cy)

355,135

Total

Dredge

Volume

(cy)

1,673,413 80,266

OD

Volume

(cy)

53,889

OD

Volume

(cy)

Total Dredge

Volume

(cv)

409.024

Total Dredge

Volume

(cy)

1,753,679

Assumed a 0.5 ft mean over placement for erosion protection/habitat material in waters shallower than 7 ft due to constructability issues with coarse grained material and cobbles. Assumed two layers of over placement for Modules 1, 2A, and 2B.

Assumed three layers of over placement for Modules 6B, 5B and 3B.

Assumed mean overplacement was used for dredged material volume calculation. Minimum cap thickness assumes no over placement.

SETTLEMENT

No settlement was conservatively assumed for determining dredging elevations.

AnchorDredgeDevelopmentTable	MEAN	011111.xlsx	

FIGURES





- Water Level (EI.=362.5)

Not to Scale

Figure 1 Typical Dredging Transition Details Appendix F - Dredge Prism Development Onondaga Lake, Syracuse, New York

DRAWINGS

ONONDAGA LAKE DRAFT CAPPING, DREDGING AND HABITAT INTERMEDIATE DESIGN DREDGING PLAN



DRAFT DOCUMENT SUBJECT TO CHANGE IN WHOLE OR IN PART. PRELIMINARY DRAFT – NOT FOR CONSTRUCTION



DRAWING INDEX

CHEET BEGBENDE	SHEET NO.	SHEET TILLE
EXISTING CONDITIONS		
G		COVER SHEET - LEGEND (NOT INCLUDED)
G-IDX		SHEET INDEX - GENERAL NOTES (NOT INCLUDED)
G-1		KEY MAP (NOT INCLUDED)
G-2		REMEDIATION AREA A - EXISTING CONDITIONS (NOT INCLUDED)
G-3		REMEDIATION AREA A - EXISTING CONDITIONS (NOT INCLUDED)
G-4		REMEDIATION AREA B - EXISTING CONDITIONS (NOT INCLUDED)
G-5		REMEDIATION AREA C - EXISTING CONDITIONS (NOT INCLUDED)
G-6		REMEDIATION AREA D - EXISTING CONDITIONS (NOT INCLUDED)
G-7		REMEDIATION AREA D & E - EXISTING CONDITIONS (NOT INCLUDED
G-8		REMEDIATION AREA E - EXISTING CONDITIONS (NOT INCLUDED)
G-9		REMEDIATION AREA E - EXISTING CONDITIONS (NOT INCLUDED)
G-10		REMEDIATION AREA E - EXISTING CONDITIONS (NOT INCLUDED)
	1	COVER SHEET
	2	
D-1	2	DREDGING PLAN KEY MAP
D-2	4	
D-3	5	
D-4	6	REMEDIATION AREA B - DREDGING PLAN
D-5	7	REMEDIATION AREA C - DREDGING PLAN
D-6	8	REMEDIATION AREA D - DREDGING PLAN
D-7	9	REMEDIATION AREA D & F - DREDGING PLAN
D-8	10	REMEDIATION AREA E - DREDGING PLAN
D-9	11	REMEDIATION AREA E - DREDGING PLAN
D-10	12	REMEDIATION AREA E - DREDGING PLAN
D-11	13	REMEDIATION AREA A - DREDGING CROSS SECTIONS 1, 2, & 3
D-12	14	REMEDIATION AREA A - DREDGING CROSS SECTIONS 4 & 5
D-13	15	REMEDIATION AREA A - DREDGING CROSS SECTIONS 6 & 7
D-14	16	REMEDIATION AREA B - DREDGING CROSS SECTIONS 8 & 9
D-15	17	REMEDIATION AREA C - DREDGING CROSS SECTIONS 10. 11. 12. &
D-16	18	REMEDIATION AREA C - DREDGING CROSS SECTIONS 14 & 15
D-17	19	REMEDIATION AREA D - DREDGING CROSS SECTIONS 16, 17, & 18
D-18	20	REMEDIATION AREA D - DREDGING CROSS SECTIONS 19. 20. & 21
D-19	21	REMEDIATION AREA D - DREDGING CROSS SECTIONS 22 & 23
D-20	22	REMEDIATION AREA D - DREDGING CROSS SECTIONS 24 & 25
D-21	23	REMEDIATION AREA E - DREDGING CROSS SECTION 26
D-22	24	REMEDIATION AREA E - DREDGING CROSS SECTIONS 27 & 28
D-23	25	REMEDIATION AREA E - DREDGING CROSS SECTIONS 28, 29, & 30
D-24	26	REMEDIATION AREA E - DREDGING CROSS SECTIONS 30, 31, & 32
	27	REMEDIATION AREA E - DREDGING CROSS SECTIONS 32, 33, & 34
D-25	-	
D-25 D-26	28	REMEDIATION AREA E - DREDGING CROSS SECTIONS 35 & 36

