ONONDAGA LAKE
CAPPING FIELD DEMONSTRATION
WORK PLAN

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Project Manager: _____ 10/20/11
Date

Technical Manager: _____ 10/20/11
Date

OCTOBER 2011

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LIST OF FIGURES

LIST OF ACRONYMS

CY	cubic yards
GAC	granular activated carbon
HDPE	high-density polyethylene
IRM	Interim Remedial Measure
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
PSP	Project Safety Plan
QC	quality control
ROD	Record of Decision
SES	Sevenson Environmental Services
USEPA	United States Environmental Protection Agency

SECTION 1

INTRODUCTION

Honeywell continues the progress toward achieving the goals of the Onondaga Lake Record of Decision (ROD) and the community's vision for a restored lake with the development of this *Capping Field Demonstration Work Plan* (Work Plan). The lake remediation plan, which was selected by the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA), includes dredging of up to an estimated 2.65 million cubic yards (CY) of contaminated sediments and capping of over 400 acres of lake bottom. Consistent with ongoing design evaluations, the chemical isolation layer of the cap in portions of the lake will include addition of granular activate carbon (GAC) in order to promote long-term chemical isolation. The capping field demonstration described in this work plan will be completed to provide additional design- and construction-related information pertaining to placement of the GAC-amended chemical isolation layer.

The primary purpose of the work described in this Work Plan is to demonstrate the ability to effectively place sand and GAC through the water column, resulting in a chemical isolation layer with GAC distributed throughout. The Work Plan describes the field demonstration equipment and materials necessary for on-shore material management and placement of the material within the lake, and the procedures that will be followed during the demonstration. The capping field demonstration will provide an evaluation of the implementability of mixing/slurrying GAC and sand and placing the material uniformly over a pre-defined depth and area within the lake. Information obtained from this demonstration will be utilized in construction planning and constructability details.

In order to demonstrate the ability to effectively place sand and GAC through the water column prior to the start of the lake dredging in 2012, the capping field demonstration will be conducted in the fall of 2011.

1.1 FIELD DEMONSTRATION LOCATION

The location for the capping field demonstration will be in an approximately 1 acre area of Remediation Area D. The cap material staging and slurry equipment location for the demonstration will be on the Wastebed B site adjacent to the in-lake demonstration area. This support location is at or near the proposed full-scale capping support area. The demonstration and support locations are shown in Figure 1.

The demonstration area will be in water depths ranging from approximately 5 to 30 ft. The majority of the demonstration area is in an area planned for capping-only (i.e., no initial dredging), and the full-scale cap for this area will be placed over the demonstration cap during final construction. Any demonstration cap placed over an area that is within the area planned for initial dredging prior to capping (dredge-and-cap area) will be removed during dredging of that area as part of the full-scale remediation.

1.2 CONTENTS OF THIS WORK PLAN

The organization of the Work Plan is summarized below.

Section 1 – Introduction

Section 2 – Field Activities

Section 3 – Health and Safety

Section 4 – References

SECTION 2

FIELD ACTIVITIES

The field work for the demonstration will consist of the following major activities:

- **Mobilization and Site Preparation -** Mobilization, road upgrades if needed, and above ground site clearing.
- **Material Transport** – Trucks will deliver capping materials (sand and GAC) to the lakeshore.
- **Material Staging** – Capping material stockpiles will be created to support the field demonstration.
- **Cap Mixing System Construction** – This will include installation of separate sand and GAC feed systems that will feed capping materials from stockpiles to a sand/GAC slurry mix system. The sand/GAC slurry mix system will allow the materials to be mixed with water for pumping. The capping slurry will be pumped through a pipeline and booster pumps to a spreader barge. A hydraulic spreader barge will be used during the capping field demonstration for placement of materials. Section 2.4 provides additional details on the capping system.
- **Cap Placement Field Demonstration –** This will include placement of sand and GAC in a series of parallel "lanes". Monitoring and measurements will be conducted to validate placement of specified GAC within the sand cap.

With oversight by Parsons, Sevenson Environmental Services (SES) will be responsible for implementation of the capping field demonstration. Sevenson will also be responsible for the Quality Control (QC) during implementation of the capping field demonstration. SES will mobilize water-based and shore support equipment, install and assemble the systems, perform cap material placement for the demonstration, and remove selective equipment as required. A portion of the equipment and support appurtenances that will be used for the demonstration test are also expected to be used for 2012 capping operations. This equipment will be winterized, and left on site, or moved to a temporary storage location. Each of the planned activities is detailed below.

2.1 MOBILIZATION AND SITE PREPARATION

Site preparation activities will include equipment and material mobilization, upgrading existing site roads, site clearing, establishing a shore support area, and storm water/erosion control.

2.1.1 Mobilization

Equipment, personnel, materials, and supplies will be mobilized to the site. Items to be mobilized are anticipated to include:

- Shore Support

  - Storage container
  - Sanitary facilities
- Equipment
  - Loader
  - Crane
  - Backhoe
  - Forklift
  - Sectional barges
  - Work boats
  - Booster pumps
  - Slurry make up water pump
  - Sand feed hopper
  - Material Conveyors
  - Sand/GAC slurry mix tank
  - GAC process tank with agitation
  - GAC slurry metering pump
  - Hydraulic Spreader Barge
  - High-density polyethelene (HDPE) pipe welder
- Materials
  - Sand, estimated 4,000 tons
  - GAC, estimate 18,000 pounds
  - HDPE pipe
  - Demarcation system with buoys and lights
- Miscellaneous hand tools and portable equipment

Analytical and geotechnical characterization results of the sand to be used for the demonstration will be provided to the NYSDEC for review prior to the commencement of placement of the demonstration.

