ONONDAGA LAKE PRE-DESIGN INVESTIGATION: PHASE IV WORK PLAN

Onondaga County, New York

Prepared For:

Honeywell

5000 Brittonfield Parkway
East Syracuse, NY 13057

Prepared By:

PARSONS

290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Phone: (315) 451-9560
Fax: (315) 451-9570

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PHASE IV PRE-DESIGN INVESTIGATION WORK PLAN

1.0 INTRODUCTION

Onondaga Lake is a 4.6-mi^2 (2900-acre) lake located northwest of the City of Syracuse in central New York State. The lake, its tributaries, and the upland hazardous waste sites related to the lake have been identified as a federal Superfund site on USEPA's National Priorities List (CERCLIS NYD986913580). The remedial investigation (RI) for the Onondaga Lake bottom subsite was completed in December 2002, the feasibility study (FS) was completed in November 2004, the Phase I Pre-Design Investigation (PDI) was completed in 2005, the Phase II PDI was completed in 2006, and the Phase III PDI was completed in 2007. Additional information on the site can be found in the FS (Parsons, 2004) and the Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) on July 1, 2005 (NYSDEC and USEPA, 2005).

The Phase IV PDI will be structured in a similar fashion as the Phase III effort to collect additional information for the Onondaga Lake design and to fulfill additional data gaps. Unless otherwise noted, all Phase IV field activities will be conducted in accordance with the procedures outlined in the Phase I, II, and III PDI Work Plans and associated appendices (Parsons, 2005, 2006, and 2007).

2.0 PROJECT OBJECTIVES

Before any of the remedial actions are implemented, additional information is required to complete the remedial design. The Phase IV PDI will be focused on collecting additional data to advance the conceptual design. Since many of the details around the design have not been finalized, this work plan is intended to address several remaining gaps within the existing data set, such as porewater conditions, cap and dredge extents, and groundwater upwelling velocities. Any additional PDI required in 2008 beyond the scope of this work plan will be submitted to NYSDEC as addenda to this work plan.

The Phase IV information will be combined with the existing data set for the lake for use during remedial design. An overall assessment of remaining data gaps for intermediate and/or final design will need to be conducted based on a review of data collected through the Phase IV PDI.

3.0 MOBILIZATION AND LOGISTICS

Health and Safety

Parsons ranks health and safety as its highest priority. Parsons Project Safety Plan (PSP) and our Subcontractor's Safety Plans (SSP) prepared for previous PDI activities will be reviewed by Parsons and the specific subcontractor and updated as needed for use during this investigation and will be strictly followed by all personnel. Any task outside of the current scope defined in the PSP will have a new Job Safety Analysis (JSA) completed before the task begins. A summary of the revised roles/responsibilities, contact information, and JSAs have been included in Appendix A of this work plan. Copies of the PSP and SSPs will be maintained at the support zone and on each vessel.

Site Facilities, Decontamination, and Waste Handling

The support zone and facilities utilized for the Phase I, II, and III PDI work will be relocated to the clearing off the upper road to Harbor Brook (Figure 1). The dock will be located west of the causeway, closer to the entry gate to the Onondaga Lake site. The support zone has been relocated due to field work for the installation of the Willis portion of the Willis/Semet IRM (interim remedial measure) barrier wall. All decontamination and waste management activities will be conducted in accordance with Phase I PDI Work Plan (Parsons, 2005).

4.0 POREWATER INVESTIGATION

Additional sampling is needed to characterize porewater concentrations in the sediment management units (SMUs) where capping is part of the lake remedy. In order to address existing data gaps and further the design process, porewater samples will be collected from SMUs 2, 3, 4, 5, 6, and 7. Sediment cores will be collected and centrifuged to obtain porewater data. Additional porewater data needs may be required for SMU 8 based on future Technical Work Group discussions. Pending further review by the Capping Technical Work Group, it is believed that sufficient porewater data is available for SMU 1 for the initial design submittal; therefore, no additional sampling is proposed in this work plan.

4.1 Sediment Cores - Porewater

Sediment core samplers will be advanced approximately 6 ft or 10 ft. into the sediment in SMUs 2, 3, 4, 5, 6, and 7 using vibracore techniques (Figures 2 through 4). Following extraction, each core will be cut into 2 ft intervals, capped, sealed, and shipped to the lab for processing. The proposed sample locations were chosen to ensure adequate spatial coverage over remedial areas, and specifically over the Ninemile Creek delta where VOCs have been detected in porewater and sediment. Sampling intervals and locations are presented in Table 1.

Three of the 11 proposed porewater locations in SMU 7 (Figure 4) are located at cap bench testing locations including the three cap bench testing locations where non-aqueous phase liquids (NAPL) was observed (70048, 70049, and 70050) to evaluate porewater concentrations in areas where NAPL was previously observed. In addition, a second vibracore sample will be collected at each porewater location in SMU 7 for lithology description and logging on-shore). Sediment samples will be archived for future analysis if necessary.

4.2 Processing and Analysis

The cores collected during the Phase IV PDI will be processed and analyzed by Test America Labs in Pittsburgh, PA in accordance with the Phase III PDI WP and standard operating procedures (SOPs) (Parsons, 2007):

- The cores will be 3.5-inch diameter and desired sample intervals will be sent to the laboratory. The cores will be maintained upright until the sections are measured, cut, capped, and labeled in the field before shipment to the lab. The cores will be cut, capped, and labeled on the sampling vessel.
- Any lake water on top of the cores will be decanted before the core is capped. Any fluid that separates from the sediment within the core during sample shipment will be considered porewater and included in the analysis. Due to this modification, samples do not need to be kept vertical prior to processing.
- The raw sediment will be sampled prior to centrifugation and analyzed for mercury, volatile organic compounds (VOCs), chemical parameters of interest (CPOIs) (including benzene and toluene), pH, TOC, percent moisture, and specific gravity (for porosity calculations).
- The centrifugation process will be conducted in a refrigerated environment to minimize volatilization.
- The dissolved fraction of the porewater generated from these cores will be analyzed. For the dissolved porewater fraction, the non-volatile parameters (Hg, TOC, and pH) will be pressure filtered through 0.7 um TCLP filtration paper. The volatiles will be centrifuged for 10 minutes and decanted into pre-preserved VOA vials.
- Spiked samples will be run at 2000 ppb rather than 10 ppb to be more representative of concentrations at the site. The spiked blanks will be handled in a similar fashion to the VOC samples with an initial 30 to 90 minute centrifuge, plus ten additional minutes after being decanted into a smaller vessel. The results of the spiked samples from previous porewater investigations are still being discussed with NYSDEC. Based on those discussions, the spiking methodology may need to be modified.

5.0 SEDIMENT INVESTIGATION

A strategy has not been completely developed around defining the extent of the cap and dredge areas for the non-in-lake waste deposit (ILWD) SMUs. The sample locations proposed in this work plan will address the need for additional sediment data within the SMUs 2, 4, 6, and 7 to define the extent of capping and dredging. Sediment samples from SMUs 3 and 5 are meant to define exceedances in these SMUs likely originating from contamination in adjoining SMUs (2, 4, and 6) and thus included in Table 2 as "SMU 2 Area", "SMU 4 Area", and "SMU 6 Area."

5.1 Sediment Cores

Cores will be collected from SMUs 2, 3, 4, 5, 6, and 7 (Figures 5 through 7) from a pontoon boat using a vibracore in accordance with the procedures outlined in the Phase I PDI Sampling and Analysis Plan (SAP) (Parsons, 2005). Sample locations were selected to refine the boundaries of the proposed remedial area, recognizing that final delineation of this boundary will occur prior to construction activities. The preliminary remedial area was defined by creating a boundary along sample locations where the mercury is less than 2.2 mg/kg and the mean probable effect concentration quotient (PECQ) is less than 1. Sampling analysis, intervals and locations are presented in Table 2. Sediment samples will be collected to a depth of 10 ft at nearshore locations and 4 ft at offshore locations. The cores will be sectioned into 1-ft intervals and will be capped and sealed on the sampling vessel. The cores will be brought to the onshore support zone where they will be processed for lithology. Sediment samples from these cores will be collected and shipped to the lab for chemical analysis. During previous PDI efforts, shallow vibracores were advanced to 10 ft outside of the ILWD. The proposed sediment cores for this PDI effort will be advanced to 4 ft outside of the ILWD because deep dredging is not assumed in offshore locations. The proposed sediment core locations in this work plan will provide additional data for the conceptual design to refine the extent of capping and dredging within the lake. The deeper intervals have been included for nearshore areas to evaluate removal options. The sampling intervals for these cores also provide a higher resolution of contaminant concentrations for the initial design. There are a variety of PECQ drivers in the western end of SMU 2, predominately various PAHs and total PCBs, therefore, samples analysis will include polyaromatic hydrocarbons (PAHs) and total polychlorinated biphenyls (PCBs). As a result, analyses of total analyte list (TAL) metals are not considered necessary and have not been included in Tables 1 and 2.

6.0 GROUNDWATER INVESTIGATION

Temperature/conductivity probes will be advanced into the sediments to further evaluate the groundwater discharge to Onondaga Lake. Geoprobe® developed a probe that was utilized during the Phase II and III PDI to rapidly collect temperature and conductivity data from the lake sediments. The probes utilized during the Phase III effort will also be used during the Phase IV PDI. Temperature/conductivity probes were conducted during Phase III in areas of the lake that required more data in support of the Groundwater Upwelling Investigation. Due to weather conditions, 84 of these proposed locations were unable to be completed from Addendum 5 of the Phase III Work Plan. The outstanding locations will be completed as part of the Phase IV PDI. In addition to the 84 temperature/conductivity probes from Addendum 5 that will be completed as part of the Phase IV PDI, 10 temperature/conductivity probes will be redone at locations that were originally tested in 2007. At those locations, the conductivity profiles read at or above the maximum value. If the Phase IV Geoprobes do not provide usable date (i.e. continued exceedances of the instrument limit at locations that also previously exceeded the limit).

Honeywell/Parsons and NYSDEC will determine if vibracores are needed to fill a data gap at that location.