С COVER SHEET CAPPING PLAN SHEET INDEX - GENERAL NOTES - LEGEND (NOT INCLUDED) C-IDX CAPPING PLAN KEY MAP (NOT INCLUDED) C-1 REMEDIATION AREA A - CAPPING PLAN (NOT INCLUDED) C-2 C-3 REMEDIATION AREA A - CAPPING PLAN (NOT INCLUDED) C-4 REMEDIATION AREA B - CAPPING PLAN (NOT INCLUDED) REMEDIATION AREA C - CAPPING PLAN (NOT INCLUDED) C-5 REMEDIATION AREA D - CAPPING PLAN (NOT INCLUDED) C-6 C-7 REMEDIATION AREA D & E - CAPPING PLAN (NOT INCLUDED) C-8 REMEDIATION AREA E - CAPPING PLAN (NOT INCLUDED) REMEDIATION AREA E - CAPPING PLAN (NOT INCLUDED) C-9 C-10 REMEDIATION AREA E - CAPPING PLAN (NOT INCLUDED)



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				REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION	DESIGNED BY: K. POWELL / W. DINICOLA	ONONDAGA LAKE DRAFT CAPPING, DR	REDGING	צחו-ח
					DRAWN BY: G. HOWELL	AND HABITAT INTERMEDIATE DES	IGN	
					CHECKED BY: R. MOHAN			
					APPROVED BY: J. VERDUIN			
					SCALE AS NOTED	DREDGING PLAN	s	SHEET NO. 2 OF 2
					DATE: JANUARY 24, 2011	SHEET INDEX - GENERAL NOTES - LEG	END	

LEGEND



GENERAL NOTES

- 1. BATHYMETRIC SURVEY PERFORMED BY CR ENVIRONMENTAL, INC. FOR
- HONEYWELL IN 2005. 2. GROUND SURFACE CONTOURS ARE 2 FEET. BATHYMETRY CONTOURS ARE 1
- FOOT. 3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), U.S. SURVEY FEET.
- 4. HORIZONTAL DATUM: NEW YORK STATE PLANE, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NADB3), U.S. SURVEY FEET. 5. BASEMAP PROVIDED TO ANCHOR QEA BY PARSONS IN SEPTEMBER 2008. 6. ALL LOCATIONS AND FEATURES ARE APPROXIMATE.
- 7. WATER LEVEL 362.5 FT NAVD 88 IS THE AVERAGE LAKE LEVEL DURING AQUATIC PLANT GROWING SEASON.

DRAFT DOCUMENT SUBJECT TO CHANGE IN WHOLE OR IN PART. PRELIMINARY DRAFT - NOT FOR CONSTRUCTION















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SECOTHECHNICAL ANALYSIS INDICATES

THAT DREDGING WITHIN APPROXIMATELY 150 FT. OF THE SHORELINE COULD RESULT IN AN UNACCEPTABLE FACTOR OF SAFETY FOR THE SHORELINE AND RAIL LINE STABILITY DETAILS FOR THIS AREA WILL BE DEVELOPED AS PART OF THE DRAFT FINAL DESIGN.

1



SCALE IN FEET

LEGEND:

LIMITS OF DREDGING AND CAPPING LIMITS OF REMOVAL AND CAPPING IN ADJACENT AREAS INCLUDED IN THE DESIGN LIMITS OF CAP ONLY — — — PROJECT BASELINE EXISTING CONTOUR PROPOSED DREDGING CONTOUR -360 -SHORELINE (ELEV. 362.5) REMEDIATION AREA BOUNDARY BARRIER WALL ----- SMU BOUNDARY + + + + + + RAILROAD LINE + + + + CROSS SECTION LOCATION AND DESIGNATION D-13/

BASELINE COORDINATES				
POINT #	NORTHING	EASTING		
65	1116762.43	925336.95		
66	1116635.52	925448.67		
67	1116345.82	925904.96		
68	1116117.81	926327.44		
69	1116112.62	926889.51		
70	1116216.95	927304.39		
71	1116494.16	927600.25		

NOTE: SEE SHEET D-IDX FOR GENERAL NOTES AND LEGEND.

DRAFT DOCUMENT

 SUBJECT TO CHANGE IN WHOLE OR IN PART.
PRELIMINARY DRAFT - NOT FOR CONSTRUCTION

 ONONDAGA LAKE DRAFT CAPPING, DREDGING
AND HABITAT INTERMEDIATE DESIGN
 D-7

 REMEDIATION AREAS D AND E
DREDGING PLAN
 SHEET NO. 9 OF 29









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ν	-		

SHEET NO. 13 OF 29







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				REVISIONS		
REV	DATE	BY	APP'D	DESCRIPTION	DESIGNED BY:	K. POWELL / W. DINICOLA
					DRAWN BY:	G. HOWELL
					CHECKED BY:	R. MOHAN
					APPROVED BY:	J. VERDUIN
					SCALE:	AS NOTED
					DATE:	JANUARY 24, 2011

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DRAFT DOCUMENT SUBJECT TO CHANGE IN WHOLE OR IN PART. PRELIMINARY DRAFT - NOT FOR CONSTRUCTION

ONONDAGA LAKE DRAFT CAPPING, DREDGING AND HABITAT INTERMEDIATE DESIGN

D-14

REMEDIATION AREA B DREDGING CROSS SECTIONS 8 & 9

SHEET NO. 16 OF 29



SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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DESIGNED BY: K. POWELL / W. DINICOLA DRAWN BY: G. HOWEL CHECKED BY: R. MOHAN APPROVED BY: J. VERDUIN SCALE: AS NOTED DATE: JANUARY 24, 2011

200

250

EL. = 355.0











1. SEE SHEET D-IDX FOR GENERAL NOTES AND LEGEND.

4. CAP THICKNESS AND ELEVATION ARE BASED ON MEAN

AQUATIC PLANT GROWING SEASON.