2.1.2 Stormwater/Erosion Control

Stormwater, erosion, and sediment control is anticipated to consist of silt fencing around the stockpile storage and slurry mix areas to prevent sediment or soil erosion from leaving the site. Silt fencing will be installed prior to the start of site clearing, road upgrades or installation of support facilities. Shore activities performed during the Capping Field Demonstration are covered by the Storm Water Polution Prevention Plan for the West Wall Interim Remedial Measure (IRM) (Parsons 2010). Figure 4, Detailed Demonstration Equipment Layout, depicts the location of erosion control measures to be implemented during the demonstration.

2.1.3 Road Upgrades

Upgrades to existing site roads, if required, may include placing and grading of gravel, recycled asphalt, crushed rock, or other appropriate aggregate material on an as-needed basis. Aggregate material will be obtained from off-site, or reused from on-site sources if available.

2.1.4 Site Clearing

Site clearing will be performed in designated work areas as required. Site clearing for the work described in this Work Plan will take place near the area of Wastebed B/Harbor Brook as shown on the shoreline support area Figure 1. Site clearing may include of cutting and removing trees, if required. The area will be leveled as required and covered with gravel to make a platform for the on-shore capping slurry equipment.

2.1.5 Support Area

Temporary facilities, sanitary facilities, storage containers, and material handling equipment will be installed as required.

2.2 MATERIAL TRANSPORT

Cap demonstration material will be trucked to the site. Transport routes to the site will maximize major highways as shown in Figure 2.

GAC will be delivered on site in prepackaged 1,000 pound supersacks. GAC will be kept dry and stored in the supersacks until they are introduced into the GAC process tank for saturation. Trucks delivering the GAC will take the same routes onto the site as the capping material trucks above.

2.3 MATERIAL STAGING

Material stockpiles will be used to supply the necessary capping materials throughout the cap demonstration project. Stockpiles will be kept to a minimum size, with an estimated one to three days of quantity available to ensure the demonstration can be performed as scheduled without delays. Maintaining small stockpiles will minimize the need to handle the capping material multiple times, reduce the stockpile maintenance required, and result in as small a footprint of the stockpile as practicable.

2.4 CAP MATERIAL MIXING AND DELIVERY SYSTEM CONSTRUCTION

A hydraulic capping system will be used for the placement of capping materials during this demonstration. System components will be comprised of the same equipment planned for the full-scale capping construction, or equipment similar in capacity and function to what will be used at full-scale. A Process Flow diagram for the demonstration is shown on Figure 3. The hydraulic slurry system will be comprised of an upland hopper that will feed capping materials (sand and GAC mixed together) from a stockpile to a slurry system that will mix the capping materials with water from the lake. The slurried cap materials will be pumped through a pipeline by a booster pump to the spreader barge at the demonstration location. The hydraulic cap placement system will consist of a spreader barge equipped with a diffuser plate that reduces the

energy and evenly distributes the capping materials. Each of these components is discussed below.

2.4.1 Sand Feed System

The sand slurry system will consist of a stockpile, feed hopper, weighbelt feeder, and a belt conveyor. A hydraulic excavator will load the sand material into the hopper. The sand will then be dropped to a belt conveyor with a weigh-belt scale and transported to the sand/GAC slurry mix tank at a constant rate. It is anticipated that the feed rate for the sand material during the field demonstration will be approximately 100 CY per hour. The actual rate of application may vary throughout the test.

2.4.2 Carbon (GAC) Feed System

The GAC will be mixed with water prior to placement in order to saturate the void space of the GAC (i.e. removing entrained air) to promote more rapid settling through the water column during placement. The GAC is planned to be loaded at the end of the day in order to soak overnight. Although not expected, if dry GAC is required to be added to the agitated mix tank during the test day, the minimum saturation time for the agitated GAC will be two hours. If required, capping lanes that use GAC that has not been soaked overnight will be placed separately from GAC that has soaked overnight. This will keep the variable of soaking consistent within each demonstration test lane.

The GAC slurry system will consist of an agitated process mix tank, a water make-up pump, and a slurry metering pump. GAC will be delivered and stored in 1,000 pound supersacks. A hydraulic excavator will load the supersacks into the GAC process tank where it will be combined with make-up water from the lake via a makeup water pump. The GAC will be mixed with water to create a known concentration of GAC in the water solution. The agitation process mix tank will homogenize the wetted GAC and maintain a uniform concentration. The GAC slurry will then be pumped from the tank through a peristaltic metering pump and flow meter, and delivered to the sand/GAC slurry mix tank at the desired rate, based on the planned GAC dose in the chemical isolation layer. The rate of *in situ* GAC loading (in pounds of GAC per hour, or per square foot) slurry will be determined from the proposed carbon dosage and the rate of the sand being introduced into the sand/GAC slurry mix tank.

2.4.3 Sand/GAC Slurry Mix Tank

Sand and GAC will be introduced into the makeup water that is being pumped through the slurry mix tank. The sand and GAC will be mixed into the water to form a slurry. The tank will be fitted with water jet recirculation pumps to keep the slurry in suspension and homogenized. The slurry will be drawn from the tank through a slurry feed pump and pumped out to the spreader barge for placement.