Prior to the start of daily data collection, a calibration check of the Geoprobe® tool will be conducted using the test jig apparatus to perform three calibration tests. The first test is the instrument calibration check. The second test will be conducted to verify the existence of a good electrical connection between the field instrument and each probe dipole by performing a probe continuity test. The third test is to verify that no dipoles are shorted together (i.e. from damaged cables or connectors) by conducting an isolation test. All instrument check data will be stored in the Geoprobe® computer and downloaded to a disk at the end of each day. In addition to the calibration checks, a field comparison will be performed by immersing the Geoprobe® tool in two test solutions of known conductivity. Results will be recorded in the field book each day by the field team. An updated Geoprobe® SOP is included in Appendix B.

The probe results will be reviewed in real time to verify that temperature and conductivity profiles have been recorded. Profile data will be used to estimate groundwater upwelling rates along with the other methods being evaluated during the Phase III and IV PDI.

6.1 Temperature/Conductivity Probes

The 84 locations (Table 3) that will be completed as part of the initial PDI activities for Phase IV are as follows:

- SMU 2 – 26 locations;
- SMU 3 – 3 locations;
- SMU 4 – 17 locations;
- SMU 5 – 3 locations;
- SMU 6 – 30 locations; and
- SMU 7 – 5 locations.

The 10 locations that will be redone (Table 4 and Figures 8 through 10) during the Phase IV PDI field activities are as follows:

- SMU 4 – 7 locations; and
- SMU 7 – 3 locations.

Temperature/conductivity probes will be advanced to a depth of at least 10 ft at these locations in accordance with the Phase III PDI Work Plan (Parsons, 2007). Each Geoprobe® will produce a continuous conductivity profile, which will be used to calculate a chloride profiles.

The chloride profiles will be used to estimate groundwater upwelling velocities through the shallow sediments. The rate of groundwater discharge into the lake is a critical design parameter of the sediment isolation cap. The Geoprobe® temperature and conductivity locations are identified on Figures 8 through 10. Additionally, duplicate temperature/conductivity probes will be advanced at approximately 5% of the proposed locations and will be noted with a suffix of "A." Location of the duplicates will be determined based on field conditions, but will generally be spread evenly among the SMUs.

Additional Geoprobe® temperature and conductivity locations in SMUs 3 and 5 were selected to provide coverage of areas where exceedances of the mercury PEC and/or the mean PECQ have been noted at different intervals within the top meter. These additional locations are listed on Table 3 and are shown on Figures 8 through 10. If a Geoprobe is not able to be advanced in SMU 3 due to the hard calcite crust, a 10 ft. vibracore will be collected in its place and sent to the lab for groundwater analysis in accordance with Addendum 5 from the Phase III PDI. The need for additional groundwater data will be discussed with the Groundwater Technical Work Group.

7.0 DATA MANAGEMENT AND REPORTING

Field Database

An electronic database will be developed for the Phase IV PDI to ensure consistency in field sample ID assignment and compatibility with the Locus Focus data management system. The data collection program prepared for the Phase IV field program will be similar to the one used during previous phases of the PDI. The database will be operated by trained QEA or Parsons personnel.

Quality Assurance/Quality Control (QA/QC)

Field QA/QC will consist of the collection and analysis of field duplicates, and matrix spike/matrix spike duplicate samples in accordance with the Phase I PDI WP (Parsons, 2005). Since most of the samples will be collected from dedicated tubes/liners, rinse blanks will be collected at a rate of one per batch of dedicated sampling equipment. Duplicate temperature/conductivity probes will be conducted at 5% of locations. All field QA/QC samples will be identified using standard sample identifiers and collected in accordance with the Phase I PDI Work Plan (Parsons, 2005).

Sample Holding, Collection, and Recordkeeping

Samples will be collected and handled according to the procedures outlined in the Phase I PDI Work Plan and associated appendices. Samples will be managed by the field database as described above. All sample recordkeeping and database entry (Locus Focus) will be conducted in accordance with the Phase I PDI Work Plan (Parsons, 2005).

Data Validation and Reporting

Analytical data generated during this investigation will be reviewed and validated in accordance with the Phase I PDI Work Plan (Parsons, 2005). The results will be incorporated into the Locus Focus database following validation.

Upon completion of the Phase IV PDI field activities and laboratory analyses, Parsons will submit unvalidated and validated data to NYSDEC in accordance with the Consent Decree for the lake. Once the Phase IV investigation and evaluation has been completed, a data summary report will be prepared and submitted to NYSDEC.

8.0 REFERENCES

NYSDEC and USEPA, 2005. Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site Syracuse, New York Record of Decision. Albany, New York.

Parsons, 2004, Onondaga Lake Feasibility Study Report, Onondaga County, New York. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Parsons, 2005, Onondaga Lake Pre-Design Investigation: Phase I Work Plan and Appendices. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

Parsons, 2006, Onondaga Lake Pre-Design Investigation: Phase II Work Plan and Addenda. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

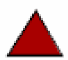
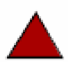
Parsons, 2007, Onondaga Lake Pre-Design Investigation: Phase III Work Plan and Addenda. Prepared for Honeywell, Morristown, New Jersey. Syracuse, New York.

TABLES

TABLE 1
Onondaga Lake Phase IV PDI
Porewater Sample Locations and Analyses

Description		Map Symbol	Number of Locations	Number of Intervals	Sampling Intervals (ft)	Location	Total Depth (ft)	Analyses / Number of Samples	Mercury	VOCs(CPOIs)[1]	pH	DOC/TOC	Percent Moisture[2]	Specific Gravity[2]
SMU 2	Shallow Vibracores		8	3	2-ft intervals from top of core	OL-VC-20150 - 20157	6	Porewater	24	24	24	24		
								Raw Sediment	24	24	24	24	24	24
			2	5	2-ft. intervals from top of core	OL-VC-20148 -20149	10	Porewater	10	10	10	10		
								Raw Sediment	10	10	10	10	10	10
SMU 3	Shallow Vibracores		7	3	2-ft. intervals from top of core	OL-VC-30078 - 30084	6	Porewater	21	21	21	21		
								Raw Sediment	21	21	21	21	21	21
SMU 4	Shallow Vibracores		8	3	2-ft intervals from top of core	OL-VC-40188 - 40195	6	Porewater	24	24	24	24		
								Raw Sediment	24	24	24	24	24	24
			6	5	2-ft. intervals from top of core	OL-VC-40196 - 40201	10	Porewater	30	30	30	30		
								Raw Sediment	30	30	30	30	30	30

TABLE 1
Onondaga Lake Phase IV PDI
Porewater Sample Locations and Analyses

Description		Map Symbol	Number of Locations	Number of Intervals	Sampling Intervals (ft)	Location	Total Depth (ft)	Analyses — Number of Samples	Mercury	VOCs(CPOIs)[1]	pH	DOC/TOC	Percent Moisture[2]	Specific Gravity[2]
SMU 5	Shallow Vibracores		5	3	2-ft intervals from top of core	OL-VC-50052 - 50056	6	Porewater	15	15	15	15		
								Raw Sediment	15	15	15	15	15	15
SMU 6	Shallow Vibracores		12	3	2-ft intervals from top of core	OL-VC-60203 - 60209, 60211-60213, 60215, 60216	6	Porewater	36	36	36	36		
								Raw Sediment	36	36	36	36	36	36
			7	5	2-ft. intervals from top of core	OL-VC-60210, 60214, 60217, 60221 - 60224	10	Porewater	35	35	35	35		
								Raw Sediment	35	35	35	35	35	35
SMU 7	Shallow Vibracores		11	5	2-ft intervals from top of core	OL-STA-70048-70050, OL-VC-70108 - 70111, 70119, 70120, 70122, 70123	10	Porewater	55	55	55	55		
								Raw Sediment	55	55	55	55	55	55

Notes:
1. CPOI list for VOCs are the same compounds as the Phase II PDI Work Plan, including benzene and toluene (Parsons, 2006)
2. Porosity of the raw sediment will be calculated from the persent moisture and specific gravity.

TABLE 2
Onondaga Lake Phase IV PDI
Shallow Vibracore Sediment Sample Locations and Analyses

Description		Map Symbol	Number of Locations	Number of Intervals	Sampling Intervals (ft)	Location	Total Depth (ft)	Chemical Analyses: Mercury	VOCs (CPOIs) + Benzene & Toluene[1]	SVOCs (CPOIs)	Total PCBs	pH	TOC (Loyd Kahn)	Phenol	Percent Moisture[2]	Specific Gravity[2]
								Number of Samples								
SMU 2 Area	SMU 2		5	4	1-ft intervals from top of core	OL-VC-20142 - 20146	4	20	20	20	20	20	20		20	20
SMU 2 Area	SMU 2		8	10	1-ft intervals from top of core	OL-VC-20135 - 20141, 20147	10	80	80	80	80	80	80		80	80
SMU 2 Area	SMU 3		4	4	1-ft intervals from top of core	OL-VC-30089 - 30092	4	16	16	16	16	16	16		16	16
SMU 4 Area	SMU 3		4	4	1-ft intervals from top of core	OL-VC-30085 - 30088	4	16	16	16	16	16	16	16	16	16
SMU 4 Area	SMU 4		3	4	1-ft intervals from top of core	OL-VC-40202 - 40204	4	12	12	12	12	12	12	12	12	12
SMU 4 Area	SMU 4		7	10	1-ft intervals from top of core	OL-VC-40205 - 40211	10	70	70	70	70	70	70	70	70	70
SMU 4 Area	SMU 5		5	4	1-ft intervals from top of core	OL-VC-50028 - 50032	4	20	20	20	20	20	20	20	20	20
SMU 6 Area	SMU 5		3	4	1-ft intervals from top of core	OL-VC-50033 - 50035	4	12	12	12	12	12	12		12	12
SMU 6 Area	SMU 6		2	4	1-ft intervals from top of core	OL-VC-60195 - 60196	4	8	8	8	8	8	8		8	8
SMU 6 Area	SMU 6		6	10	1-ft intervals from top of core	OL-VC-60197 - 60202	10	60	60	60	60	60	60		60	60
SMU 7	Shallow Vil		4	10	1-ft intervals from top of core	OL-VC-70112 - 70115	10	40	40	40	40	40	40		40	40

Notes:
1. CPOI list for VOCs are the same compounds as the Phase II PDI Work Plan, including benzene and toluene (Parsons, 2006)
2. Porosity of the raw sediment will be calculated from the percent moisture and specific gravity.