2. WATER LEVEL 362.5 FT NAVD 88 IS THE AVERAGE LAKE LEVEL DURING

3. THE TYPICAL DREDGING SLOPE FOR EDGES AND TRANSITIONS IS 5:1 AND THE TYPICAL CAPPING SLOPE FOR EDGES AND TRANSITIONS IS 4:1.

NOTES:



NOTES:

ANCHOR
V, QEA

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				REVISIONS		
REV	DATE	ΒY	APP'D	DESCRIPTION	DESIGNED BY:	K. POWELL / W. DINICOLA
					DRAWN BY:	G. HOWELL
					CHECKED BY:	R. MOHAN
					APPROVED BY:	J. VERDUN
					SCALE:	AS NOTED
					DATE:	JANUARY 24, 2011
						·

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1. SEE SHEET D-IDX FOR GENERAL NOTES AND LEGEND. 2. WATER LEVEL 362.5 FT NAVD 88 IS THE AVERAGE LAKE LEVEL DURING AQUATIC PLANT GROWING SEASON. 3. THE TYPICAL DREDGING SLOPE FOR EDGES AND TRANSITIONS IS 5:1 AND THE TYPICAL CAPPING SLOPE FOR EDGES AND TRANSITIONS IS 4:1. 4. CAP THICKNESS AND ELEVATION ARE BASED ON MEAN OVER-PLACEMENT WITHOUT SETTLEMENT CONSIDERATIONS.

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ONONDAGA LAKE DRAFT CAPPING, DREDGING AND HABITAT INTERMEDIATE DESIGN

REMEDIATION AREA C DREDGING CROSS SECTIONS 14 & 15

D	-1	6

SHEET NO. 18 OF 29



2. WATER LEVEL 362.5 FT NAVD 88 IS THE AVERAGE LAKE LEVEL DURING 3. THE TYPICAL DREDGING SLOPE FOR EDGES AND TRANSITIONS IS 5.1 AND THE TYPICAL CAPPING SLOPE FOR EDGES AND TRANSITIONS IS 4:1. CAP THICKNESS AND ELEVATION ARE BASED ON MEAN OVER-PLACEMENT WITHOUT SETTLEMENT CONSIDERATIONS.

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ONONDAGA LAKE DRAFT CAPPING, DREDGING AND HABITAT INTERMEDIATE DESIGN

REMEDIATION AREA D DREDGING CROSS SECTIONS 16, 17, & 18

D	-1	7

SHEET NO. 19 OF 29







REMEDIATION AREA D	
DREDGING CROSS SECTIONS 24 & 25	

SHEET	NO.	22	OF	2
				_



- NOTES: 1. SEE SHEET D-IDX FOR GENERAL NOTES AND LEGEND.
- 2. WATER LEVEL 362.5 FT NAVD 88 IS THE AVERAGE LAKE LEVEL DURING
- AQUATIC PLANT GROWING SEASON.

* %	ANCHOR
V.	QEA 🚟

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REVISIONS						
REV	DATE	BY	APP'D	DESCRIPTION	DESIGNED BY:	K. POWELL / W. DINICOLA
					DRAWN BY:	G. HOWELL
					CHECKED BY:	R. MOHAN
					APPROVED BY:	J. VERDUIN
					SCALE:	AS NOTED
					DATE:	JANUARY 24, 2011

 THE TYPICAL DREDGING SLOPE FOR EDGES AND TRANSITIONS IS 5:1 AND THE TYPICAL CAPPING SLOPE FOR EDGES AND TRANSITIONS IS 4:1.
 REMEDIATION AREA D / REMEDIATION AREA E CAP THICKNESS AND ELEVATION ARE BASED ON MEAN OVER-PLACEMENT WITHOUT SETTLEMENT CONSIDERATIONS. 5. OUTBOARD AREA CAP THICKNESS AND ELEVATION ARE BASED ON MEAN OVER-PLACEMENT WITHOUT SETTLEMENT CONSIDERATIONS. DRAFT DOCUMENT SUBJECT TO CHANGE IN WHOLE OR IN PART. PRELIMINARY DRAFT - NOT FOR CONSTRUCTION ONONDAGA LAKE DRAFT CAPPING, DREDGING **D-21** AND HABITAT INTERMEDIATE DESIGN **REMEDIATION AREA E** SHEET NO. 23 OF 29 **DREDGING CROSS SECTION 26**





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SHEET NO.	28	OF	29
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