2.4.4 Slurry Line

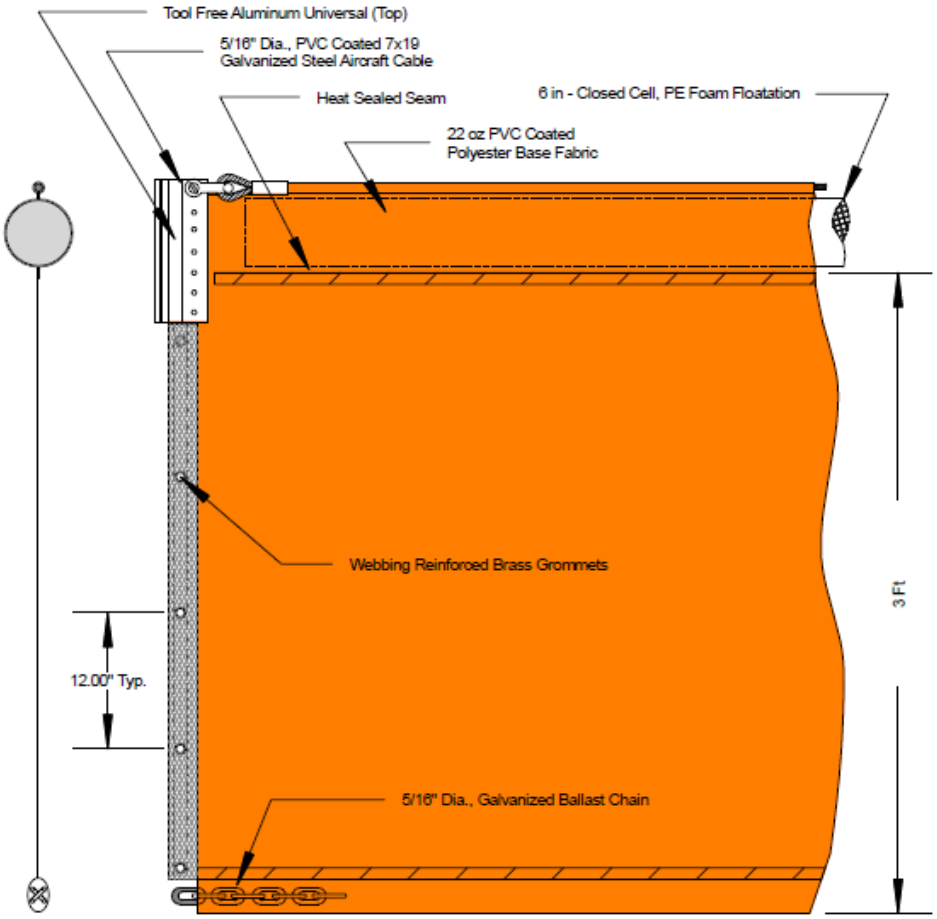
A HDPE pipeline will be used to transport the sand/GAC slurry to the spreader barge. The HDPE pipe and fittings will be mobilized to the site and fused together to produce the required length of pipe for the demonstration test. The slurry pipeline will be marked by buoys and lights to warn recreational boats of the work area. The line may be submerged where appropriate.

2.4.5 Spreader Barge

The HDPE slurry pipe will be connecected to a diffuser located on the spreader barge. The diffuser system will be attached to the back of the barge. The barge will have a waterfall type discharge apparatus (steel plate angled towards the water) positioned on the deck of the barge. The angled discharge plate will act to dissipate the energy in the capping material slurry delivered to the placement barge via the floating line, allowing the slurry to enter the water in a controlled manner, thus allowing for uniform placement of capping materials. The diffuser barge will have a hydraulic cable winch system and anchors to facilitate the movement of the barge for placement of the material. Using the arrangement of winches and anchors, the diffuser barge will be operated in a series of parallel "lanes" equal to the width of the diffuser barge itself.

2.4.6 Demarcation System

A demarcation system will be installed around the demonstration area to delineate the demonstration area. The demarcation of the demonstration area will include lighted buoys for visibility of the area at night, in accordance with US Coast Guard regulations. The demarcation system will be held in place with Danforth type anchors, chain, and anchor line. Spacing of the anchors will allow minimal movement in the current and wind and accommodate any water level fluctuations. Components will be installed and anchored prior to the start of the demonstration test.



2.5 CAP PLACEMENT FIELD DEMONSTRATION

2.5.1 Demonstration Procedures

The capping materials will be placed in a series of parallel "lanes" that are 20 ft. wide (corresponding to the width of the angle plate diffuser on the spreader barge). The cap placement operation will start at one end of a capping lane, and the sand spreader barge will progress along that lane at a constant rate that will provide the target lift thickness for the capping material. Multiple lifts in the same capping lane may be required to achieve the targeted thickness, with lifts varying between 6 inches and 12 inches. This is the same lift thickness anticipated during full-scale capping operations in 2012.

Placement within a given capping lane may progress from shallow to deep water, or from deep to shallow water, depending on a number of factors including the anchor configurations, water depth, lift thickness, spreader barge location, etc. A capping lane may encompass the complete demonstration water depth (5 ft. of water to 30 ft. of water), or just a targeted portion of depth (i.e., 5-10 ft. of water, or 15-20 ft. of water).

The demonstration cap will be constructed with two target GAC placement rates. For visual observation of the vertical distribution of GAC, a placement rate of 1.0 pound per square foot will be employed in each targeted water depth. During the column testing, this dosage rate allowed for visual observation of the carbon in the sand layer. Due to the volume of carbon used for the 1.0 pound per square foot dosage, this rate will applied as few times as necessary. The second GAC placement rate of 0.25 pounds per square foot will be used for lower dose testing. This lower rate is the approximate average dosage rate proposed for the amended cap being placed in 2012.