TABLE 3
Onondaga Lake Phase IV PDI
Groundwater Sample Locations

	Description	Map Symbol	Location	Number of Sample Locations	Total Depth (ft.)	Sampling Intervals
SMU 2	Temperature/Conductivity Probes	or	OL-GP-20109 - 20134	26	10	Continuous from 0 ft to 10 ft.
SMU 3	Temperature/Conductivity Probes	or	OL-GP-30059 - 30061	3	10	Continuous from 0 ft to10 ft.
	Temperature/Conductivity Probes		OL-GP-30062 - 30077	16	10	Continuous from 0 ft to10 ft.
SMU 4	Temperature/Conductivity Probes	or	OL-GP-40148 - 40163, 40166	17	10	Continuous from 0 ft to10 ft.
SMU 5	Temperature/Conductivity Probes	or	OL-GP-50026 - 50028	3	10	Continuous from 0 ft to10 ft.
	Temperature/Conductivity Probes		OL-GP-50036 - 50051	16	10	Continuous from 0 ft to10 ft.
SMU 6	Temperature/Conductivity Probes	or	OL-GP-60119 - 60120, 60122-60123, 60125-60127, 60130-60131, 60136-60137, 60142-60144, 60149-60151, 60156-60158, 60161-60163, 60167-60170, 60174-60175, 60193	30	10	Continuous from 0 ft to10 ft.
SMU 7	Temperature/Conductivity Probes	or	OL-GP-70088 - 70092	5	10	Continuous from 0 ft to10 ft.

Notes:
indicates co-located vibracore completed in 2007

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TABLE 4

Onondaga Lake Phase IV PDI

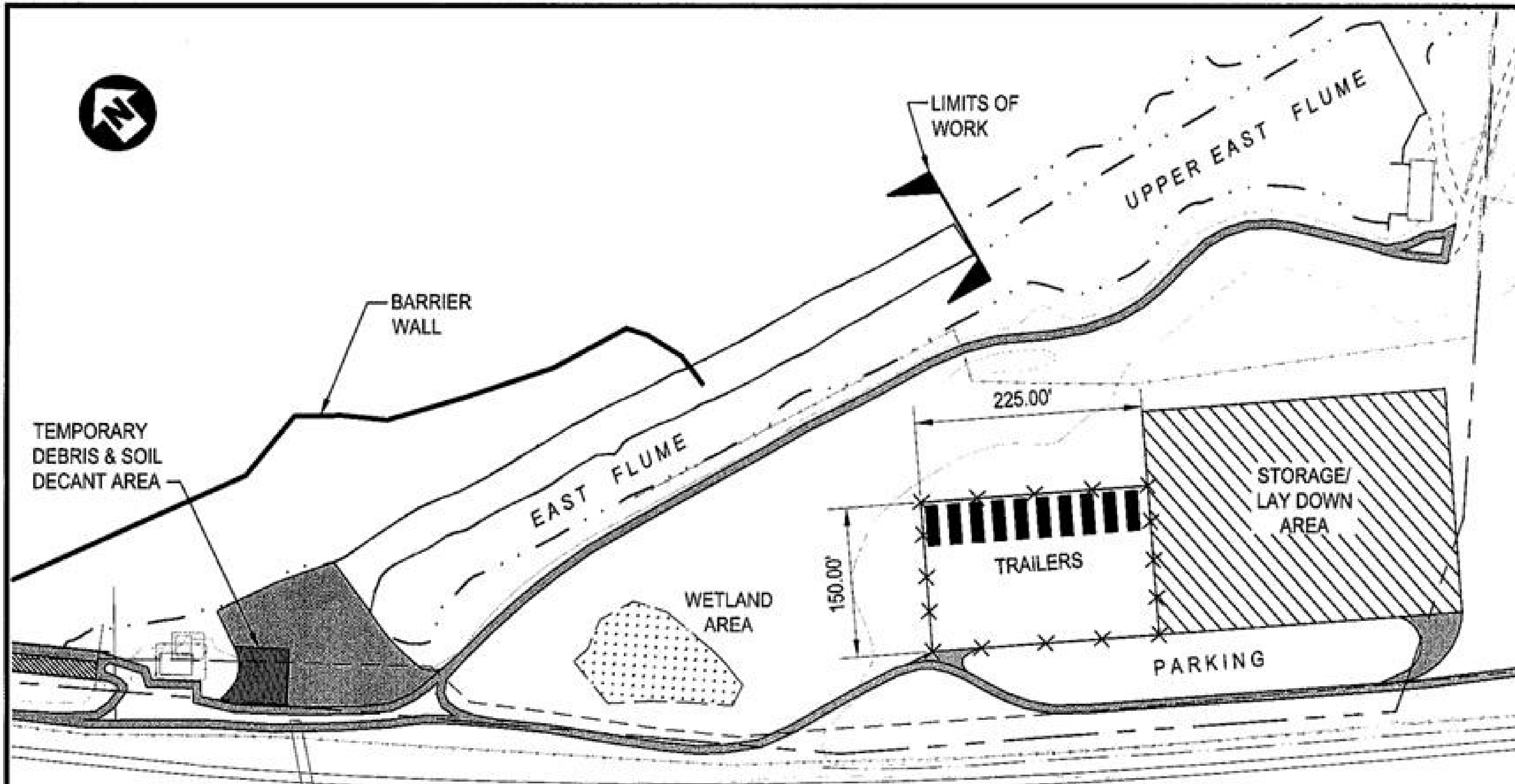
Geoprobe Conductivity/Temperature Retests

Description		Map Symbol	Location	Number of Sample Locations	Total Depth (ft.)	Sampling Intervals
SMU 4	Temperature/Conductivity Probes		OL-GP-40183 - 40186, OL-STA-40074, 40075, 40110	7	10	Continuous from 0 ft to10 ft.
SMU 7	Temperature/Conductivity Probes		OL-GP- 70053, 70054, 70107	3	10	Continuous from 0 ft to10 ft.

Notes:

Reprobe for conductivity/temp. Originally completed in 2007 and had conductivity at maximum recorded value.

FIGURES



OPTION 1 - FIELD TRAILERS

TRAILER OCCUPANCY

1. PARSONS CONSTRUCTION MANAGEMENT (1)
2. PARSONS PDI (2)
3. OBG (2)
4. DEC (1)
5. CONTRACTOR'S (4)

150 75 0 150 300

SCALE: 1"=150'

Figure 1

Phase IV PDI
Field Office Location

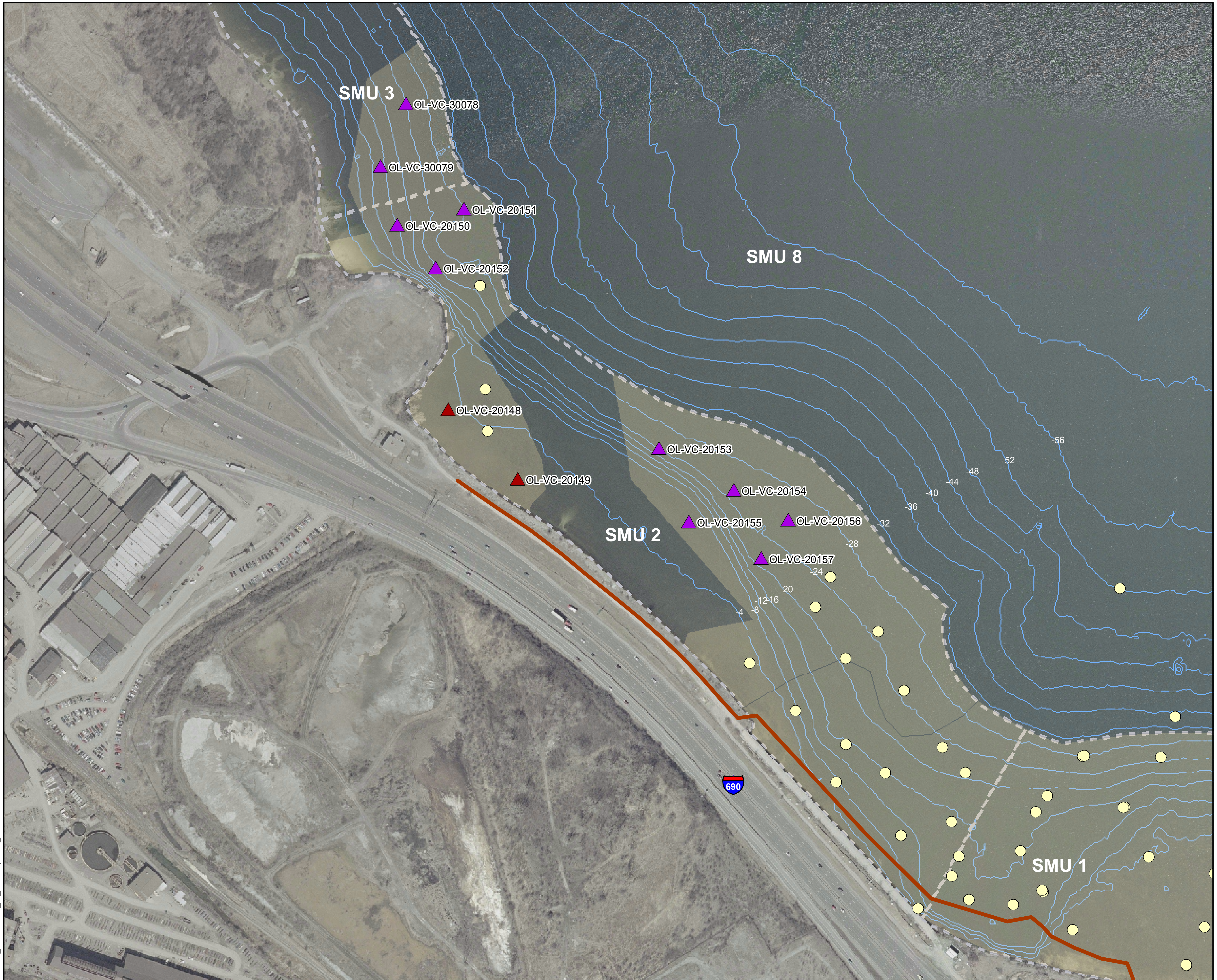
Honeywell

Onondaga Lake
Syracuse, NY

PARSONS

290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

FILE NAME: P:\Honeywell -SYR\Phase IV PDI\Work Plan\Figure 1.jpg



Proposed Phase IV PDI Sample Locations

6 ft. Porewater Vibracore

10 ft. Porewater Vibracore

Historical Sample Locations (RI to Phase III PDI)

