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Remedial Alternatives Analysis & Remedial Action Work Plan

NYSDEC BCP Site No. C738046

Location:

Former Breneman Site
8 East Utica Street
Oswego, New York

Prepared for:

Canalview Development, LLC
70 East First Street
Oswego, New York 13126

LaBella Project No. 2190490
Revised March 2019

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Certification

I, Daniel P. Noll, P.E., certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Work Plan [Remedial Alternatives Analysis and Remedial Work Plan] was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

DAN NOLL
Printed Name

3/22/19
Date

Signature

DANIEL P. NOLL
No. 081996

1.0 INTRODUCTION

This Remedial Alternatives Analysis & Remedial Action Work Plan (RAA & RAWP) has been prepared by LaBella Associates, D.P.C. (LaBella) on behalf of Canalview Development, LLC as part of its participation in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). This RAA and RWP summarizes remedial alternatives evaluated and selects remedial actions to be implemented for the property known as the Former Breneman Site and located at 8 East Utica Street in the City of Oswego, Oswego County, New York and defined in the BCP Application (as amended) as the "Site." A Site Location Map is included as Figure 1. Information relative to adjacent properties is depicted on Figure 2.

The Site was entered into the BCP as Site No. C738046 in March 2013, based upon previous environmental investigations that identified the presence of semi-volatile organic compounds (SVOCs), metals and pesticides in surface and subsurface soil at the Site. The BCP Agreement was amended in June 2013 to increase the size of the BCP Site to 2.0144 acres.

The remedial alternatives and actions were evaluated based on the data obtained during a Remedial Investigation (RI) conducted at the Site. This RAA & RWP summarizes the findings of the Remedial Investigation Report for the Site; however, the RI Report should be referenced for greater details about the investigation.

2.0 BACKGROUND

2.1 Site Description

The Site consists of one parcel encompassing approximately 2.1044 acres. Property information for the Site and surrounding area are depicted on Figure 2. The Site is located in a mixed commercial and residential area in the City of Oswego. The Site is currently owned by Canalview Development, LLC.

2.2 Previous Environmental Work/Reports

The below summarized previous environmental work/reports are associated with the Site prior to acceptance into the BCP:

- *Final Site Remediation Report Breneman Building, Environmental Products and Services, Inc. (EPS), 1990* – This report indicates that the NYSDEC retained EPS in response to a Spill that was reported associated with transformer oil at the Site. EPS's report indicates that approximately 35-gallons of oil had been released from a transformer; EPS reportedly cleaned up the oil with absorbent materials (i.e., Speedy Dry) and disposed of all impacted materials off-site. In addition, EPS removed five (5) transformers that had contained PCB-oil and three (3) transformers that had contained non-PCB oil as well as roofing material from Building 2 that had been contaminated from a leaking PCB-oil transformer (the transformer had been located on the roof). EPS noted that the PCB-oil appeared to have leaked onto the roofing material, down the side of the building and onto soil next to Building 2. It should be noted that Building 2 is located within the current BCP Site boundary (refer to Figure 2).

- *Final Draft Site Inspection Report, Halliburton NUS Environmental Corporation, 1991* – This limited report was prepared for the USEPA Environmental Services Division. The report identified the former use of organic solvents including acetone and methyl ethyl ketone (MEK) during historical industrial operations at the Site. Halliburton NUS recommended the

Site be listed as “Higher Priority for Further Action” based on the presence of asbestos within the Site buildings.

- *Preliminary Environmental Assessment of the Former Breneman Building O’Brien and Gere Engineers, Inc. (O’Brien and Gere) 1991* – This report detailed several site visits by O’Brien and Gere and a historical and regulatory record review. O’Brien and Gere’s assessment identified the following potential environmental issues at the Site:
    - ➢ Bulk storage tanks including four (4) ASTs used respectively for the storage of naphthalene, MEK (this AST was actually partially buried) and two (2) for heating oil as well as one (1) UST used for the storage of acetone. It should be noted that one (1) of the heating oil ASTs was located in Building 10 of the facility, which is not within the current BCP Site boundary (refer to Figure 2).
    - ➢ O’Brien and Gere reported the presence of approximately 30-40 drums within the Site buildings. Labels on the drums indicated they contained at least 20 different materials including, but not limited to bleaching powder, hydrogen peroxide and gear oil. The interior drums were reported to be in generally good condition. O’Brien and Gere reported the presence of five (5) drums in the vegetated area on the western portion of the BCP Site. O’Brien and Gere also indicated that additional drums may be located in this vegetated area.
    - ➢ The presence of on-site transformers containing PCB oil. The NYSDEC retained a contractor (EPS) to remove PCB-containing transformers in 1989 following the report of a Spill associated with a PCB-containing transformer. O’Brien and Gere had previously inventoried the transformers in 1988 and indicated in the 1991 report that the PCB-transformers had been removed from the Site by the NYSDEC-hired contractor.
    - ➢ The presence of miscellaneous interior items including floor staining and small (up to 2-gallons) oil reservoirs.

- *Breneman Site Development Projects, Phase I Report, Nussbaumer and Clarke, Inc., 1996* – The report comprises a structural analysis of the Site buildings subsequent to a major fire at the facility. Nussbaumer and Clarke, Inc., recommend the emergency demolition of the Site building and the containment and abatement of asbestos containing materials.

- *Site Prioritization Report, Weston Solutions Inc., (Weston) 2005* – This report indicates that “suitable” demolished building material had been used as fill during the emergency demolition of the Site buildings in 1996 through 1998. Documentation does not appear to exist which indicates if potentially impacted (e.g., stained) building materials were used as fill at the Site.

    The report also details a subsurface investigation conducted at the Site in January 2005 by the USEPA Region 2 Site Assessment Team. This investigation included the collection of surface and subsurface samples from the Site. Fourteen (14) direct-push soil borings were advanced, of which twelve (12) were completed within the BCP Site boundary. A total of fourteen (14) subsurface soil samples and three (3) surface soil samples were collected within the BCP Site boundary. One (1) subsurface sample (SS-02) appears to have been collected specifically in the vicinity of former transformers. Each soil sample was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs and metals. This investigation did not find evidence of PCBs but did identify pesticides, metals and SVOCs in surface and subsurface soils.

    In addition to this investigation, Weston’s report notes that two (2) standing water samples were collected from test pits during previous earthwork construction in 1998. This work was completed by NFCS Environmental and Safety Consultants in 1998. Analysis of these water samples detected elevated concentrations (i.e., above NYSDEC Technical and Operation Guidance Series 1.1.1 Groundwater Standards) of methylene chloride and o-xylene in one of the test pits. Groundwater samples do not appear to have been collected within the BCP Site boundary.

2.3 Areas of Concern

This section summarizes the investigation completed at the Site. Based on the data obtained from this work, the Areas of Concern (AOCs) remaining at the Site are presented. These AOCs will be subsequently evaluated for remedial alternatives.

Summary of Remedial Investigation

The RI activities were conducted in accordance with a NYSDEC approved RI Work Plan (RIWP) last revised June 2013. This report was also completed in accordance with the NYSDEC Division of Environmental Remediation (DER) BCP Guide dated May 2004 and the DER-10 (*Technical Guidance for Site Investigation and Remediation*) dated May 3, 2010.

The BCP RI fieldwork consisted of the excavation of seventeen (17) test pits, advancement of thirty (30) soil borings (i.e., 6 with a rotary drill rig, 24 with a Geoprobe), collection of twelve (12) surface soil samples and installation of four (4) groundwater monitoring wells at the Site. To evaluate conditions at the Site, the following soil and groundwater samples were submitted for laboratory testing:

Sampled Media	**Sample Quantities**
Surface Soils	12
Test Pit Soils	8
Soil Boring Soils	15
Groundwater	4 (x 2 sampling events)

Samples were submitted for analysis of a combination of the following parameters:

- USEPA TCL VOCs
- USEPA TCL SVOCs
- PCBs
- Pesticides
- TAL Metals
- Total Cyanide

Additional Surface Soil Sampling

In November 2018 additional surface soil sampling was completed to determine the need for a cover system in the area to be classified for commercial use. Four composite samples were collected from the 0-2 inch interval and four composite samples were collected from the 2-12 inch interval. Each composite sample consisted of 3 discrete grab samples and was analyzes for the full suite of contaminants minus VOCs. In addition, 4 discrete grab samples were collected from the 0-2 inch interval and analyzed for VOCs. Figures and tables detailing the November 2018 Sampling are included in Appendix 1.

In addition to the soil and groundwater sampling described above, approximately 200 cubic yards of topsoil was removed from the footprint of the former Breneman building and was staged on and covered with 6-mil polyethylene sheeting on property located adjacent to the Site to the east, across East First Street/State Route 481. Subsequent to removal of the topsoil, the material located above the former building slabs was removed and placed in the southern portion of the Site in the location of the planned future parking lot.