It is anticipated that approximately one to three targeted depth capping lanes will be placed per day. The total duration for the demonstration is anticiapted to be approximately one to two weeks, subject to actual production rates, weather delays, etc. Samples collected at various steps within the mixing and delivery process, as well as from the placed cap material, will be analyzed for GAC content, as discussed in Section 2.5.2. Analysis will be conducted with a fast turn-around-time (e.g., overnight) so that results from one day will be available to guide the next day's activities.

It is expected that the testing will establish a correlation between the measured input concentration of GAC and the measured in-place concentration. Once this correlation is established, refinements can be made to the placement technique, sampling method, carbon input volume and/or carbon verification procedures to fine tune the system. This flexibility of placement, sampling, and testing variables will allow a dynamic field demonstration. This will allow the most flexibility to ensure that the carbon can be consistently placed in the sand cap during full scale operations.

2.5.2 Verification Sampling and Analysis

Post-placement verification samples will be collected as part of the capping demonstration project to measure the thickness of capping materials placed and the concentration of GAC. Verification samples will be collected using a "catch pan", which consists of a small open-top container placed on the bottom piror to cap placement and collected after placement to measure the applied thickness. Multiple catch pans will be deployed for each capping lane demonstration lift. The targeted water depth will vary with each capping lane demonstration lift. The catch pans will rest on the existing sediment surface and will be attached to a rope and buoy to allow for retrieval. The capping operations will pass over the top of a catch pan during each capping lift. After a lift with the capping spreader barge, the catch pans will be retrieved. The thickness of capping material will be measured in each catch pan and samples will be collected for measurement of the GAC content and comparison to the input GAC content.

Verification samples will also be collected at several steps during the cap material mixing and delivery process (i.e., prior to placement on the lake bottom) to measure the GAC content. Samples will be collected from the discharge of the carbon mix tank, the discharge of the sand/GAC slurry mix tank, and just prior to entering the water column, as shown in Figure 3. Samples will be collected through sampling ports installed at the exit of the carbon slurry mix tank, the sand/GAC slurry mix tank, and at the discharge of the spreader barge. A process sampling summary is provided below.

Sample Location	Primary Catch pans	Secondary GAC Process Tank	Secondary Sand/GAC Slurry Mix Tank	Secondary Energy Diffuser Plate
Sample Frequency[1]	Min. 3 per run[2]	10 minute intervals	10 minute intervals	10 minute intervals
Analysis	Thickness, GAC dosage	GAC/water slurry concentration	GAC dosage	GAC dosage

[1] Test sample frequency may be varied depending on the target water depth and length of a capping lane.

[2] A run consists of a single capping lane, through a targeted water depth. The targeted water depth will vary for each run, and may consist of a similar depth interval (i.e. 10 ft to 15 ft, or 20 ft to 25 ft), or a larger water depth interval (i.e. 5 ft to 25 ft).

Once the sample has been collected, it will be transferred to shore for measurement of GAC content. GAC will be removed from the sample matrix by thermal destruction and quantified. The thermal destruction method will be used to accurately measure, by weight, the amount of GAC present in sand/GAC slurry samples. The method was developed to allow for large sample sizes and rapid turnaround times.

The thermal method developed for the GAC removal relies on exposing the sample to heat that will burn off the GAC without burning off the sand. Full capping catch pan samples taken from a capping run will be placed in containers for analysis at the lab. The samples will be sieved to remove particle sizes larger and smaller than the expected GAC particles. This sieve step reduces the sample size to be dried and heated. Following the sieve step, the samples will be placed in an oven and heated to 110°C to remove the water from the sample. Once the water has been removed the sample will be weighted and placed in an oven and heated to approximately 500°C to burn off the GAC. The sample will be reweighed to determine the quantity of GAC in the sample. The weight of GAC removed from the sample will be used with the area of the catch pan to determine the dose of the GAC in the layer (lb/sf).Each day's operations will include a control sample of a known weight of carbon in a sand matrix to verify recovery of GAC within the matrix. If more than 20 samples are taken per day, a control sample will be taken for each 20 field demonstration samples.

Demonstration samples will be used to track the GAC content in the capping material throughout the process, from initial mixing with sand through the delivery to the water column, and for comparison with GAC content of the capping materials measured *in situ* following placement (via catch pans discussed above). It is anticipated that for full-scale capping, a relationship will established between the input GAC content to the *in situ* (post-placement) GAC content, and the frequency of *in situ* sampling can be reduced or eliminated.

2.5.3 Water Quality Sampling

During the Capping Field Demonstration, turbidity will be monitored at performance and compliance monitoring stations to assess the water quality conditions during capping at locations

similar to the full-scale program. Performance monitoring stations will be placed approximately 300 ft. outside of the demarcation curtain at upcurrent (background), down current, and adjacent to the demonstration area. A compliance monitoring station will be placed approximately 500 ft. outside of the demarcation curtain. Results will be continuously recorded (i.e., 15-minute interval averaged into 2-hour values) from each location during the demonstration. Water quality sampling locations are depicted in Figure 5.

Visual monitoring of turbidity during the demonstration will also be employed. If visual observations indicate that revisions to the monitoring program, such as adding monitoring locations or moving the performance monitoring locations closer to the work area would provide more useful data, the Design Team will consult with DEC on the new proposed location (s).

Washed sand will be used for the demonstration test to minimize turbidity and focus the demonstration on the placement of GAC in the sand layer. Un-washed screened sand may be used after the initial demonstration to provide observational and turbidity data for use in the Lake Final Design Documents.