Historical Porewater Location

Willis/Semet IRM Barrier Wall

Preliminary Potential Remedial Area- Final Delineation to be Determined

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

0 100 200 400 600 800

Feet

FIGURE 2

Honeywell — Onondaga Lake, Syracuse, New York

SMUs 2 & 3
Proposed Phase IV PDI
Porewater Sample Locations

PARSONS

290 ELWOOD DAVIS RD, SUITE 312, LIVERPOOL, NY 13088 Phone:(315)451-9560

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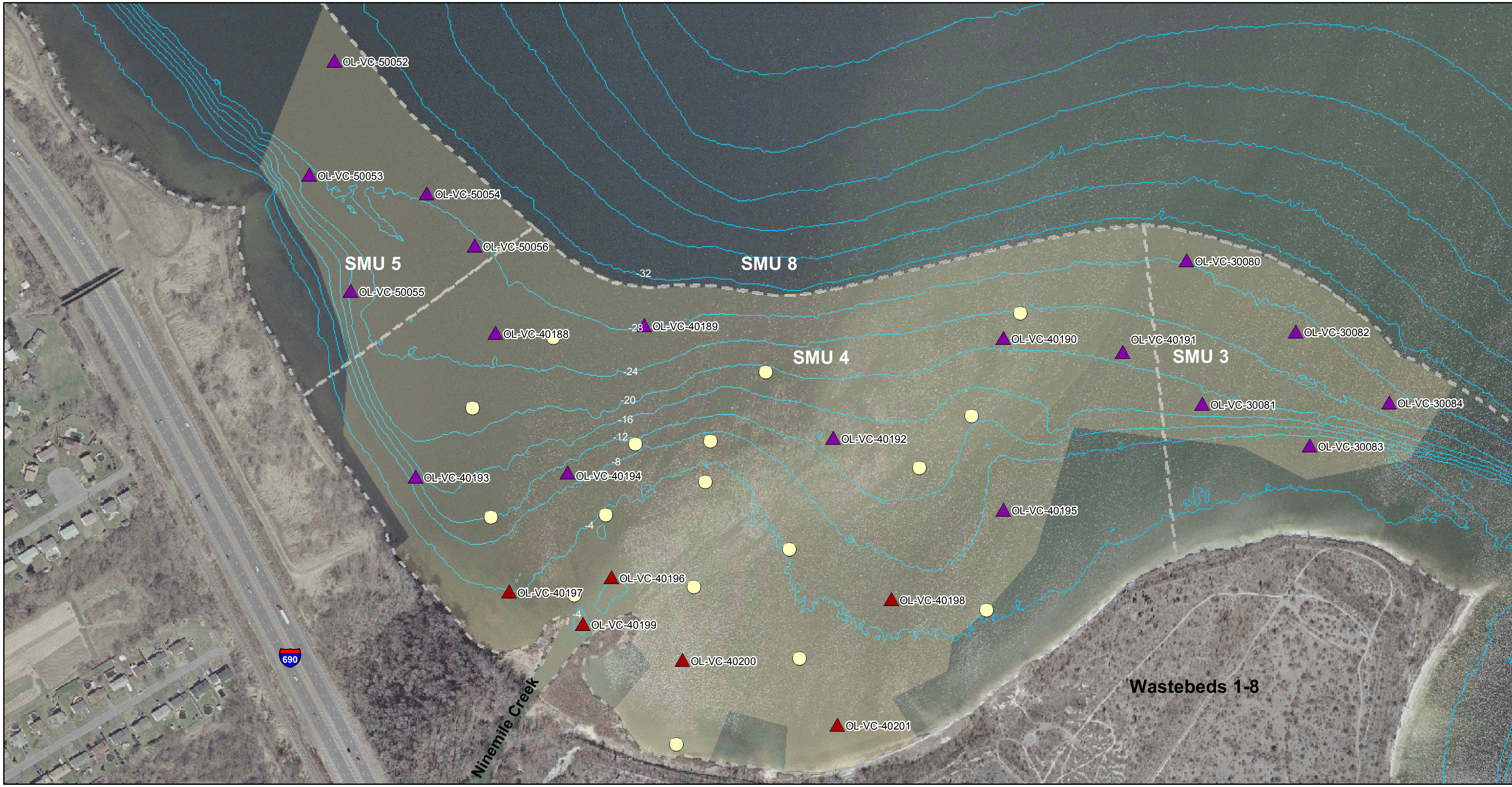

Proposed Phase IV PDI Sample Locations

- 6 ft. Porewater Vibracore
- 10 ft. Porewater Vibracore

Historical Sample Locations (RI to Phase III PDI)

- Historical Porewater Location

Preliminary Potential Remedial Area- Final Delineation to be Determined

0 120 240 480 720 960 1,200
Feet

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

N

FIGURE 3

Honeywell Onondaga Lake Syracuse, New York

SMUs 3, 4, 5
Proposed Phase IV PDI
Porewater Sample Locations

PARSONS
290 ELWOOD DAVIS RD, SUITE 312, LIVERPOOL, NY 13088 Phone:(315)451-9560

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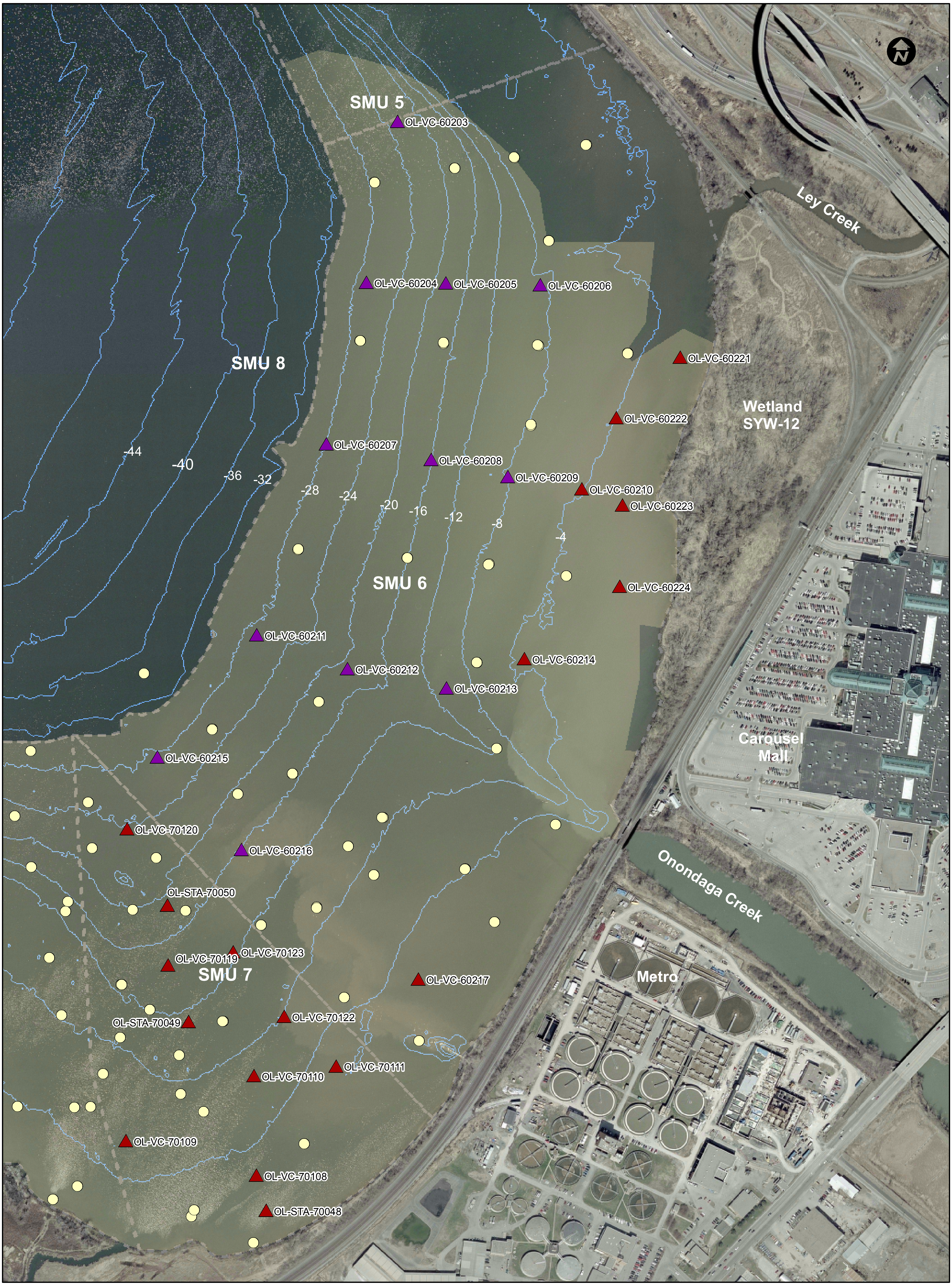

Proposed Phase IV PDI Sample Locations

- 6 ft. Porewater Vibracore
- 10 ft. Porewater Vibracore

Historical Sample Locations (RI to Phase III PDI)

- Historical Porewater Location

Preliminary Potential Remedial Area- Final Delineation to be Determined

0 125 250 500 750 1,000 Feet

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.
3. An extra vibracore will be collected at each location in SMU 7 for lithology description and logging.