Based on the work completed it was determined that the predominant contaminants of concern include petroleum related volatile and semi-volatile organic compounds (VOCs and SVOCs) in soil and groundwater and metals, SVOCs and PCBs in Site soil and historical fill material.

Based on the results of the RI the following conclusions were made:

1. Petroleum related soil and groundwater impacts at the Site have been delineated. Areas of petroleum contamination remaining above 6 NYCRR Part 375-6.8 Soil Cleanup Objectives (SCOs) are depicted on Figure 3.
2. Soil and fill material from the footprint of the former Breneman building containing metals, SVOCs and PCBs at concentrations above Part 375-6.8 SCOs have been relocated to the southern portion of the Site. In addition, soil containing metals, SVOCs and PCBs at concentrations above Part 375-6.8 SCOs are present in surface and subsurface soils across the Site. The location of soil samples exceeding Part 375-6.8 SCOs are depicted on Figure 3.
3. Groundwater at the Site is impacted by VOCs at concentrations above Part 703 groundwater standards. The groundwater flow at the Site is to the west, towards the Oswego River. While the results of on-Site sampling indicate groundwater contamination may be moving off-Site, off Site sampling is necessary to confirm and extent. The location of groundwater samples containing VOCs above Part 703 groundwater standards are depicted on Figure 4.
4. Based on the data collected during the RI, a potential completed on-Site exposure pathway exists in the event that construction/utility workers were to be exposed to remaining contaminants during intrusive site work.

Areas of Concern

The cumulative investigative work performed during the pre-BCP investigations and RI have identified two (2) areas of concern remaining at the Site that warrant further consideration (e.g., on-site management, monitoring, and/or active remediation). The data discussed below is included in the RI Report, submitted under separate cover. Areas of Concern (AOCs) are depicted on Figure 5. The nature and extent of impacts for these areas are summarized below:

AOC #1: Metals, SVOCs and PCBs in Soil and Historical Fill Material

Based on laboratory analysis, metals, SVOCs and PCBs are present in soil and fill material relocated from the footprint of the former Breneman building to the southern portion of the Site at concentrations exceeding Part 375-6.8(b) Restricted Commercial Use SCOs. These compounds are present in surface and subsurface soils site wide as well.

AOC #2: Petroleum Impacts in Soil and Groundwater

Based on the results of laboratory analysis of soil and groundwater samples collected during the RI, VOCs and SVOCs are present at the Site at concentrations exceeding Part 375-6.8(b) Restricted Commercial Use SCOs and Part 703 groundwater standards.

3.0 OBJECTIVE

The objective of this RAA & RWP is to evaluate remedial alternatives to address the AOCs presented above and select remedial actions to be implemented. As defined in NYSDEC DER-10 (Section 4.0), remedial alternatives will be evaluated based on the following criteria:

1.) Overall Protection of Public Health and the Environment: This criterion evaluates exposure and residual risks to human health and the environment during or subsequent to implementation of the alternative.

2.) Compliance with SCGs: This criterion evaluates whether the remedial alternative will ultimately result in compliance with SCGs, to the extent practicable.

3.) Long-Term Effectiveness and Permanence: This criterion evaluates if the remedy is effective in the long-term after implementation (e.g., potential rebound). In the event that residual impacts will remain as part of the alternative, then the risks and adequacy/reliability of the controls are also evaluated.

4.) Reduction of Toxicity, Mobility, or Volume with Treatment: This criterion evaluates the reduction of contaminant toxicity, mobility or volume as a result of the remedial alternative. In addition, the reversibility of the contaminant destruction or treatment is evaluated.

5.) Short-Term Impacts and Effectiveness: This criterion evaluates if the remedial alternative protects the community, workers and the environment during implementation.

6.) Implementability: This criterion evaluates the remedial alternative based on its suitability, implementability at the specific site, and availability of services and materials that will be required.

7.) Cost: This criterion evaluates the capital, operation, maintenance, and monitoring costs for the remedial alternative. The estimated costs are presented on a present worth basis.

8.) Community Acceptance: A summary of the public participation program completed as part of the project. In addition, any public comments concerns and overall perception are addressed as part of the criteria.

    [*Note: The public participation work completed to date included public notice of the BCP Application, Remedial Investigation Work Plan (RIWP) and the Remedial Investigation Report. A public comment period was held on the BCP Application, the RIWP and the RAWP. The proposed alternative will be evaluated for community acceptance. In the event that any public comments are received, these will be addressed as Appropriate.*]

9.) Land Use: This criterion evaluates the current, intended and reasonably anticipated future land uses of the Site and its surroundings.

4.0 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCGs) established by NYSDEC and/or New York State Department of Health (NYSDOH).

Groundwater

RAOs for Public Health Protection
- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection
- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection
- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection
- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

5.0 DEVELOPMENT OF REMEDIAL ALTERNATIVES

This section develops the remedial alternatives being considered for addressing the AOCs identified for the Site.

Alternative #1 – No Action

The no action alternative is included as a procedural requirement and as a baseline to evaluate other alternatives. Under this alternative no remedial or monitoring activities would occur. No environmental easement would be recorded to run with the land including institutional or engineering controls to further manage residual contamination. This area would remain virtually as it is and change in use would not be limited except by existing land use controls such as zoning.

Alternative #2 – Unrestricted Use: BCP Cleanup Track 1

To meet the requirements of a Track 1 cleanup the following would be required for each AOC:

AOC #1: Metals, SVOCs and PCBs in Soil and Historical Fill Material

Under this alternative, soil and historical fill material relocated containing metals, SVOCs and PCBs above Unrestricted Use SCOs would be excavated and disposed off-Site. Prior to removal additional sampling would be required to better define the area(s) requiring removal, and confirmatory sampling would be performed to ensure all materials with contaminant concentrations above Unrestricted Use SCOs were removed.

AOC #2: Petroleum Impacts in Soil and Groundwater

Under this alternative, petroleum impacted soil would be excavated and disposed off-Site. A groundwater monitoring program would be implemented to monitor VOC concentrations over time to verify the effectiveness of the remedial action.

Alternative #3 – Restricted Use – Mixed Commercial & Residential: BCP Cleanup Track 4

To meet the requirements of a Track 4 cleanup the following would be required for each AOC:

AOC #1: Metals, SVOCs and PCBs in Soil and Historical Fill Material

Under this restricted use alternative the site will be divided into a commercial use section and a restricted residential use section. The soil and historical fill material containing metals, SVOCs and PCBs in the restricted residential area would be addressed with a cover system consisting of asphalt pavement, concrete or a minimum 2 foot thick layer of clean imported material. The soil and historical fill material containing metals, SVOCs and PCBs in the commercial area requiring cover would be addressed with a cover system consisting of a minimum 1 foot thick layer of clean imported material. Portions of the commercial use area where soil in the top foot does not exceed commercial use SCOs based on the November 2018 sampling do not require construction of a cover system since a clean soil cover is already present. In addition, institutional controls (e.g., an Environmental Easement) would be implemented and a Site Management Plan (SMP) would be developed to protect against exposure and control Site use.

AOC #2: Petroleum Impacts in Soil and Groundwater

Under this restricted use alternative in-situ chemical oxidation would be utilized to treat petroleum impacts in soil and groundwater. A chemical oxidant would be injected through via a direct push drill rig and high pressure injection pump to chemically destroy contaminants and stimulate biological degradation of residual contaminants. In addition, the oxidant evaluated contains oxygen which is released over time, thereby enhancing bioremediation of residual petroleum compounds subsequent to injection. A network of injection wells would be installed to facilitate additional injections in the future if needed. A groundwater monitoring program would be implemented to monitor VOC concentrations over time to verify the effectiveness of the treatment determine the need for additional injections.

6.0 DETAILED EVALUATION OF ALTERNATIVES

Alternative #1 – No Action

Description

Under this alternative the soil and historical fill material in AOC #1 and petroleum impacted soil in AOC #2 would remain as is and future Site use and development would not be limited. In addition, remedial and monitoring activities as well as placement of institutional controls at the Site would not be implemented.

Assessment

This alternative may not be protective of human health or the environment. Soil samples collected from AOCs #1 and 3 were found to exceed NYSDEC Part 375 Soil Cleanup Objectives and in the event that this area is disturbed in the future with no action, there is a potential for human exposure to the impacts and potentially the environment.

With the exception of possible natural attenuation of petroleum constituents, this alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with chemical-specific SCGs.

There would be no increased short-term risks associated with the no action alternative since remedial activities are not implemented and there does not appear to be a current exposure pathway with these impacts; however, this alternative may not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date it is anticipated that this alternative would not be acceptable to the community.

Of the alternatives being considered, the no action alternative is not effective for the long-term and does not reduce toxicity, mobility, or volume of contaminants. The estimated cost for this alternative is summarized below:

Estimated Cost of No Action.. $0

Alternative #2 – Unrestricted Use: BCP Cleanup Track 1

Description

Under this alternative, soil and historical fill material containing metals, SVOCs and PCBs above Unrestricted Use SCOs in AOC#1 and petroleum impacted soil above Unrestricted Use SCOs in AOC #3 would be excavated and disposed off-Site.