2.5.4 Current Velocity and Wave Height Measurement

During the Capping Field Demonstration, current velocity will be measured to assess the water current conditions during capping demonstration. The current velocity will be measured at a specified point within the water column for the demonstration. The water velocities will be measured in 20 ft. of water at the middle of the water column. The monitor will take real time velocity throughout the demonstration. The monitor will be located approximately 200 ft. west of the demonstration area.

Wave heights will be measured and recorded throughout the demonstration placement in order to evaluate potential wave affects on placement.

2.6 REPORTING

After completion of the demonstration test, a Capping Field Demonstration Final Report will be drafted and submitted to NYSDEC to compile the information collected during the demonstration. The report will include the equipment utilized for the test, and the details and results of the sand and GAC placement. The results of the demonstration will be communicated to the NYSDEC by early December 2011 for benefit of review and consideration prior to submittal of the Onondaga Lake Capping, Dredging, Habitat and Profundal Zone Final Design.

SECTION 3

HEALTH AND SAFETY

3.1 HEALTH AND SAFETY OVERVIEW

The health and safety of the site-workers are of paramount importance in designing and implementing the lake remedy. Worker safety is addressed through a system of planning and management that will be performed by Parsons during the construction planning and execution stages. A Project Safety Plan (PSP) (Parsons, 2011) has been developed to document the worker safety system.

As stated in Section 1.1, the Capping Field Demonstration work will be performed prior to the start of dredging and will consist of conventional hydraulic capping equipment with clean materials delivered to the site. The field demonstration work will involve placement of clean sand on top of the lake sediments. With this consideration, risks to the health and safety of the community during field demonstration work are very low.

3.2 COMMUNITY HEALTH AND SAFETY

Community project health and safety procedures have been developed to provide safety during the capping field demonstration. These initiatives will provide protection to both Honeywell's contractors and the local community. Initiatives include measures for site security at the established work areas, traffic protection for both public vehicles and recreational vessels, demarcation and navigational safety of the work area, preventive measures and responses for addressing potential spills of petroleum, oils and lubricants, and Honeywell's routine monitoring of noise levels during operations.

3.2.1 Site Security

The land based work area has been established to support the project. Access to the site and to this area will be restricted. Anyone wishing to access the site will be required to sign in and show proper identification.

Security measures will include clearly identifying work areas (using flagging tape, construction fencing, etc.) and restricting access where work is taking place. If any equipment is to be left unattended overnight, additional security measures will be implemented, as necessary. Precautions will be observed in order to protect materials, equipment, and completed work from unauthorized public access, damage by theft, vandalism, and/or sabotage.

Each day, portable equipment will be secured in designated areas. If required, heavy equipment will be relocated to a safe location and work areas will be properly barricaded. Temporary fencing will be installed as required. On the lake, barges and support boats will be securely anchored and all will have night lights, reflectors, and signage as appropriate.

3.3.2 In-Lake Activities and Lakeshore Support Area

A shoreline support area will be constructed on Honeywell lakeshore property. Shoreline support areas for the capping activities will consist of, at a minimum, docks for access to the lake, equipment staging for shoreline activities, cap material stockpiles, staging and storage of other materials, equipment, and storage trailers.

In-lake work zones will be clearly marked. Buoys will be installed around the work activities to alert the boating public to avoid work zones. Air horns or other appropriate means will warn non-project vessels approaching an active work area to keep away. In addition, high visibility demarcation booms will serve as a barrier to keep the boating public out of the work area.

On-water equipment will use biodegradable hydraulic oils and antifreeze. The capping barge will be equipped with safety equipment and spill prevention materials to address any petroleum spills that may occur. Support vessels will also be equipped with safety equipment. Additional spill prevention materials will be on hand at the lakeshore.

Water based equipment will be stored securely when not in use. Prior to disembarking a project vessel for a shutdown period, workers will ensure vessel enclosures have been locked, and equipment and supplies have been secured. When not in use, vessels will dock at or near the project docking facilities, which will be illuminated during night hours.

2.3.3 Traffic Management

The traffic management strategy establishes preferred approved New York State Department of Transportation (NYSDOT) roadways for trucks use in order to minimize congestion and maximize safety. However, for specific times or activities, the routes may vary. Traffic to and from the project sites will be active for the duration of the project including regular material deliveries to the Capping Field Demonstration shore support area.

Traffic leaving the project work sites will be monitored for dirt/mud to minimize tracking material onto the roads. Enforcement of project safe driving practices for drivers delivering equipment and materials to the project sites will be covered with all employees. This includes practices such as adhering to local speed limits and always covering loads with tarps. Awareness training will be provided to contractors involved with the transport of demonstration materials.

To the extent practicable, traffic routes will maximize use of major state highways. The route that will be used for traffic to and from the shoreline support area will be the same as was used during the installation of the sheet pile barrier wall along the shoreline of the southwest corner of the lake. Regular traffic to and from this location will include delivery of capping materials and regular maintenance and site workers.

As depicted in Figure 2, incoming traffic will access this site from the Exit 7 ramp from I-690 west bound. Outgoing traffic will access I-690 from State Fair Blvd. Based on normal traffic in this area from the New York State Fair and nearby businesses, traffic associated with the Capping Field Demonstration is expected to have minimal impact on the surrounding community.

SECTION 4

REFERENCES

New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) Region 2. 2005. *Record of Decision*. Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site. July 2005.

New York State Department of Health (NYSDOH). 2000. *Generic Community Air Monitoring Plan.*

Parsons 2011. *Draft Onondaga Lake Capping, Dredging, and Habitat Intermediate Design*, January 2011.