FIGURE 4

Honeywell

Onondaga Lake
Syracuse, New York

SMUs 6 & 7
Proposed Phase IV PDI
Porewater Sample Locations

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290 ELWOOD DAVIS RD, SUITE 312, LIVERPOOL, NY 13088 Phone:(315)451-9560

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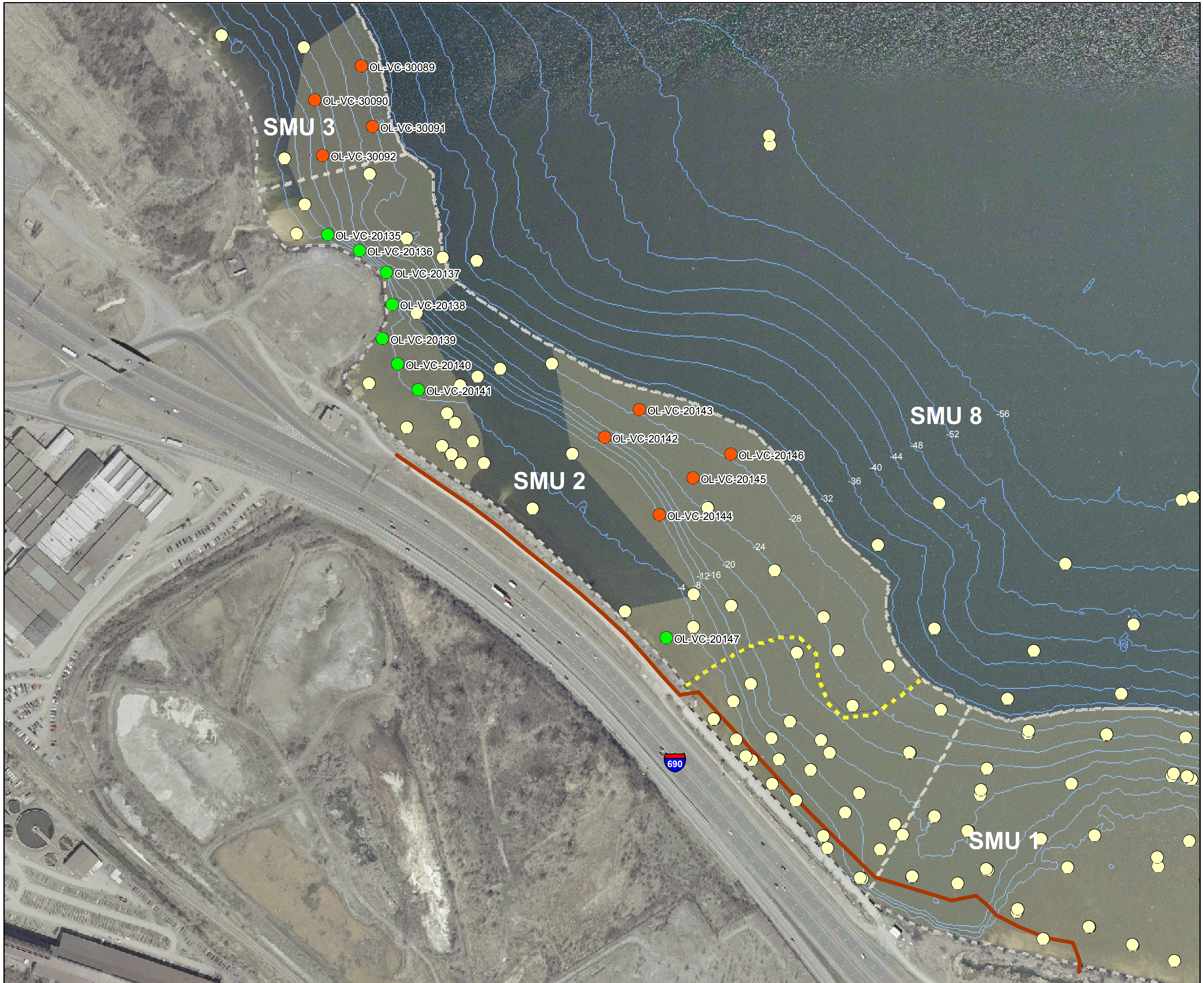

Proposed Phase IV PDI Sample Locations

- 10 ft. Vibracore
- 4 ft. Vibracore

Historical Sample Locations (RI to Phase III PDI)

- Historical Sediment Location

- Preliminary Potential Remedial Area- Final Delineation to be Determined
- ILWD Boundary
- Willis/Semet IRM Barrier Wall

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

0 100 200 400 600 800
Feet

FIGURE 5

Honeywell Onondaga Lake Syracuse, New York

SMUs 2 & 3
Proposed Phase IV PDI
Sediment Sample Locations

PARSONS

290 ELWOOD DAVIS RD, SUITE 312, LIVERPOOL, NY 13088 Phone:(315)451-9560

5/21/08

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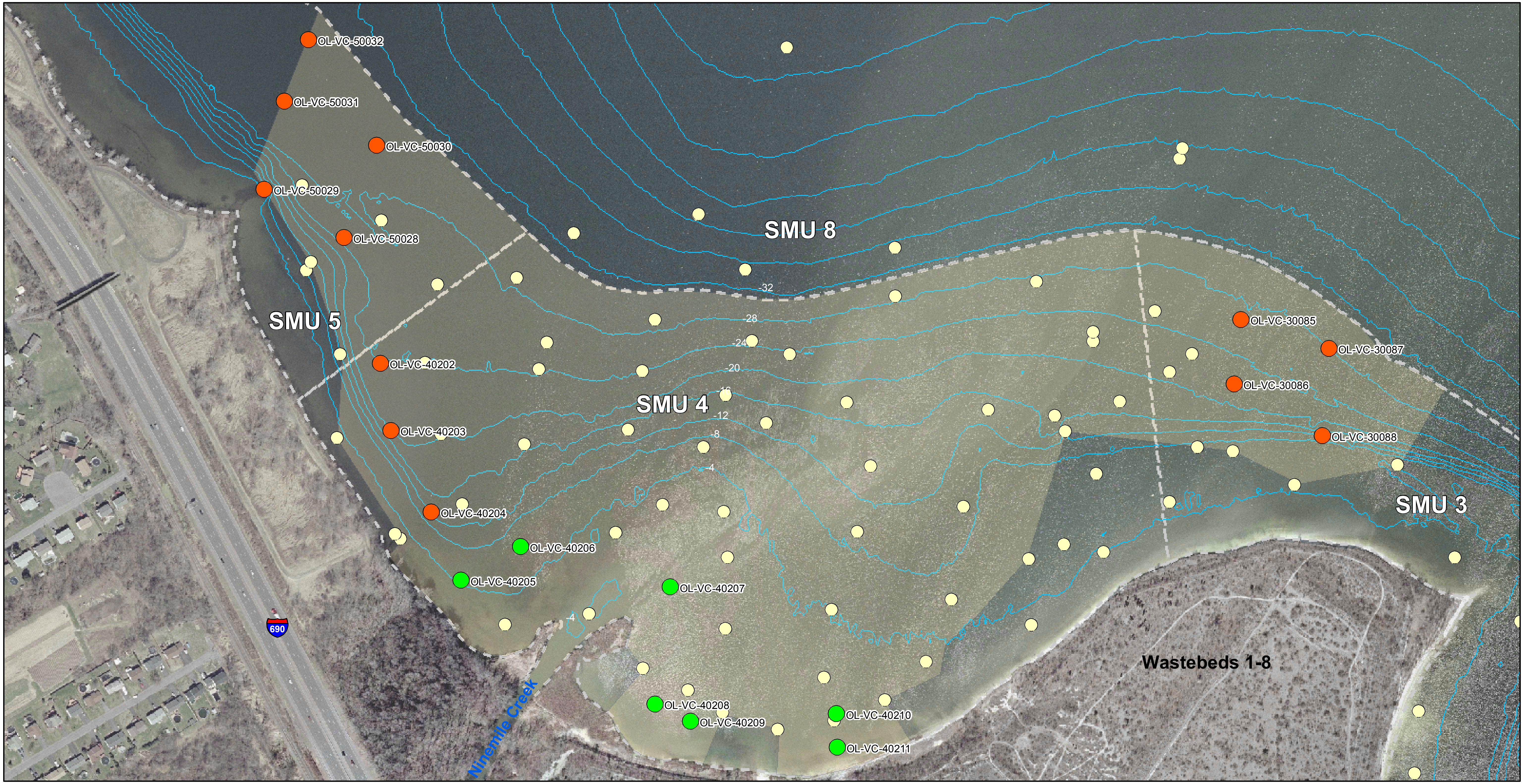

Phase IV PDI Proposed Sample Locations

4 ft. Vibracore

10 ft. Vibracore

Historical Sample Locations (RI to Phase III PDI)