Based on RI data approximately 5,000 cubic yards (CY) of soil and fill material moved to the southern portion of the Site would be removed. . An additional approximately 1,000 CY of soil from various locations across the site would be removed as well [Note: The actual quantity of soil requiring removal would be determined based on additional sampling required to fully delineate impacts]. Approximately 1,500 CY of petroleum impacted soil would be removed from AOC #3. Subsequent to collection of confirmatory soil samples the excavation(s) would be backfilled.

Subsequent to completion of soil removal a groundwater monitoring program would be implemented to monitor VOC concentrations over time to verify the effectiveness of the remedial action.

Assessment

This alternative should be protective of human health and the environment. Soil and fill material with contaminant concentrations above unrestricted use SCOs on-site would be removed. Contaminated soil would be transferred to a landfill or other disposal facility and would not undergo treatment to destroy the contaminants.

This alternative would result in the reduction of the toxicity, mobility, and volume of contaminants in the soil. Therefore, the area of soil removal would be in compliance with chemical-specific SCGs.

This alternative would increase short-term risks for the workers implementing the alternative. However, this alternative would be effective in the long-term. The short-term risks to workers would be reduced through controls such a Health and Safety Plan and short-term risks to the environment and surrounding community would be controlled through erosion controls, dust controls and air monitoring. The soil removal and disposal alternative would be a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

Implementability of this alternative – This alternative would be costly and difficult to implement. Significant benching and material removal on the southwestern portion of the Site would be required to access petroleum contaminated soil.

The cost for this alternative is summarized below:

Estimated Cost of Unrestricted Use: BCP Track 1 Cleanup $1,000,750

Alternative #3 – Restricted Use – Mixed Commercial & Residential: BCP Cleanup Track 4

Description

Under this restricted use alternative the site will be divided into a commercial use section and a restricted residential use section. The soil and historical fill material containing metals, SVOCs and PCBs in the restricted residential area would be addressed with a cover system consisting of asphalt pavement, concrete or a minimum 2 foot thick layer of clean imported material. The soil and historical fill material containing metals, SVOCs and PCBs in the commercial area requiring cover would be addressed with a cover system consisting of a minimum 1 foot thick layer of clean imported material. Portions of the commercial use area where soil in the top foot does not exceed commercial use SCOs based on the November 2018 sampling do not require construction of a cover system since a clean soil cover is already present

In-situ chemical oxidation would be utilized to treat petroleum impacts in soil and groundwater. A chemical oxidant would be injected through via a direct push drill rig and high pressure injection pump to chemically destroy contaminants and stimulate biological degradation of residual contaminants. A network of injection wells would be installed to facilitate additional injections in the future if needed. A groundwater monitoring program would be implemented to monitor VOC concentrations over time to verify the effectiveness of the treatment determine the need for additional injections.

Institutional controls (e.g., an Environmental Easement) would be implemented and a Site Management Plan (SMP) would be developed to protect against exposure and control Site use.
Assessment

This alternative should be protective of human health and the environment. Fill material and soils in AOC #1 with contaminant concentrations above Restricted Commercial or Restricted Residential Use SCOs on-site would be managed with a cover system of a thickness appropriate to their use (i.e., 2 feet for Restricted Residential Areas, 1 foot for Restricted Commercial Areas). Concentrations of petroleum impacts in soil in AOC #2 would be reduced through in-situ chemical oxidation and residual impacts would continue to reduce over time by enhancement of biological processes.

This alternative would not result in the reduction of the toxicity and volume of contaminants in the soil and fill material in AOC #1. However, the mobility of the contamination under the cover system would be reduced due to the reduction in erosion, and human exposure would be limited. This alternative would result in the reduction of the toxicity and volume of contaminants in the soil in AOC #2. However, contaminants would likely remain at concentrations above SCGs for some time.

This alternative would increase short-term risks for the workers implementing the alternative. However, this alternative would be effective in the long-term. The short-term risks to workers would be reduced through controls such a Health and Safety Plan and short-term risks to the environment and surrounding community would be controlled through erosion controls, dust controls and air monitoring. With installation of a cover system and treatment of soils in AOC#2 this is a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

Implementability of this alternative – Installation of the covers system is relatively straight forward and is likely to be anticipated under any site development plan meeting the criteria for commercial or restricted residential use. The presence of the network of injection wells would ensure that additional injections could be performed in the future should groundwater monitoring determine it is necessary.

The cost for this alternative is summarized below:

Estimated Cost of Mixed Restricted Commercial & Restricted Residential Use:
BCP Track 4 Cleanup $378,250

7.0 COMPARATIVE EVALUATION OF ALTERNATIVES AND RECOMMENDED ACTIONS

This section of the report compares the remedial alternatives proposed and presents the recommended action. Alternative #1 would not comply with SCGs, and as such does not satisfy one of the threshold criteria and therefore will not be evaluated any further.

Evaluation Criteria	Alternative #2 – Unrestricted Use: BCP Cleanup Track 1	Alternative #3: Mixed Restricted Commercial & Restricted Residential Use: BCP Cleanup Track 4
Overall Protection of Public Health & The Environment	This alternative will be protective of human health and the environment.	This alternative will be protective of human health and the environment.
Compliance with	This alternative will be in	This alternative will be in compliance

SCGs	compliance with SCGs.	with SCGs.
Long-Term Effectiveness and Permanence	This alternative will be effective in the long term and will be a permanent remedy.	This alternative will be effective in the long term and will be a permanent remedy.
Reduction of Toxicity, Mobility, or Volume	This alternative will result in the reduction of toxicity, mobility and volume of contaminants in soil.	This alternative will result in the reduction of toxicity and volume of contaminants in soil.
Short-Term Impacts and Effectiveness	This alternative will increase short-term risks for workers implementing the remedy. These risks can be mitigated through implementing a HASP, dust controls and CAMP. In comparison to Alternative #3, this alternative would have a much greater short-term impact on the community due to significant truck traffic associated with material relocation/waste transport.	This alternative will increase short-term risks for workers implementing the remedy. These risks can be mitigated through implementing a HASP, dust controls and CAMP. Compared to Alternative #2, this alternative will result is significantly lower impact to the surrounding community.
Implementability	This alternative, while technically feasible, is costly and difficult to implement. Significant benching and material removal/relocation would be required to access petroleum impacted soil on the southwestern portion of the Site.	The cover system is relatively straightforward and is anticipated by any commercial or restricted residential use development scenario.
Cost	This alternative requires significantly higher upfront and overall costs to implement than Alternative #3. Long term monitoring costs are lower with this alternative.	This alternative has lower upfront and overall costs than Alternative #2 while still meeting the goals of compliance with SCGs, effectiveness and permanence. Long term monitoring costs would be higher with this alternative.
Community Acceptance	This alternative will likely be acceptable to the community.	This alternative will likely be acceptable to the community.
Land Use	This alternative is consistent with the current, intended and reasonably anticipated future land use of the Site.	This alternative is consistent with the current, intended and reasonably anticipated future land use of the Site.

Based on the above comparison of the Alternatives, the recommended remedial action is Alternative #3 – Mixed Restricted Commercial & Restricted Residential Use: BCP Cleanup Track 4.

8.0 SUMMARY OF RECOMMENDED FINAL REMEDIAL ACTIONS

Based on the above recommendations, this section summarizes the overall final remedial strategy for the Site.

The estimated cost to complete the work are shown below.

Area of Concern	Recommended Action	Estimated Cost
AOC #1 (Soil and fill material impacted with SVOCs, metals and PCBs)	Installation of cover system ,	$37,250
AOC #2 (Petroleum impacted soil and groundwater)	In-Situ Chemical Oxidation, Follow-up Evaluation Groundwater Monitoring	$71,500
Site wide requirements for completion of BCP, including contingencies	FER, SMP, Environmental Easement	$124,750
Annual Site Management Costs (present worth calculated over 30 years at 5% interest)	Annual Inspections & Certifications, Periodic Review Reports	$145,000
	Total	**$378,750**

9.0 REMEDIAL ACTION WORK PLAN

This section presents the Remedial Action Work Plan (RAWP) for the recommended actions for the Site. This RAWP has been developed in accordance with Brownfield Cleanup Program Guide dated May 2004 and NYSDEC DER-10 dated May 2010.

9.1 Installation of Cover System

Based on sampling in November 2018, a cover system exists over a portion of the Commercial Use area. Additional cover will be installed over the area where commercial use SCOs are exceeded within the top foot of soil to address the soil and fill material impacted with SVOCs, metals and PCBs in AOC #1. Prior to installation of new cover a demarcation layer will be placed.