FIGURES

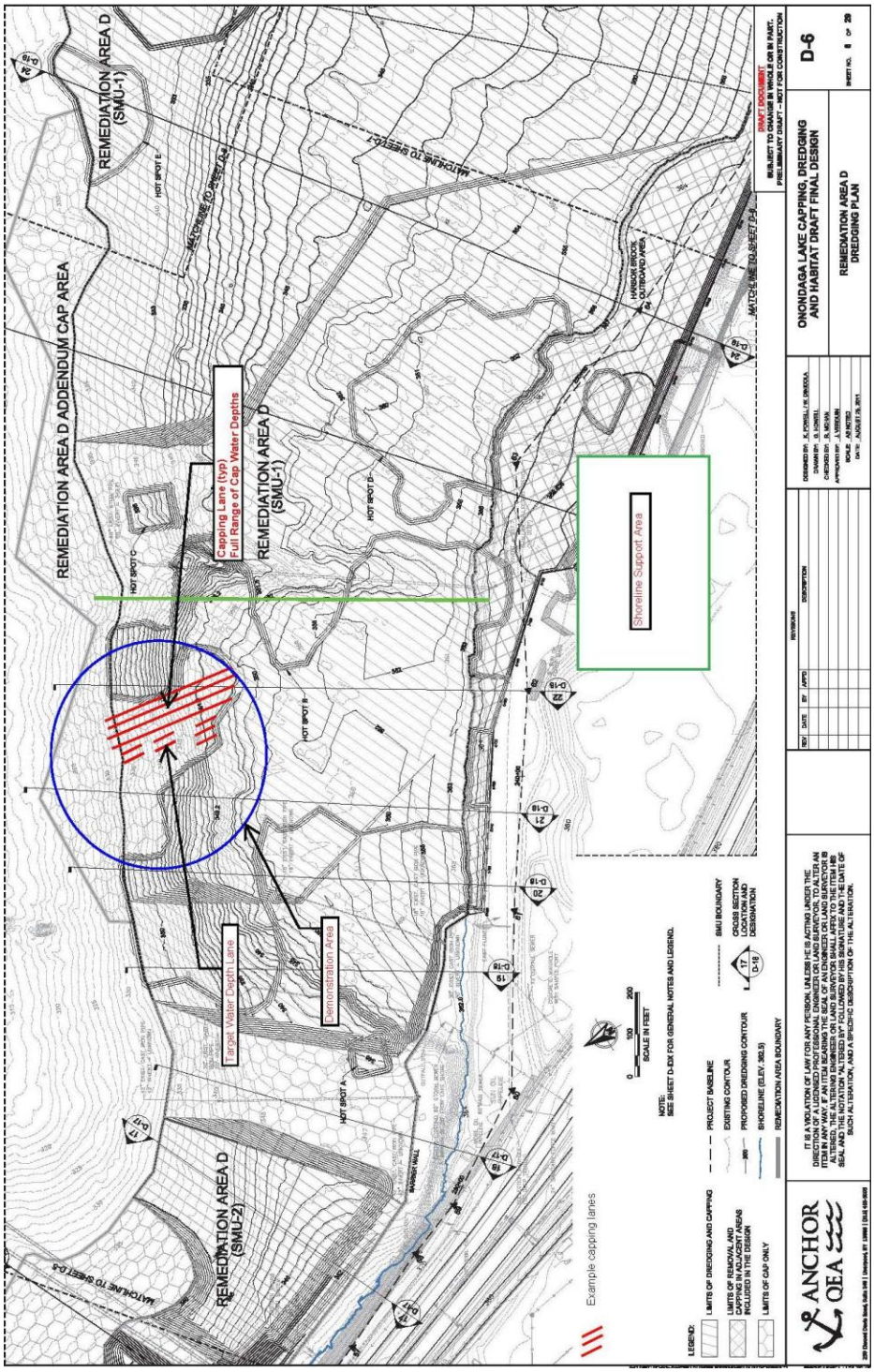


FIGURE 1
CAP DEMONSTRATION

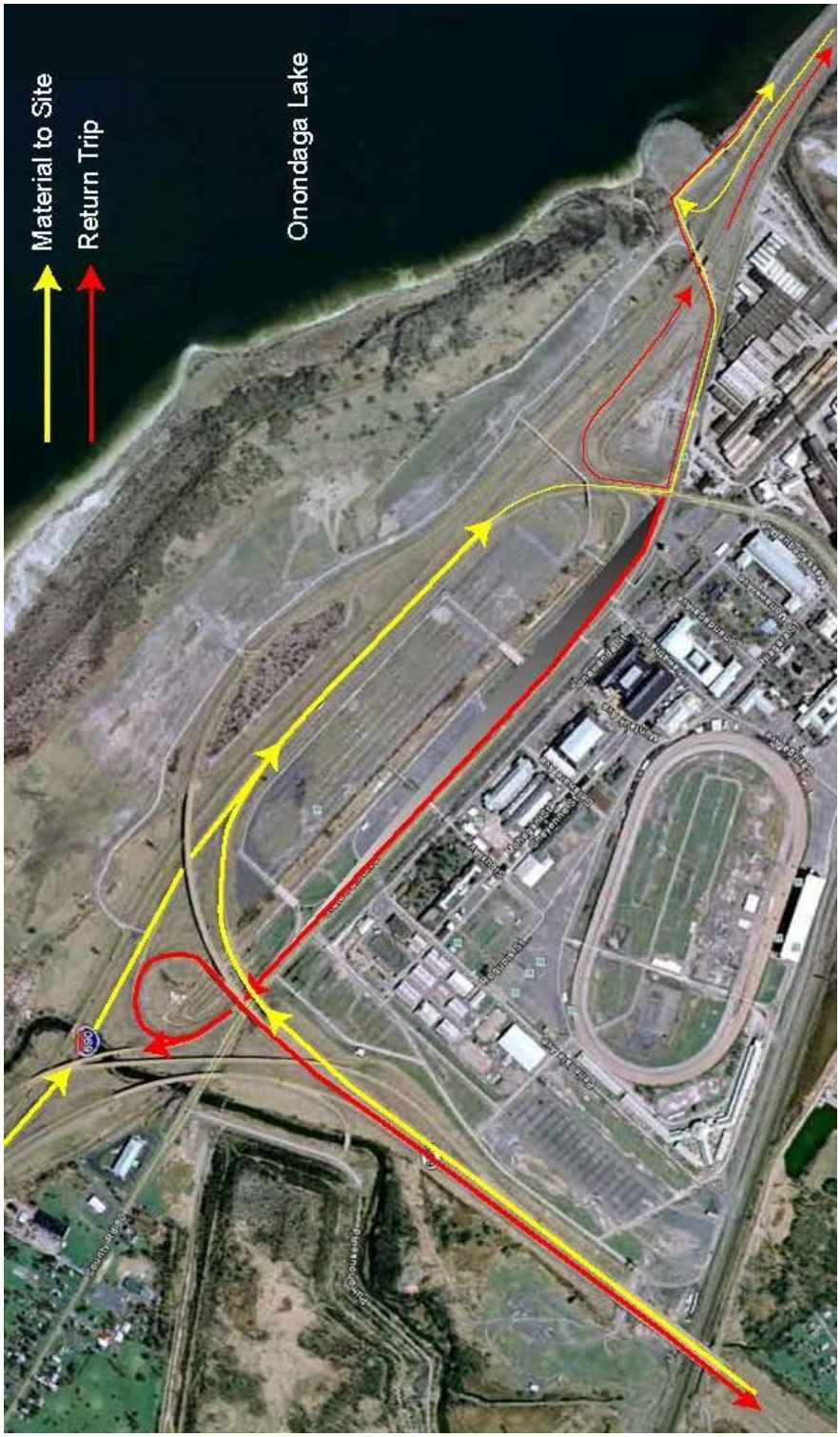


FIGURE 2
DEMONSTRATION MATERIAL TRANSPORTATION ROUTES

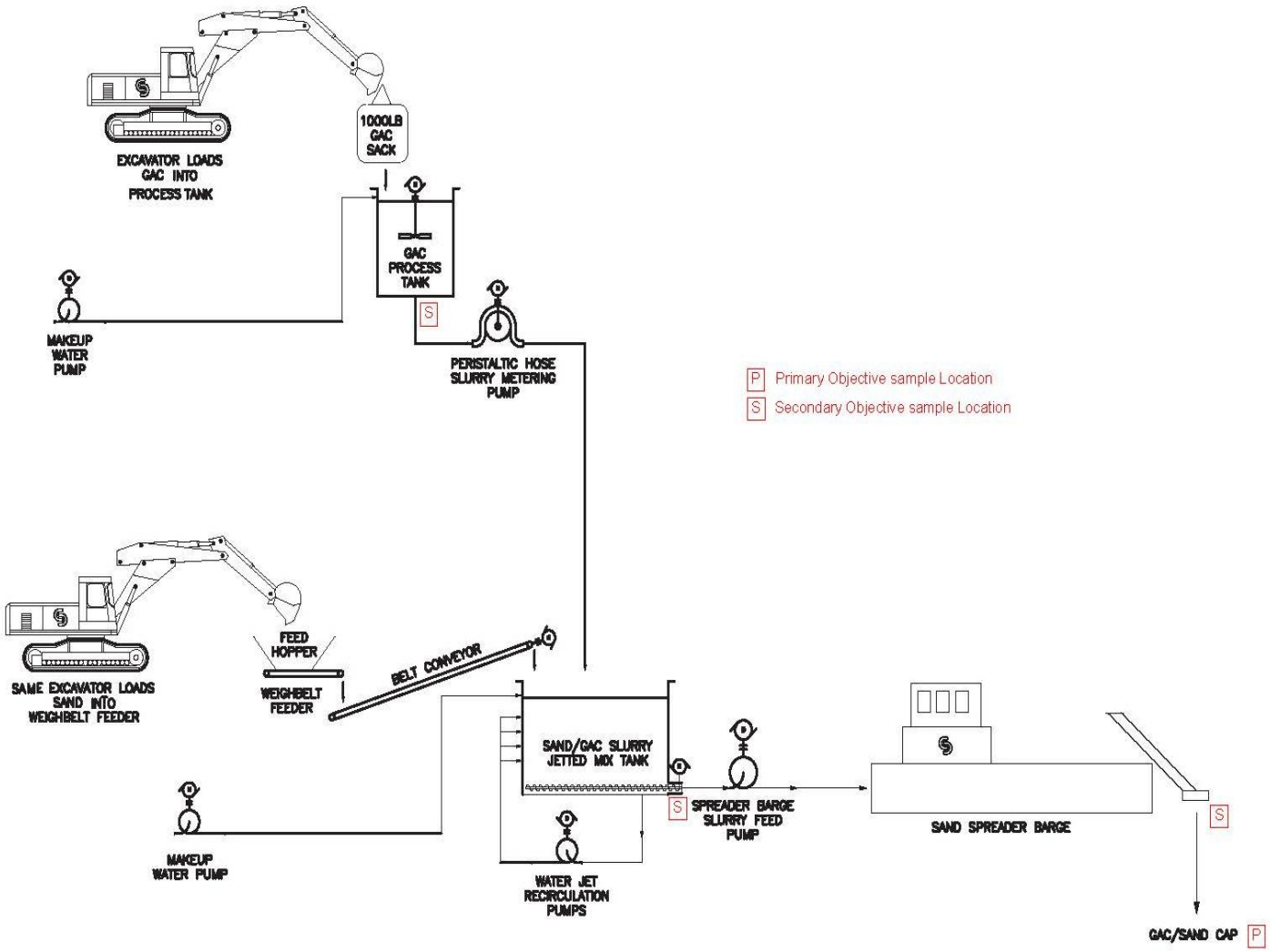

EXCAVATOR LOADS GAC INTO PROCESS TANK