Historical Sediment Location

Preliminary Potential Remedial Area- Final Delineation to be Determined

0 125 250 500 750 1,000 1,250 Feet

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

FIGURE 6

Honeywell

Onondaga Lake
Syracuse, New York

SMUs 3, 4 & 5
Proposed Phase IV PDI
Sediment Sampling Locations

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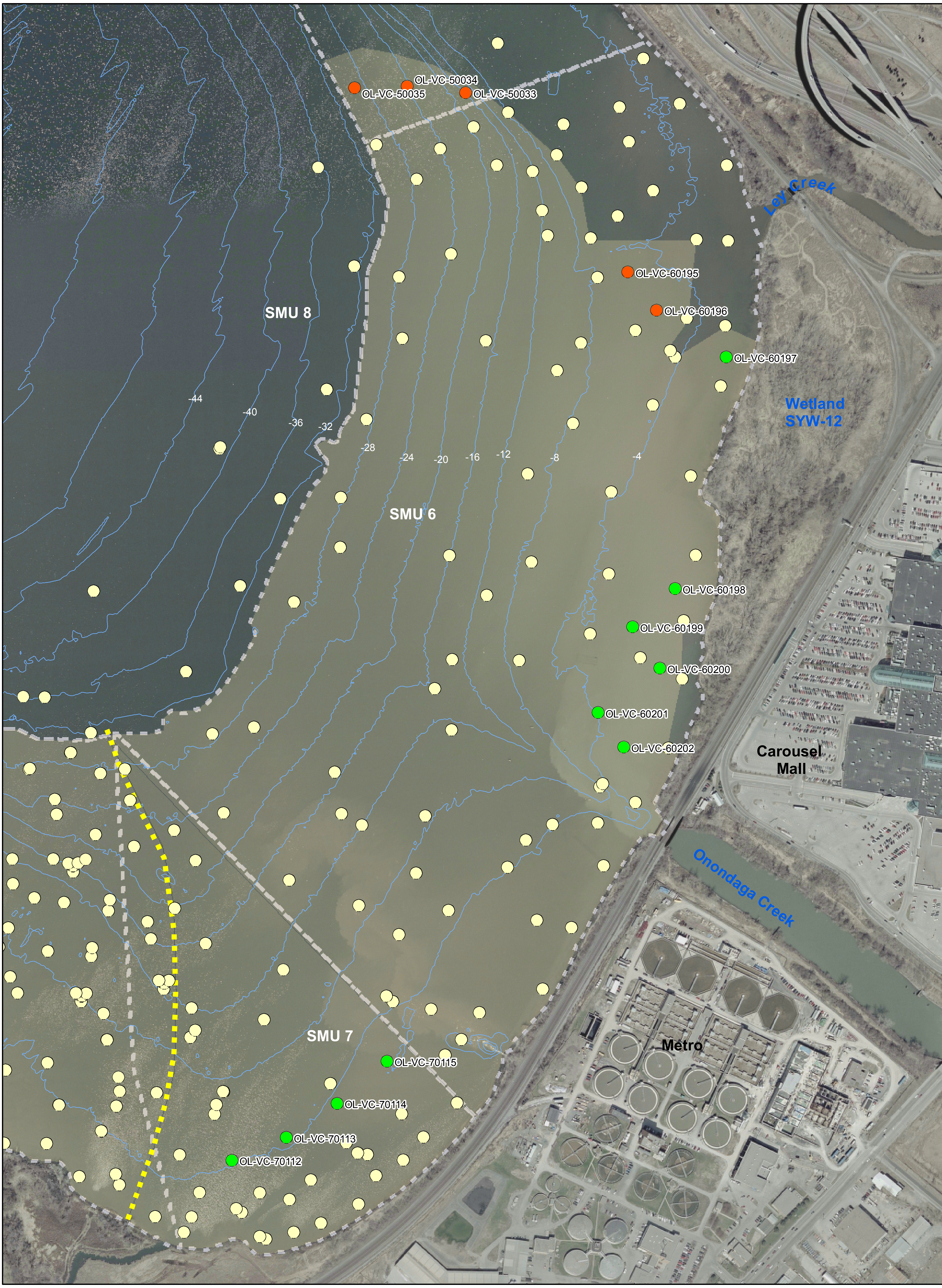

Phase IV PDI Proposed Sample Locations

- 10 ft. Vibracore
- 4 ft. Vibracore

Historical Sample Locations (RI to Phase III PDI)

- Historical Sediment Location

Extent of ILWD

Preliminary Potential Remedial Area- Final Delineation to be Determined

0 125 250 500 750 1,000
Feet

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

FIGURE 7

Honeywell

Onondaga Lake
Syracuse, New York

SMUs 5, 6 & 7
Phase IV PDI Proposed
Sediment Sample Locations

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5/15/08

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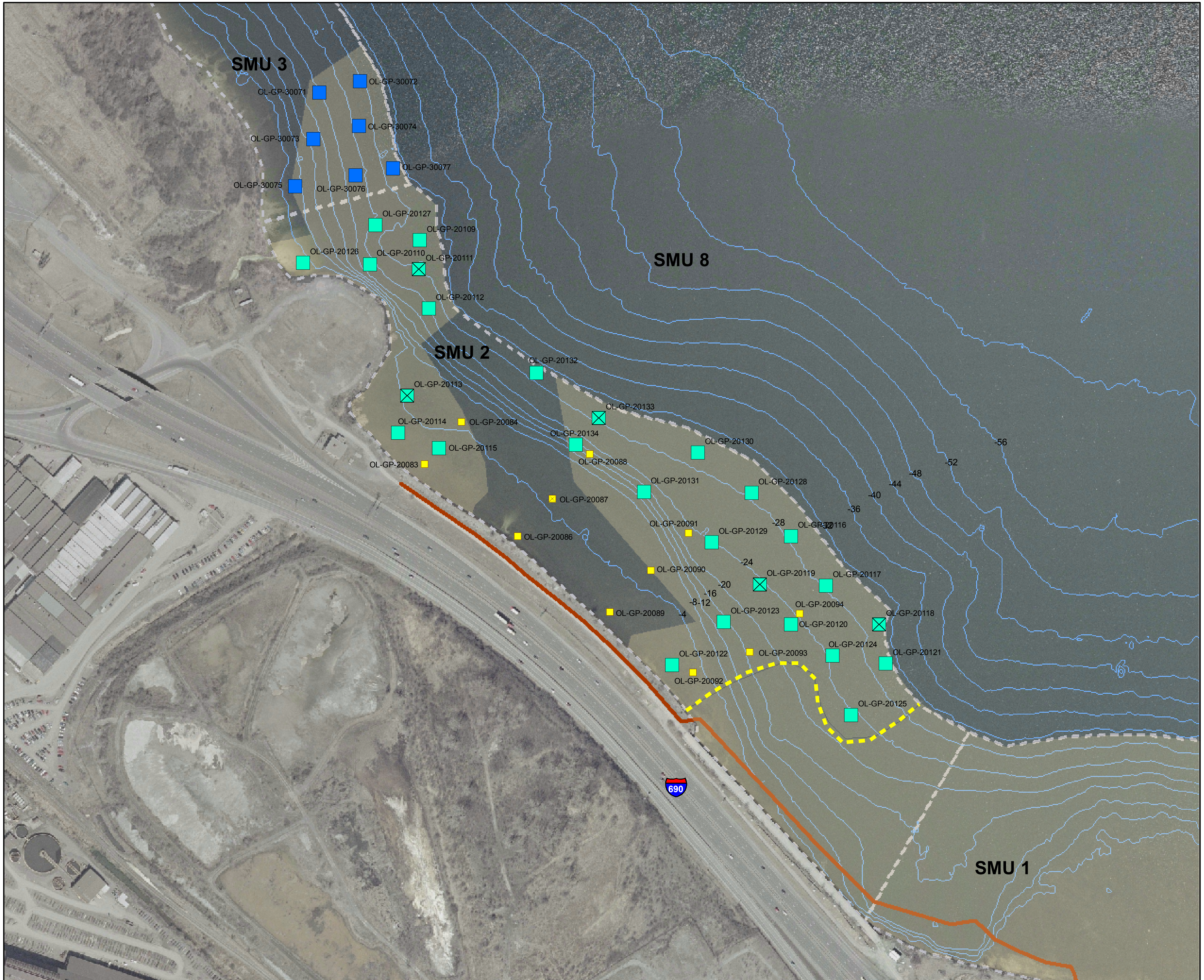

Phase IV PDI
Proposed Sample Locations

- Additional Conductivity / Temperature Probe Locations To Cover Extended Remediation Area
- Conductivity / Temperature Probe
- Conductivity / Temperature Probe (core collected 2007)

Phase II PDI
Sample Locations

- Conductivity / Temperature Probe
- Conductivity / Temperature Probe + 10 Ft Core (Sample on 1 Ft intervals)

- Extent of ILWD
- Willis/Semet IRM Barrier Wall
- Preliminary Potential Remedial Area- Final Delineation to be Determined

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

0 100 200 400 600 800
Feet

FIGURE 8

Honeywell
Onondaga Lake
Syracuse, New York

SMUs 2 & 3
Phase IV PDI Proposed
Groundwater Sample Locations

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290 ELWOOD DAVIS RD, SUITE 312, LIVERPOOL, NY 13088 Phone:(315)451-9560

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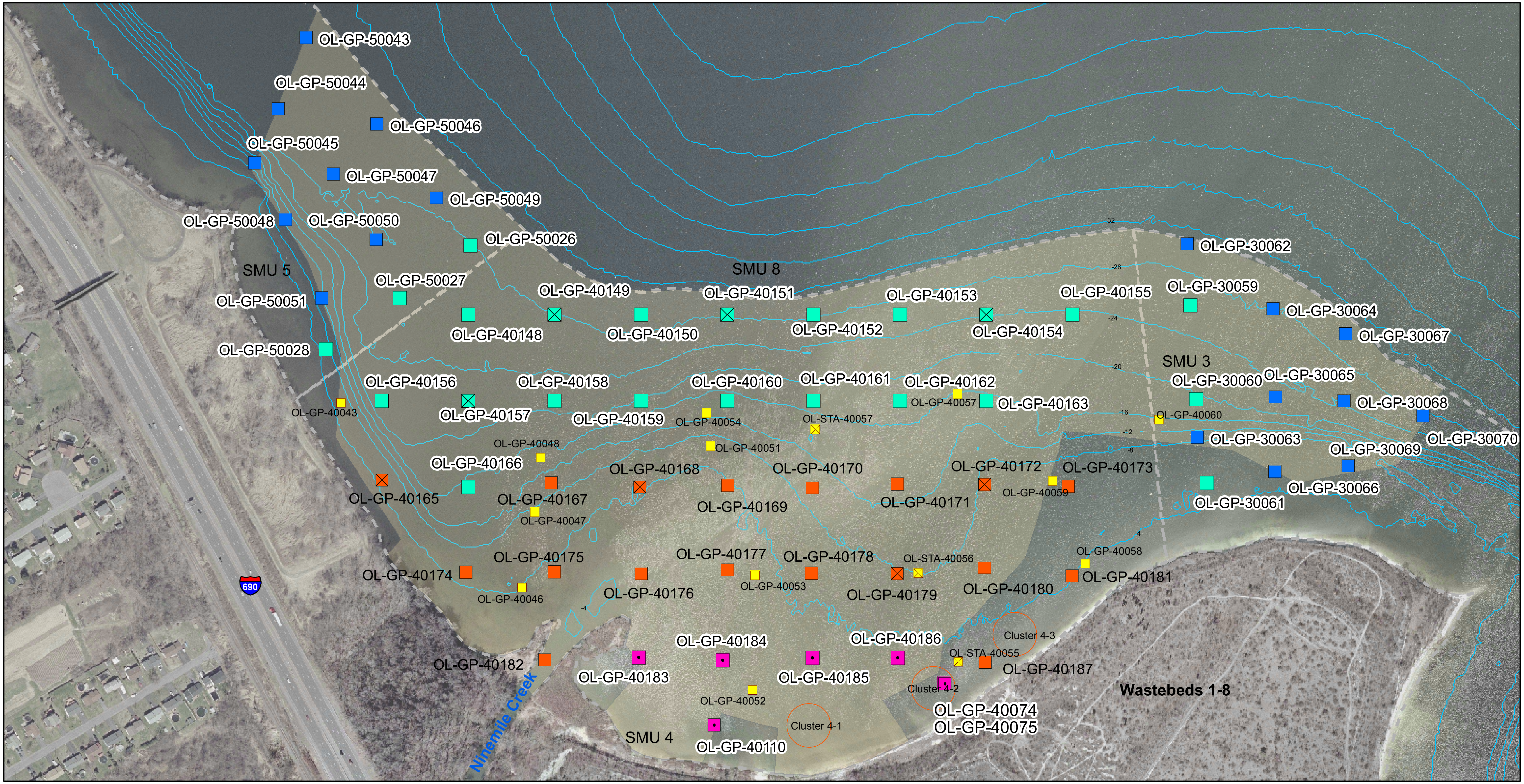

Phase IV PDI Proposed Sample Locations

- Conductivity / Temperature Probe Locations Where Readings Exceeded Instrument Maximum
- Additional Conductivity / Temperature Probe Locations To Cover Extended Remediation Area
- Conductivity / Temperature Probe
- Conductivity / Temperature Probe (core collected 2007)

Phase III PDI Sample Locations

- Conductivity / Temperature Probe
- Groundwater Cluster (seepage meters, sediment cores, peepers, Geoprobes)
- Co-located 10 ft. Geoprobe and 10 ft. Vibracore

Co-located sample locations are designated OL-GP-XXXXX for geoprobes, and OL-VC-XXXXXA for vibracores.