In the Restricted Residential portion of the Site the cover system will consist of asphalt pavement, sidewalks, concrete aprons or retaining walls. Areas not covered by impervious surfaces (e.g., landscape areas) will be covered with a minimum two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use, with the upper six inches of the soil of sufficient quality to maintain a vegetative cover.

Based on the results of the soil sampling performed in November 2018 (See Appendix 1), portions of the commercial use area meet NYSDEC Part 375 Commercial Use SCOs and as such will not require cover. The area requiring cover will be covered with a minimum one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use.

Locations of cover systems are depicted on Figure 6. The extent of the area requiring a cover system in the commercial use area will be confirmed by collecting samples along the northerly and southerly edge of the area. Samples will be collected from three locations along each edge from 0-2 inches below grad and from 2-12 inches below grade for each location. Samples will be analyzed for target analyte list (TAL) metals and total cyanide. Samples will be accompanied by one blind duplicate and one matrix spike/matrix spike duplicate pair. Laboratory deliverables will be Category B deliverables. Sampling will be performed in accordance with the Quality Assurance Project Plan (QAPP) attached in Appendix 6.

For each source of backfill (for the cover system or for general fill material) that is imported to the Site, laboratory analysis will be completed at a frequency in accordance with Table 5.4(e)10 of DER-10.

Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	VOCs	SVOCs, Metals, PCBs, Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

The results for each new source of fill will meet the values provided in Appendix 5 of DER-10 for the applicable use based on the area in which the soil will be utilized (restricted residential or commercial) and will receive approval by the NYSDEC. A copy of Allowable Constituent Levels for Imported Fill or Soil is attached in Appendix 2 of this RAA &RAWP. Crushed stone meeting the criteria set forth in Section 5.4(e)5.i. of DER-10 will not require laboratory testing. Documentation of the backfill source must be provided prior to approval by the Department, and proof that each load of imparted material originated from an approved source will be included in the Final Engineering Report (FER).

9.2 In-Situ Chemical Oxidation

9.2.1 Chemical Injection

The In-Situ Chemical Oxidation (ISCO) process includes the injection of a chemical oxidant into the subsurface to chemically oxidize contaminants of concern and enhance degradation. LaBella provided preliminary Site data to PeroxyChem, a manufacturer of ISCO remediation products, to evaluate suitable products based on considerations of effectiveness (i.e., track record) and cost. After reviewing the information Klozur® CR, a high pH activated persulfate product, appears to be a viable ISCO product for the Site. This product also includes a time-release calcium peroxide compound which releases oxygen over time to facilitate microbial degradation of residual petroleum compounds.

Based on available Site data the manufacturer has recommended that a total of 6,500 lbs of Klozur® CR be mixed into a slurry and injected at the Site. Based on Site soil conditions a total of approximately 16 injection locations appear necessary at a spacing of approximately 10 ft. The proposed injection locations are depicted on Figure 6. The injection will consist of the following:

1. An approximately 20% (by volume) slurry will be mixed by adding approximately 400 lbs of Klozur® CR with approximately 190 gallons of water (+/- 215 gallons total slurry) at each location.
2. A direct push drill rig (i.e., Geoprobe) and pump will be utilized to inject the slurry into the subsurface at each location.
3. Each injection point will be backfilled with a 5% bentonite grout through a tremmie pipe or the direct injection tooling.
4. Subsequent to completion of the injection the injection tooling will be decontaminated by steam cleaning or mechanical (i.e., brush) cleaning. A decontamination pad will be

constructed in conjunction with the injection work and all wash fluids will be collected, containerize and properly disposed.

A copy of the PeroxyChem calculation sheet and MSDS for Klozur® CR are included in Appendix 3.

Klozur® CR is provided as a powder in 45 pound pails or 1,800 supersacks. The powder is mixed with water to a concentration of approximately 20%. Approximately 2,500 gallons of water are estimated to be required to achieve the 20% slurry. Containers of Klozur® CR and the batch tank used for mixing will be kept in a secondary containment berm located outside the floodplain and capable of holding at least 110% the volume of the containers and batch tank.

9.2.2 Installation of Injection Wells

Six injection wells will be installed in AOC #2 as detailed on Figure 7 to facilitate additional injections should groundwater monitoring determine it to be necessary. The injection wells will be installed via direct push. Each injection well will be constructed of one (1) inch Sch 40 PVC with 0.020 inch machine slotted screens and an appropriate length of riser. Each injection well will be equipped with a cam and groove fitting to facilitate injection under pressure if needed. The screened section of each well will be placed at a depth such that it covers the entire thickness of the zone of petroleum impacts. A quartz sand pack will be placed around the screen section of each well followed by a two foot bentonite seal. The remainder of the annulus will be grouted to the surface. Each injection well will be completed at the surface at the time of Site construction with a flush mount or stickup protective casing.

Subsequent to installation of the injection wells a soil boring log and well construction log will be prepared for each well which will be included in the FER.

9.2.3 Regulatory Requirements for Injection

In order to comply with the USEPA's underground injection control (UIC) program, a letter of notification and an injection well inventory form will be submitted to the USEPA's UIC division at least 30-days prior to injection. The NYSDEC will be copied on the notification letter.

9.3 Health and Safety Plan and Community Air Monitoring Plan

The remedial work will be conducted under the existing Site specific Health and Safety Plan (HASP) for the Site, which was implemented as part of the RI work. In addition, the Site specific Community Air Monitoring Plan (CAMP) will also be implemented during all remedial work at the Site.

In addition to the typical safety activities outlined in the HASP and CAMP, due to the potential hazards associated with the transport, storage and usage of pursulfate, the following additional safety activities will be completed prior to and during injection.

- The chemical mixing and storage area will be located outside the floodplain as indicated on Figure 7. The batch tank utilized to mix the slurry may be moved as necessary during injection.
- The secondary containment berm in which the Klozur® CR will be held will be able to hold a volume at least 110% of the volume of the largest container. The berm anticipated to be used at the Site will be a Spillguard™ Portable Containment Berm. This Spillguard is a one-piece, heat-welded berm with permanently attached support legs and reinforced seams. The material used to construct the berm is a heavy duty 35-mil polyurethane coated fabric. The berm material is chemically resistant to the persulfate slurry. A sump will be constructed within the berm to pool stormwater which may

accumulate in the berm. Any significant stormwater which accumulates in the sump will be pumped to the batch tank. The secondary containment berm will be inspected at least once daily.

- Containers of Klozur® CR will be secured in a locked container (e.g., a small intermodal container) when not in use.
- Field personnel actively involved with the dilution and/or injection of the treatment chemical will be required to wear personal protective equipment (PPE) including chemical-resistant suits, gloves and boots and face shields. All other field personnel are required to wear at least Class D PPE.
- In the event of an flood or imminent flood work will be halted and the chemical storage and mixing area will be moved to level ground on the eastern portion of the Site.
- Additional safety information obtained from PeroxyChem can be found in Appendix 3.

9.4 Evaluation of Effectiveness of Injection Program

9.4.1 Direct Push Soil Borings

Approximately (thirty) days after completion of the injection, a direct push soil sampling program will be implemented to evaluate the effectiveness of the injection program. Approximately six (6) soil borings will be advanced. At each boring location, overburden soils will be collected using Macrocore samplers from the ground surface to equipment refusal (i.e., assumed bedrock). Soil will be screened in the field for visible impairment, olfactory indications of impairment, evidence of NAPLs, and/or indication of detectable VOCs with a PID collectively referred to as "evidence of impairment." Field screening (visual & olfactory observation, PID readings, etc.) will be recorded on a soil-boring log and will be included in the FER. Soil samples will be collected and submitted to a laboratory for analysis of Target Compound List (TCL) VOCs and SVOCs.

9.4.2 Overburden Monitoring Well Installation

In conjunction with the direct push soil borings described above, approximately three (3) overburden monitoring wells will be installed in select boreholes to supplement the existing monitoring well network. Each well will be constructed with 5 to 10-ft. of 2-in. Schedule 40 0.010-slot well screen connected to an appropriate length of 2-in. schedule 40 PVC well riser to complete the well. The annulus around the screen section will be sand packed with quartz sand to approximately 1 to 2-feet above the screen section. The remaining annulus will be bentonite sealed to approximately 1 to 2-feet below ground surface. Each well will be completed with a flush mount or stickup protective casing at the surface.

9.4.3 Development of Overburden Groundwater Monitoring Wells

Well development will be performed using dedicated bailers and/or pumping equipment (depending on volumes), and will continue until groundwater turbidity reaches 50 National Turbidity Units (NTUs), or lower. In the event that 50 NTUs is not reached after removing a reasonable number of well volumes (10), the NYSDEC will be contacted to request ceasing development. If dedicated equipment is not used, then the equipment will be decontaminated between each well (alconox wash with potable water rinse). If the NYSDEC Project Manager agrees that removal of this volume of water is impractical, then LaBella will work with NYSDEC to develop an alternate well development protocol.