1000LB GAC SACK
GAC PROCESS TANK
MAKEUP WATER PUMP
PERISTALTIC HOSE SLURRY METERING PUMP
P Primary Objective sample Location
S Secondary Objective sample Location
SAME EXCAVATOR LOADS SAND INTO WEIGHBELT FEEDER
FEED HOPPER
WEIGHBELT FEEDER
BELT CONVEYOR
SAND/GAC SLURRY JETTED MIX TANK
SPREADER BARGE SLURRY FEED PUMP
SAND SPREADER BARGE
MAKEUP WATER PUMP
WATER JET RECIRCULATION PUMPS
GAC/SAND CAP

FIGURE 4
DETAILED DEMONSTRATION EQUIPMENT LAYOUT

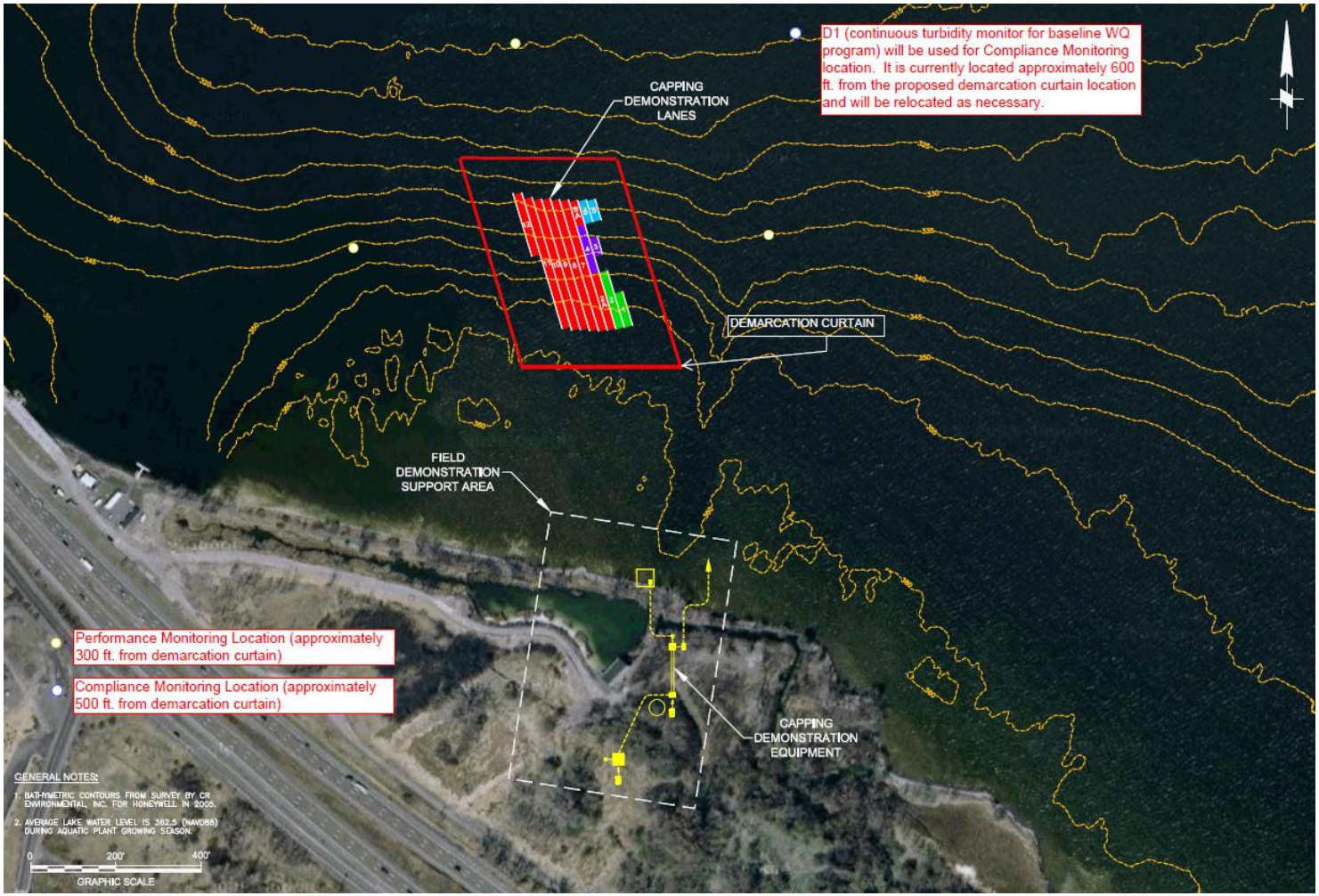


FIGURE 5
WATER QUALITY MONITORING LOCATIONS