Phase II PDI Sample Locations

- Conductivity / Temperature Probe
- Conductivity / Temperature Probe + 10 Ft Core (Sample on 1 Ft intervals)

Preliminary Potential Remedial Area- Final Delineation to be Determined

NOTES
1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.

0 125 250 500 750 1,000 1,250
Feet

FIGURE 9

Honeywell
Onondaga Lake
Syracuse, New York

SMUS 3, 4 & 5
Phase IV PDI Proposed
Groundwater Sample Locations

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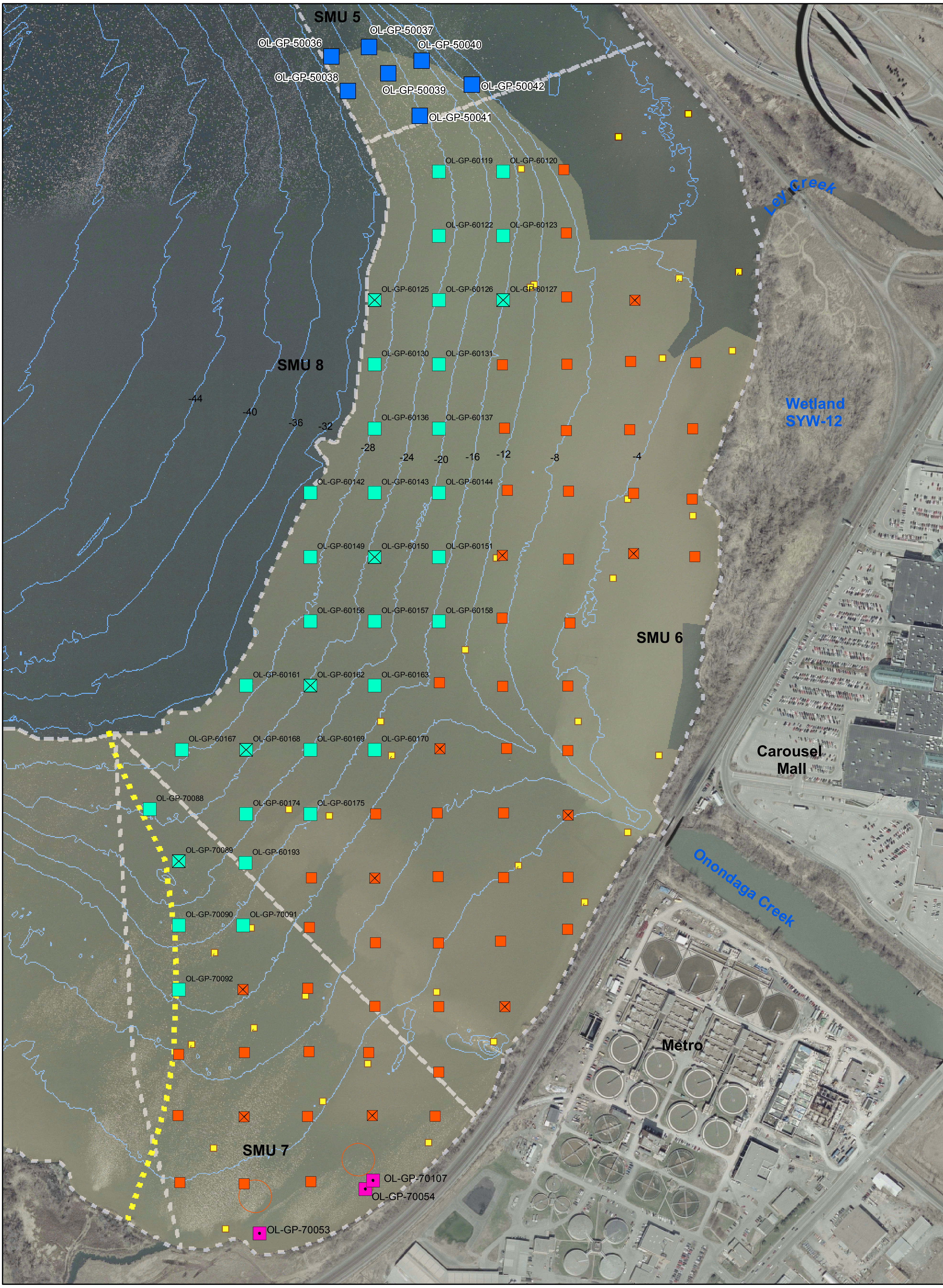

Phase IV PDI Proposed Sample Locations

- Conductivity / Temperature Probe Locations Where Readings Exceeded Instrument Maximum
- Additional Conductivity / Temperature Probe Locations To Cover Extended Remediation Area
- Conductivity / Temperature Probe
- Conductivity / Temperature Probe (core collected in 2007)

Phase III PDI Sample Locations

- Conductivity / Temperature Probe
- Co-located 10 ft. Geoprobe and 10 ft. Vibracore
- Preliminary Potential Remedial Area- Final Delineation to be Determined
- Extent of ILWD

Phase II PDI Sample Locations

- Conductivity / Temperature Probe
- Conductivity / Temperature Probe + 10 Ft Core (Sampled on 1 Ft intervals)
- Groundwater Cluster (seepage meters, sediment cores, peepers, Geoprobes)

N

0 125 250 500 750 1,000 Feet

NOTES

1. Bathymetry contours are in 4 foot intervals.
2. Water depth based on average lake elevation of 362.82 feet.
3. **Labels have been removed from all historical sample locations for the sake of figure clarity.**

FIGURE 10

Honeywell

Onondaga Lake
Syracuse, New York

SMUs 5, 6 & 7
Phase IV PDI Proposed
Groundwater Sample Locations

PARSONS

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06/17/08

APPENDIX A

PROJECT SAFETY PLAN MODIFICATIONS

Table C4.1 ONONDAGA LAKE Program/Project Level Authority and Responsibility	
Industrial Division Safety Manager **Greg Beck, CSP**	Has overall authority of Parsons Industrial Division Safety Program.
Honeywell Portfolio Safety Director **Jeff Parsons, CIH (OBG)**	Has overall authority for the Honeywell Portfolio Safety Program.
Honeywell Portfolio Safety Manager **Jerry Clark, CSP, CIH**	Has authority for Honeywell Portfolio Projects.
Program Manager/Project Manager **Stephen Warren/ Edward Glaza, P.E.**	Reports to upper-level management, has authority to direct response operations, assumes total control over Program/Project site activities.
HSP2 Senior Site Health and Safety Officer **Dale Dolph, CHST**	Advises the Program/Project Manager and SSO on all aspects of health and safety.
Site Safety Officer (SSO) **Sara Chmura/Matthew Vetter**	Reports to the PSM on all aspects of Health and Safety onsite, performs day-to-day health and safety tasks, stops work if any operation threatens worker or public health and/or safety.
Parsons Project Staff and Subcontractors **C. Kiehl-Simpson; S. Chmura; M. Vetter; S. Dillman; T. Johnson; P. Petrone; QEA & OSI.**	Act proactively with regard to project-specific and general health.

Table C4.2 Onondaga Lake Project Contact Information	
Project:	Onondaga Lake Pre-Design Investigation
Project Location:	Onondaga Lake, Onondaga County, New York
Office:	Parsons Syracuse Office
Address:	290 Elwood Davis Road, Suite 312, Liverpool, NY 13088
Telephone:	(315) 451-9560
Fax:	(315) 451-9570
Program Manager:	Mr. Stephen Warren
Contact No.:	(315) 451-9560
Project Manager:	Mr. Edward Glaza, P.E.
Contact No.:	(315) 451-9560
Deputy Project Manager:	Mr. Timothy Johnson
Contact. No.:	(315) 451-9560
Task Manager:	Mr. Peter Petrone, P.E.
Contact. No.:	(315) 451-9560
Project Safety Manager:	Mr. Jerry Clark, CSP, CIH
Contact No.:	(518) 528-0626
HSP2 Senior Site Health and Safety Officer:	Mr. **Dale Dolph, CHST**
Contact No.:	(315) 451-9560
Field Team Leader:	Ms. Sara Chmura
Contact No.:	(315) 451-9560
Site Safety Officer:	Ms. Sara Chmura
Contact No.:	(315) 451-9560
Client - Project Management:	Mr. John McAuliffe
Contact No.:	(315) 431-4443 ext. 4 (office)

PARSONS

Job Safety Analysis

Hot Work

JSA 024

Project Name & Number: Onondaga Lake Pre Design Investigation 441797	**JSA No.** 024	**Date:** August 2, 2005	**New:** Yes
Location: Onondaga Lake, Onondaga County, New York	**Contractor:** Parsons		**Revised:** **March 18, 2008**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat, work boots, leather gloves. and safety equipment specific to the task being performed as specified below.	**Analysis by:** H. Philip	**Date:** August 2, 2005
	Superintendent/Competent Person	**Reviewed by:**	**Date:**
Work Operation: Hot Work		**Approved by:**	**Date:**

Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Hot Work (welding, open flame)	Burns, eye injuries	▪ Wear appropriate PPE (e.g., think leather welding gloves, welding shield/ goggles with appropriate filtered lenses; long sleeves and pants, etc.). ▪ During welding operations all employees not performing the work or providing assistance will remain back from the work zone.	
	Fire/ Explosion	▪ Have adequate fire suppression available in immediate work area. ▪ Inspect all torches, tanks, hoses prior to starting. ▪ Remove all flammable material around the work area. ▪ Provide a firewatcher. ▪ Ensure that all fuel valves and torch supply valves are shut off when not in use. ▪ Ensure that all cylinders are properly marked and kept away from heat sources. ▪ Secure oxygen and acetylene tanks in a safe location with proper separation when not in use. ▪ Post a fire watch familiar with the work and use of fire	**Inspect work area before starting work to ensure all combustible and flame hazards are removed or shielded.** **Inspect all welding apparatus and tools to verify it is in good working order before commencing work.**

		fighting equipment before commencing hot work.	**Verify fire fighting equipment (fire extinguishers, water buckets, etc.) are present, are fully charged and filled, and are ready for use before commencing work.**
	Rain	▪ Be aware of work conditions and do not work in wet areas.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Injury from Power Tool Operation	▪ All tools will be in good working order and properly grounded. ▪ No damaged equipment will be issued until repaired or replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool.	