9.4.4 Groundwater Sampling

Groundwater samples will be collected on a quarterly basis from the newly installed wells and existing wells MW-2 and MW-3. Low flow sampling of the monitoring wells will occur in order to minimize groundwater drawdown and to obtain a representative sample of groundwater conditions. In order to accomplish this task, the following steps will be taken:

1. The following low flow equipment will be utilized to conduct low flow groundwater sampling. This equipment includes:
   - QED Sample Pro Bladder Pump
   - Horiba U-22 Water Quality Monitoring System
   - Air Compressor
   - QED MP10 Low Flow Controller
   - ~200' of ¼" Polyethylene Tubing

2. Low flow purging of the monitoring wells will include collection of water quality indicator parameters. Water quality indicator parameters will be recorded at five (5)-minute intervals during the purging of the well. These water quality indicator parameters will include:
   - Water Level Drawdown
   - Temperature
   - pH
   - Dissolved Oxygen
   - Specific Conductance
   - Oxidation Reduction Potential
   - Turbidity

3. Groundwater sampling will commence once the groundwater quality indicator parameters have stabilized for at least three (3) consecutive readings for the following parameters:
   - Water Level Drawdown <0.3'
   - Temperature - +/- 3%
   - pH - +/- 0.1unit
   - Dissolved Oxygen - +/-10%
   - Specific Conductance - +/-3%
   - Oxidation Reduction Potential - +/-10 millivolts
   - Turbidity - +/-10% for values greater than 1 NTU

4. Each overburden monitoring well will be sampled for TCL list VOCs and SVOCs. The wells will also be sampled for 1,4-dioxane and per-and polyfluoroalkyl substances (PFAS).

9.4.5 Quality Assurance/Quality Control

Activities completed at the Site will be managed under LaBella's Quality Control Program, which is included in Appendix 4. Laboratory QA/QC sampling will include analysis of sample blanks as follows: one trip blank and one routine field blank for each sampling methodology (e.g., soil borings, test pits, etc.) and matrix type (i.e., soil and groundwater). The blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater. Additionally, one (1) Matrix Spike/Matrix Spike Duplicate (MS/MSD) and one (1) duplicate sample will be collected and analyzed for each twenty samples collected for each parameter group, or one per shipment, whichever is greater. Duplicate samples will be submitted to the laboratory as blind duplicates. The MS/MSD and duplicate samples will be analyzed for the same parameters as that of the field samples. The samples will be delivered under Chain of Custody procedures to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. The laboratory will provide a NYSDEC Analytical Services Protocol (ASP) Category B Deliverables data package for all samples. A DUSR will be completed for all ASP-B and ASP-B format laboratory data packages per DER-10. The DUSRs will include the laboratory data summary pages showing corrections made by the data validator and each page will be initialed by the data validator. The laboratory data summary pages will be included even if no changes were made.

A copy of the Quality Assurance Project Plan is attached in Appendix 6.

9.5 Erosion and Sedimentation Control

Prior to any intrusive Site work, silt fence will be installed along the downgradient perimeter of the Site. The Silt fence will be inspected on a weekly basis. All necessary repairs will be made immediately. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Any surfaces not covered with pavement, buildings or retaining walls will be stabilized by establishing a vegetative cover or other appropriate measures upon completion of Site work.

9.6 Site Survey

Upon completion of the remedial work the limits of the remediation implementation will be surveyed, including all existing and newly installed groundwater monitoring wells and injection wells. A copy of the survey will be included in the FER.

9.7 Contingency Plan

In the event that grossly contaminated material is encountered during Site work, the material will be removed and staged on/covered with polyethylene sheeting pending waste characterization and disposal. The polyethylene cover will be anchored or weighted at the edges to prevent storm water and wind borne erosion. Similarly, if a UST is discovered the tank will be removed in accordance with all applicable NYSDEC regulations for closure of chemical or petroleum bulk storage tanks.

In the event that post remedial sampling indicates that he injection program has not been effective at reducing contaminant concentrations at the Site, other remedial measures (e.g., excavation) will be evaluated.

9.8 Final Engineering Report

A Final Engineering Report (FER) documenting the active remedial work conducted will be developed in accordance with 6 NYCRR Part 375 and DER-10 and submitted to NYSDEC subsequent to completing the remedial actions. The FER will be included as an Appendix the SMP for managing the Site (see below).

The following items must be included in the FER:

- Professional Engineer certification pursuant to Table 1.5 of DER-10;
- A description of the remedy, as constructed, pursuant to the NYSDEC issued decision document;
- A summary of all remedial actions completed which includes:

  - A description of any problems encountered during construction and a description of their resolution;
  - A description of changes to the RAWP, if applicable;
  - Quantities and concentrations of contaminants removed or treated;
  - A listing of the waste streams, quantity of materials disposed and disposal facility;
  - Data summarizing the ISCO program, including volume/weight of oxidant used, volume of water used and volume of slurry injected into each point;
  - Boundaries of the real property subject to the environmental easement or deed restriction or other institutional control; and
  - Restoration activities.
- A list of the remedial action objectives applied to the remedial action;
- Tables and figures containing all pre and post-remedial data keyed appropriately so that completion of the remedial action and remaining contamination is documented;
- All laboratory data packages and Category B data deliverables (electronic only) for any samples collected as part of the remedial actions;
- CAMP data (electronic only);
- Daily inspection reports (electronic only);
- A detailed description of the applicable areas of remedial action compliance;
- "As-built" drawings bearing a NYS professional engineer's stamp and signature on each drawing, which include:
  - Any permanent structures including caps, slurry walls, treatment units, piping and instrumentation diagrams or other remedial structures which will remain in place after completion of the remedial action;
  - All soil removals, indicating the surveyed limits of the excavation and location of all final documentation samples;
  - All underground storage tank removals;
  - Any permanent survey markers for horizontal and vertical control needed for site management, shown on a Site survey prepared by a NYS licensed land surveyor;
- Identification of the applicable institutional controls employed along with a copy of the environmental easement or other applicable institutional control;

9.9 Long Term Groundwater Monitoring

Groundwater samples will be collected from the on-Site monitoring wells to monitor the effectiveness of the remedial action. It is anticipated that groundwater samples will be collected quarterly for a period of approximately two (2) years and annually for a period of approximately three (3) years after that. At this time it is not anticipated that sampling for 1,4-dioxane and PFAS will be performed as part of long term groundwater monitoring.

Samples will be collected using low flow sampling techniques. Subsequent to receipt of validated data a groundwater monitoring report will be prepared summarizing all sampling activities and submitted to NYSDEC.

9.10 Site Management Plan/Institutional Controls

9.10.1 Site Management Plan

A Site Management Plan (SMP) will be prepared to manage remaining contamination at the Site. The SMP will include the following:

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

  - Institutional Controls: An Environmental Easement.
  - Engineering Controls: The soil cover system.

- An Excavation Work Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- Provisions for the management and inspection of the identified engineering controls;
- Maintaining site access controls and Department notification;
- The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;
- A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
  - Monitoring of groundwater to assess the performance and effectiveness of the remedy;
  - A schedule of monitoring and frequency of submittals to the Department; and
  - Monitoring for vapor intrusion for any developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

9.10.2 Institutional Controls

Imposition of an institutional control in the form of an environmental easement will be required for the controlled property that:

- Requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- Allows the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- Requires compliance with the Department approved Site Management Plan.

10.0 SCHEDULE

The following schedule is anticipated associated with this RAWP:

Task	Target Date
Implementation of ISCO injection/injection well installation	January 14, 2018
Submission of Environmental Easement Package	February 15, 2019
Evaluation of ISCO injection/Monitoring well installation/Development	February 19, 2018
First round of post injection groundwater sampling	February 21, 2019
Draft Site Management Plan submitted	April 1, 2019
Placement of cover system	April 15, 2019
SMP Approval	May 15, 2019
Submission of Draft Final Engineering Report	May 15, 2019
Second round of post injection groundwater sampling	May 20, 2019
Environmental Easement executed	June 1, 2019
Submission of electronic data in EQuIS format	June 15, 2019
Environmental Easement recorded and notices provided	June 15, 2019
Final Engineering Report submitted in final form	June 15, 2019

This schedule is dependent on NYSDEC approvals and does not account for potential delays due to public comments, weather conditions, etc.

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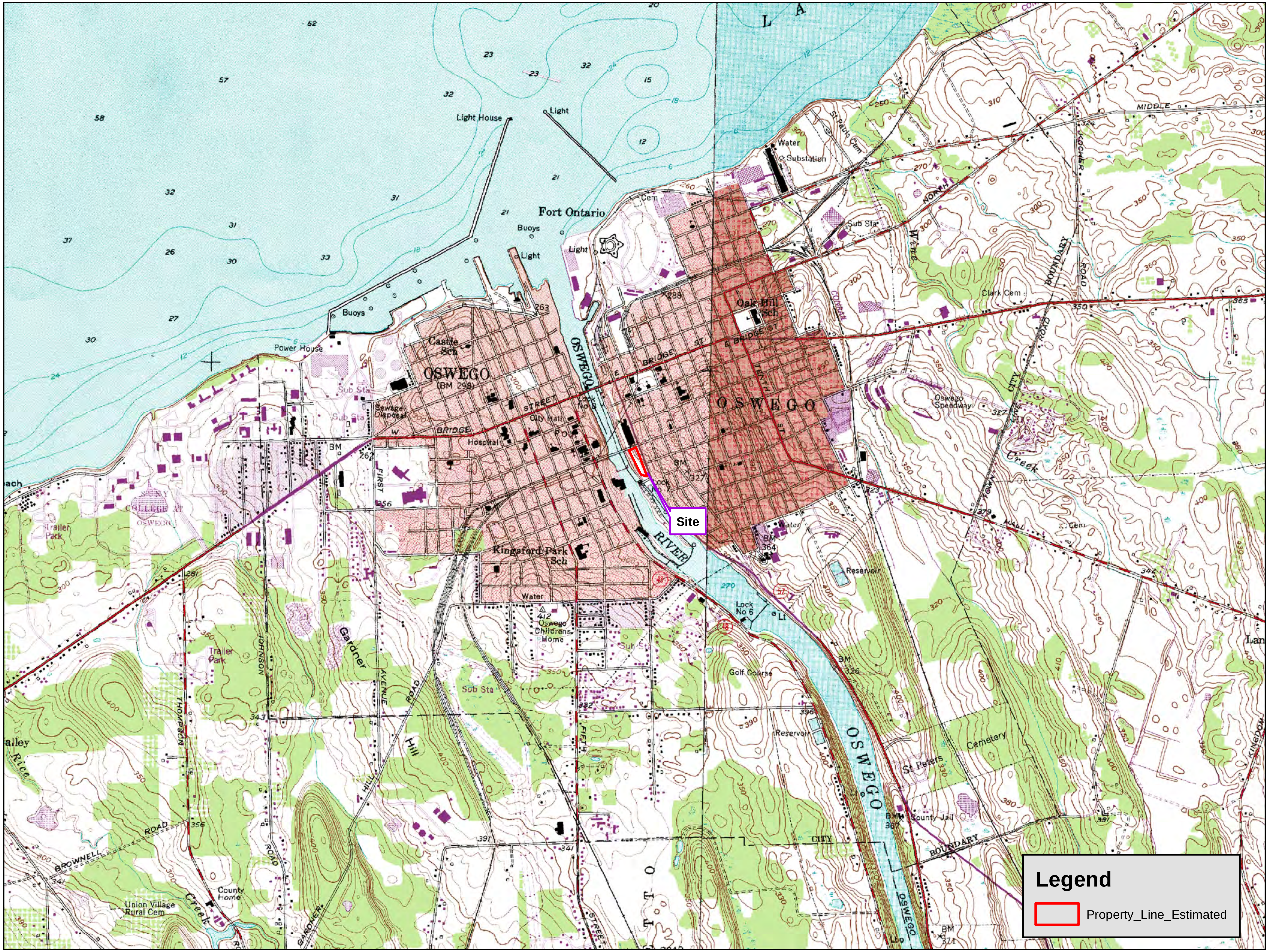
FIGURES



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1 inch = 2,000 feet

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CLIENT:

CANALVIEW
DEVELOPMENT, LLC

PROJECT:

REMEDIAL ALTERNATIVES
ANALYSIS / REMEDIAL
ACTION WORK PLAN
FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

DRAWING NAME:

SITE LOCATION MAP

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2190490

FIGURE 1

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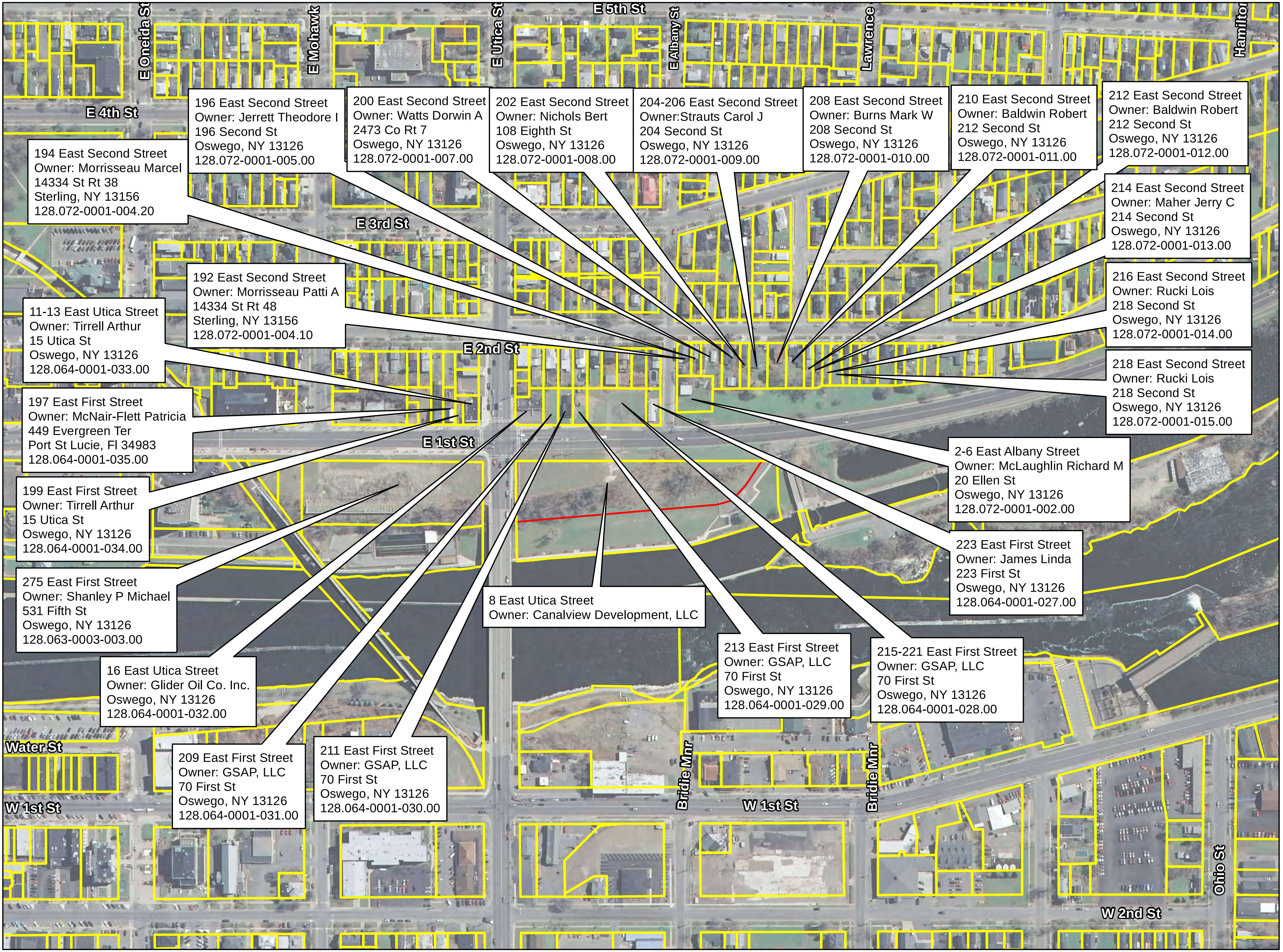

194 East Second Street
Owner: Morrisseau Marcel
14334 St Rt 38
Sterling, NY 13156
128.072-0001-004.20

196 East Second Street
Owner: Jerrett Theodore I
196 Second St
Oswego, NY 13126
128.072-0001-005.00

200 East Second Street
Owner: Watts Dorwin A
2473 Co Rt 7
Oswego, NY 13126
128.072-0001-007.00

202 East Second Street
Owner: Nichols Bert
108 Eighth St
Oswego, NY 13126
128.072-0001-008.00

204-206 East Second Street
Owner:Strauts Carol J
204 Second St
Oswego, NY 13126
128.072-0001-009.00

208 East Second Street
Owner: Burns Mark W
208 Second St
Oswego, NY 13126
128.072-0001-010.00

210 East Second Street
Owner: Baldwin Robert
212 Second St
Oswego, NY 13126
128.072-0001-011.00

212 East Second Street
Owner: Baldwin Robert
212 Second St
Oswego, NY 13126
128.072-0001-012.00

214 East Second Street
Owner: Maher Jerry C
214 Second St
Oswego, NY 13126
128.072-0001-013.00

216 East Second Street
Owner: Rucki Lois
218 Second St
Oswego, NY 13126
128.072-0001-014.00

218 East Second Street
Owner: Rucki Lois
218 Second St
Oswego, NY 13126
128.072-0001-015.00

192 East Second Street
Owner: Morrisseau Patti A
14334 St Rt 48
Sterling, NY 13156
128.072-0001-004.10

11-13 East Utica Street
Owner: Tirrell Arthur
15 Utica St
Oswego, NY 13126
128.064-0001-033.00