	Lack of Communication	▪ Prior to commencement of daily activities, the methods of communication will be discussed. ▪ Personnel will have access to a cell phone or other means of communication. ▪ The activities for the day will be discussed and understood prior to daily start up with review of safety issues. ▪ Batteries will be checked and recharged prior to start of days work.	

Permit Requirements

Hot work will be conducted using the Hot Work Permit system as specified in Parsons Corporate Safety & Health Manual (CSHM), Chapter 28

Training Requirements

All personnel engaged in the hot work will have knowledge and experience working with welding equipment, torches, and other necessary equipment. All necessary certification and permits will be provided prior to start of work. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

APPENDIX B

GEOPROBE STANDARD OPERATING PROCEDURE-20

STANDARD OPERATING PROCEDURE 20: GEOPROBE® OPERATION

1.0 INTRODUCTION

The purpose of this document is to define the SOP for conducting direct sensing of soil conductivity. A driven probe apparatus will be used to detect temperature and conductivity in Lake Bottom sediments in SMUs 2 thru 7. This will be conducted from a vessel that may be self propelled or moved by support boat or tug. Vessel positioning will be conducted as described in SOP 8.

This SOP describes the needed equipment, field procedures, materials and documentations procedures needed during the investigation. This procedure is to be followed, and any substantive modification to the procedure shall be approved in advance by the Field Team Leader and NYSDEC.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

The Field Team Leader is responsible for assigning field personnel to be responsible for site activities. The Field Team Leader is also responsible for assuring that this and any other appropriate procedures are followed by field personnel. Field personnel assigned to this activity are responsible for completing their task according to this and other applicable SOPs. Field personnel are responsible for reporting deviations from the procedure or nonconformance to the Field Team Leader. Only qualified field personnel are allowed to perform this procedure. Qualifications will be based on previous experience and health and safety training. These considerations are discussed in more detail in the project PSP.

3.0 PROCEDURES

3.1 Equipment List

The following equipment list contains materials that may be needed to carry out the soil conductivity tests described in this SOP. The following may be necessary to complete the tests according to this SOP:

- Floating platform (barge/pontoon boat or similar) with moon pool,
- Propulsion system or tug to move floating platform/pontoon boat from location to location.
- Floating platform/pontoon boat, and support boat will meet all US Coast Guard requirements for the type of vessel, including all required safety equipment (including, but not limited to, navigation lights, day signals, personal flotation devices, throw rings, VHF radio-communications, anchors, emergency signaling device, etc.).
- Floating platform/pontoon boat and support boat will have pipe, chain, or rope hand rails around the perimeter, or sufficient freeboard to prevent personnel from falling overboard.

- GPS receiver to position vessel.
- Communications (marine VHF radio and/or cell phone).
- Soil conductivity probe tip, rods, cables, tubes, portable generator, power inverter, probe test jig, conductivity field test solution and container, stringpot, stringpot mounting bracket, anvil, slotted adapter (1" x 1"), loop pull cap for 1" rods.
- Data logger or computer to record measurements.
- Appropriate decontamination equipment.
- Personal protective equipment (gloves, protective clothing, protective non-slip footwear).
- Field log book and camera to document field activities.

4.0 CALIBRATION CHECK AND FIELD COMPARISON

The equipment will be field checked and checked for calibration in accordance with the appropriate equipment user's manual. Maintenance and use of the equipment should follow the appropriate sections of the equipment user's manual. The following steps will be conducted during the calibration check and field comparison on the soil conductivity probe during the Onondaga Lake PDI.

Calibration Check

Step 1:

Select option 1 from the FC4000 prompts to test the instrument and probe. This option will allow for three tests to run (instrument calibration tests; probe continuity tests, and the probe isolation tests). Each test will be allowed to run to it's conclusion to ensure all electrical connections are sound.

Step 2:

Conductivity is tested using the wenner array by measuring the current between the probe contacts along with the voltage that results between these contacts. The conductivity is the ratio of current to voltage times a constant. A calibration procedure will be run on the probe prior to start of the work day. While the probe is seated in the test jig, a known current with an expected resulting conductivity will be sent to the probe. While the current is being passed through the instrument the string pot will be manually advanced to 3 feet. The resulting depth and conductivity will be graphed and the log will be saved to the computer. This calibration will be run for 3 known currents. The Geoprobe® unit measures the conductivity as a function of grain size, using a known liquid solution is not an effective way to calibrate the instrument.

Field Comparison

A field comparison of the Geoprobe® temperature/conductivity tool with a standard conductivity meter will be conducted by immersing both instruments in lake water as a low conductivity comparison and a high conductivity comparison using a 5,000 milli-Siemens/Meter (mS/M) solution. The following method will be used.

Step 1

The lake water and 5,000 mS/M test solutions will be checked using a YSI conductivity meter, or equivalent, to verify the conductivity of the test solutions. Readings will be recorded. The meter probe will be rinsed with distilled water between tests.

Step 2

The Geoprobe® tool tip will be lowered into the lake water solution after being rinsed with distilled water. The conductivity of the lake water test solution will be measured using the Geoprobe® temperature/conductivity probe. The measured conductivity will be recorded.

Step 3

The Geoprobe® tool tip will be lowered into the 5,000 mS/M conductivity solution after being rinsed in distilled water. The conductivity of the 5,000 mS/M test solution will be measured using the Geoprobe® temperature/conductivity probe. The reading will be recorded.

Step 4

The two sets of daily conductivity measurements will be compared to each other and to previous measurements.

5.0 DIRECT SENSING OF SOIL CONDUCTIVITY METHODS

Soil conductivity testing will be conducted from a floating platform/pontoon boat with a moon pool. The following methods will be used to conduct this test:

- A two to three person crew will be utilized to operate the transport boat/pontoon boat, soil conductivity testing equipment consisting of a field lap top, rods, cable, FC4000 field instrument, portable generator, power inverter, probe test jig, string pot, string pot mounting bracket, 30 lb. slide hammer, 15 lb. slide hammer, anvil, slotted adapter (1” x 1”), and loop pull cap for 1” rods.
- Utilities will be cleared before testing is commenced. This may be accomplished through a combination of notifying Dig Safely New York (800-962-7962) and conducting a pre-work reconnaissance, including noting the presence of any pipeline crossing signs or markers and scanning the near shore area for any visible obstructions.
- The sampling vessel contractor will navigate to and from each test location and anchor/stabilize it in place with the moon pool centered over the proposed location. The vessel captain will follow SOP 8. The captain will be responsible for safely navigating to each location. If weather, water condition, water depth, or conditions of the vessel are determined to be unsafe, work will be delayed until the unsafe conditions pass or appropriate repairs are completed.
- Set up the soil conductivity equipment.
- Power on the power inverter connected to marine deep cycle batteries.
- Power on the computer or FC4000 field instrument.

- Connect all the hardware to the FC4000 and enter the basic EC information.
- Run an instrument calibration check.
- Measure the water depth at that location.
- The soil conductivity probe will then be lowered to the top of the sediments. (the probe should be lowered ~ 6 inches above the sediment and begin testing in the water column)
- Connect the stringpot (depth measurement tool) to the driving mechanism.
- Place the trigger switch in the "ON" position.
- Begin data collection above the sediment-water interface to identify conductivity and temperature measurements in the water column just above the sediment.
- Begin probing by advancing the tool by hand. The probing rate typically varies from 1 to 5 ft per minute based on instrument response rates and the strengths of the soils being encountered and the cumulative friction on the probe rods.
- Testing will continue to the depths specified in the Work Plan or to refusal. Instances of obstructions or refusal will be documented.
- The results of the probe will be reviewed while it is advanced to determine the termination point. The probe will be considered complete once three similar data points have been collected below 10 feet deep.
- When the log is complete, turn off the trigger and slowly return the cable into the stringpot.
- Pull the soil conductivity probe using the loop pull cap or rod grip pull system.
- When the equipment reaches the surface, clean with water
- Save the data and exit the software.
- Backup data and calibration data daily or more frequently to protect all information.

6.0 QUALITY CONTROL AND QUALITY ASSURANCE

There is no test possible to measure the repeatability of a probe in a natural soil. However, a useful concept of the working repeatability of the probe can be attained by making successive probes at locations offset by short increments. This should be done at least once per week to ensure the probe is working properly.

7.0 DATA AND RECORDS MANAGEMENT

All electronic soil conductivity data will be backed up daily or more frequently as needed. Backup data will be stored separately from the field computer to protect the data from corruption, physical damage, loss, or theft. Electronic field notes will also be backed up daily. Hand written notes will be entered in a bound field notebook.

8.0 REPORTING

All data collected will be summarized in the Data Summary PDI Report.

9.0 REFERENCES

Direct Image, *A Percussion Probing Toll for the Direct Sensing of Soil Conductivity Technical Paper No. 94-100*, Prepared March, 1994, Geoprobe® Systems, A Division of KEJR, Inc.

Geoprobe®, *Direct Image FC4000 Field Instrument User's Guide Manual No. 20777*, 2002.