197 East First Street
Owner: McNair-Flett Patricia
449 Evergreen Ter
Port St Lucie, Fl 34983
128.064-0001-035.00

199 East First Street
Owner: Tirrell Arthur
15 Utica St
Oswego, NY 13126
128.064-0001-034.00

275 East First Street
Owner: Shanley P Michael
531 Fifth St
Oswego, NY 13126
128.063-0003-003.00

16 East Utica Street
Owner: Glider Oil Co. Inc.
Oswego, NY 13126
128.064-0001-032.00

209 East First Street
Owner: GSAP, LLC
70 First St
Oswego, NY 13126
128.064-0001-031.00

211 East First Street
Owner: GSAP, LLC
70 First St
Oswego, NY 13126
128.064-0001-030.00

8 East Utica Street
Owner: Canalview Development, LLC

213 East First Street
Owner: GSAP, LLC
70 First St
Oswego, NY 13126
128.064-0001-029.00

215-221 East First Street
Owner: GSAP, LLC
70 First St
Oswego, NY 13126
128.064-0001-028.00

2-6 East Albany Street
Owner: McLaughlin Richard M
20 Ellen St
Oswego, NY 13126
128.072-0001-002.00

223 East First Street
Owner: James Linda
223 First St
Oswego, NY 13126
128.064-0001-027.00

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1 inch = 250 feet

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REMEDIAL ALTERNATIVES
ANALYSIS / REMEDIAL
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FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

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ADJACENT PROPERT
INFORMATION

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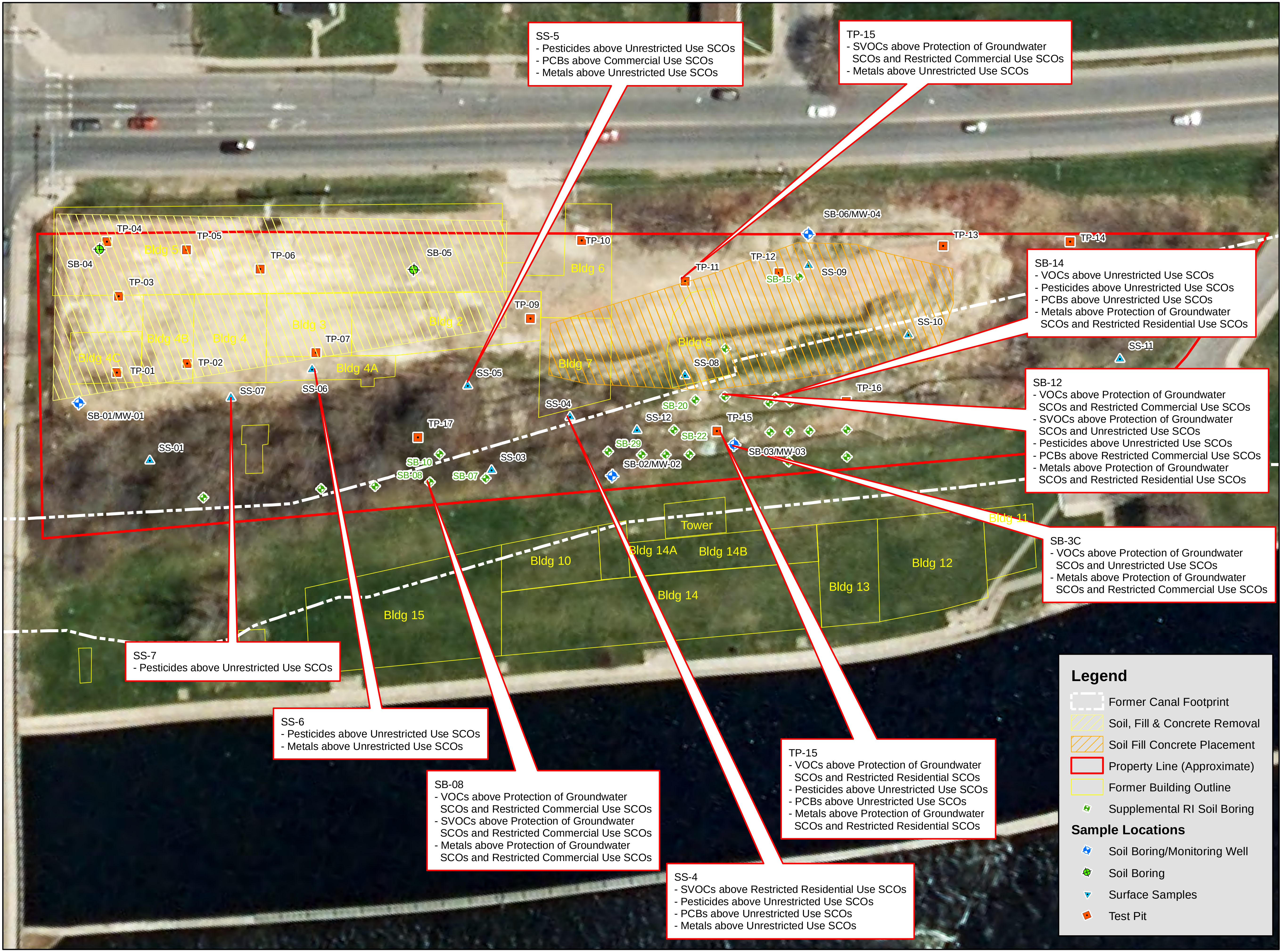
FIGURE 2



SS-5
- Pesticides above Unrestricted Use SCOs
- PCBs above Commercial Use SCOs
- Metals above Unrestricted Use SCOs

TP-15
- SVOCs above Protection of Groundwater SCOs and Restricted Commercial Use SCOs
- Metals above Unrestricted Use SCOs

SB-14
- VOCs above Unrestricted Use SCOs
- Pesticides above Unrestricted Use SCOs
- PCBs above Unrestricted Use SCOs
- Metals above Protection of Groundwater SCOs and Restricted Residential Use SCOs

SB-12
- VOCs above Protection of Groundwater SCOs and Restricted Commercial Use SCOs
- SVOCs above Protection of Groundwater SCOs and Unrestricted Use SCOs
- Pesticides above Unrestricted Use SCOs
- PCBs above Restricted Commercial Use SCOs
- Metals above Protection of Groundwater SCOs and Restricted Residential Use SCOs

SB-3C
- VOCs above Protection of Groundwater SCOs and Unrestricted Use SCOs
- Metals above Protection of Groundwater SCOs and Restricted Commercial Use SCOs

SS-7
- Pesticides above Unrestricted Use SCOs

SS-6
- Pesticides above Unrestricted Use SCOs
- Metals above Unrestricted Use SCOs

SB-08
- VOCs above Protection of Groundwater SCOs and Restricted Commercial Use SCOs
- SVOCs above Protection of Groundwater SCOs and Restricted Commercial Use SCOs
- Metals above Protection of Groundwater SCOs and Restricted Commercial Use SCOs

TP-15
- VOCs above Protection of Groundwater SCOs and Restricted Residential SCOs
- Pesticides above Unrestricted Use SCOs
- PCBs above Unrestricted Use SCOs
- Metals above Protection of Groundwater SCOs and Restricted Residential SCOs

SS-4
- SVOCs above Restricted Residential Use SCOs
- Pesticides above Unrestricted Use SCOs
- PCBs above Unrestricted Use SCOs
- Metals above Unrestricted Use SCOs

Legend

▭ Former Canal Footprint
▨ Soil, Fill & Concrete Removal
▨ Soil Fill Concrete Placement
🟥 Property Line (Approximate)
▭ Former Building Outline
● Supplemental RI Soil Boring

Sample Locations

● Soil Boring/Monitoring Well
● Soil Boring
▼ Surface Samples
■ Test Pit

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N E S W

1 inch = 50 feet

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REMEDIAL ALTERNATIVES ANALYSIS / REMEDIAL ACTION WORK PLAN
FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

DRAWING NAME:

SOIL SAMPLES EXCCEEDING PART 375-6.8 SCOS

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2190490

FIGURE 3

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MW-1
Metals above Part 703
Groundwater Standards

MW-4
VOCs and metals above Part 703
Groundwater Standards

MW-3
VOCs and metals above Part 703
Groundwater Standards

MW-2
VOCs and metals above Part 703
Groundwater Standards

Legend

🟥 Property Line (Approximate)

Sample Locations

- Soil Boring/Monitoring Well
- Soil Boring
- Surface Samples
- Test Pit
- Former Building Outline

I:\Canalview Development, LLC\2190490 - 8 E Utica St - Remedial Actions\Drawings\RAA-RIWP\Fig4.mxd

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1 inch = 50 feet

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8 EAST UTICA STREET
OSWEGO, NEW YORK

DRAWING NAME:

GROUNDWATER SAMPLES
EXCEEDING PART 703
GROUNDWATER STANDARDS

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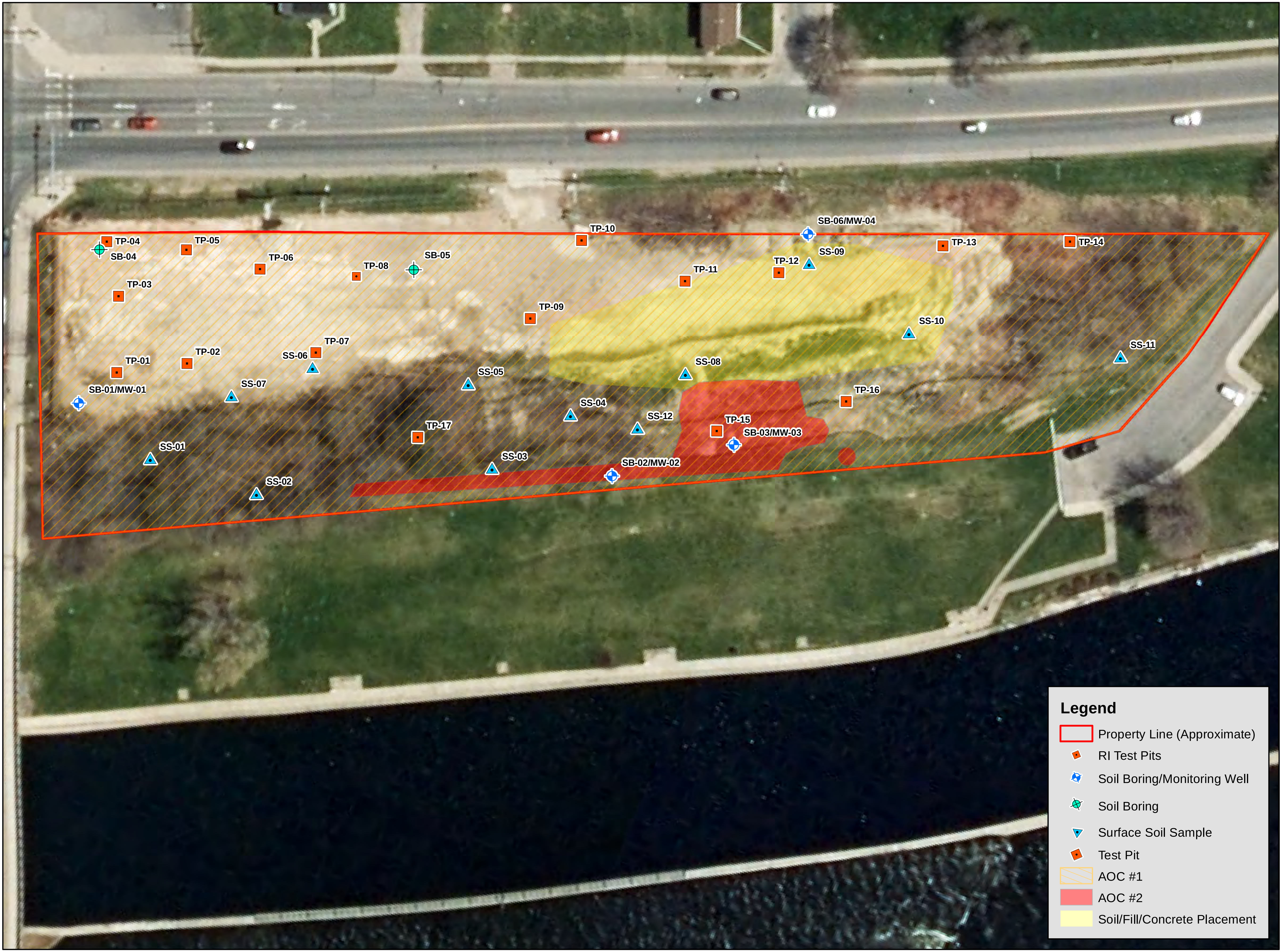
2190490

FIGURE 4



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LaBella
Powered by partnership.

N E S W

1 inch = 50 feet

INTENDED TO PRINT AS: 11" X 17"

CLIENT:

CANALVIEW DEVELOPMENT, LLC

PROJECT:

REMEDIAL ALTERNATIVES ANALYSIS / REMEDIAL ACTION WORK PLAN
FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

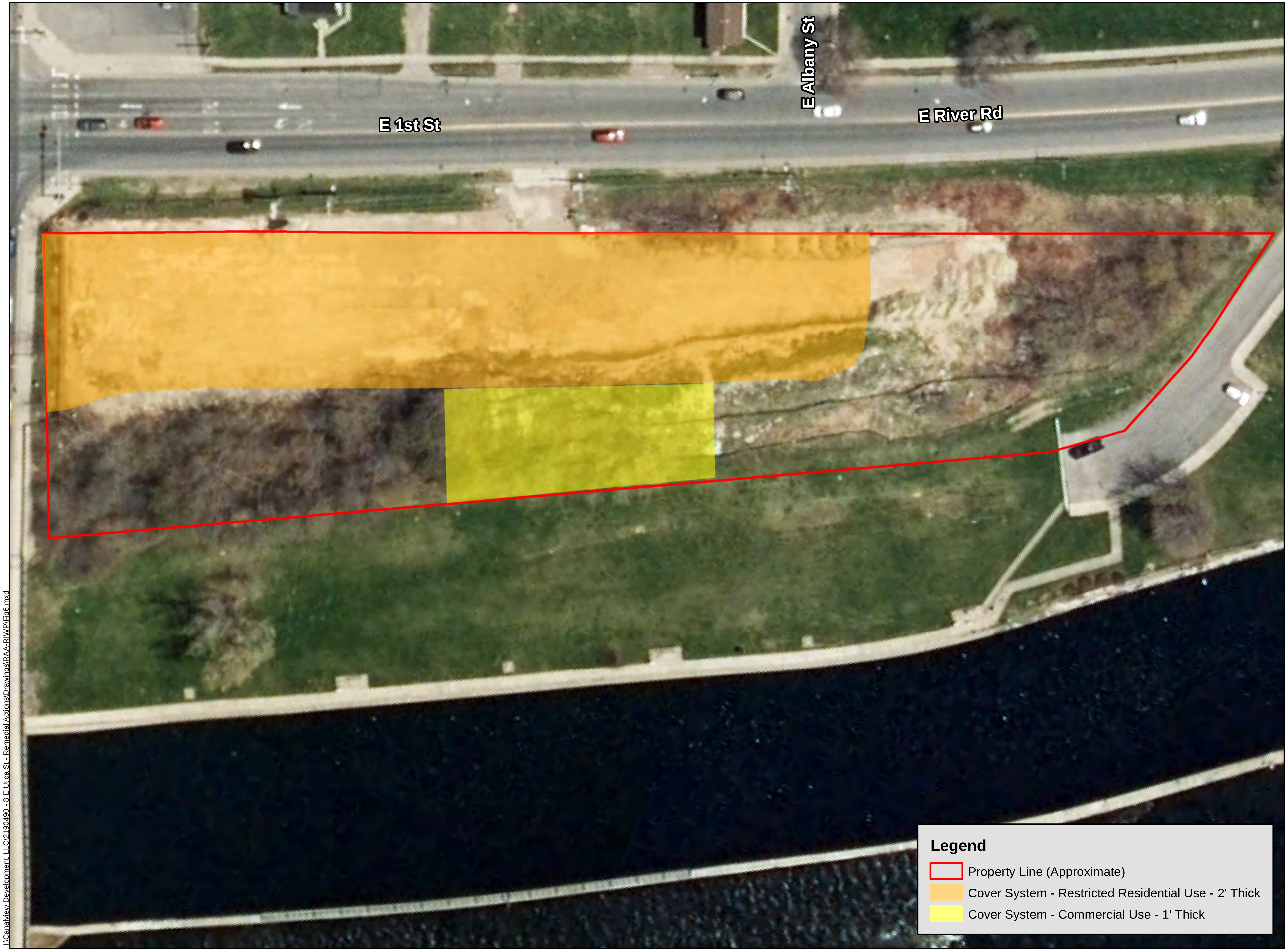
DRAWING NAME:

AREAS OF CONCERN

PROJECT #/DRAWING #/ DATE

2190490

FIGURE 5



Legend

🟥	Property Line (Approximate)
🟧	Cover System - Restricted Residential Use - 2' Thick
🟨	Cover System - Commercial Use - 1' Thick

I:\Canalview Development, LLC\2190490 - 8 E Utica St - Remedial Actions\Drawings\RAA-RIWP\Fig6.mxd

LaBella
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1 inch = 50 feet

INTENDED TO PRINT AS: 11" X 17"

CLIENT:

CANALVIEW DEVELOPMENT, LLC

PROJECT:

REMEDIAL ALTERNATIVES ANALYSIS / REMEDIAL ACTION WORK PLAN
FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

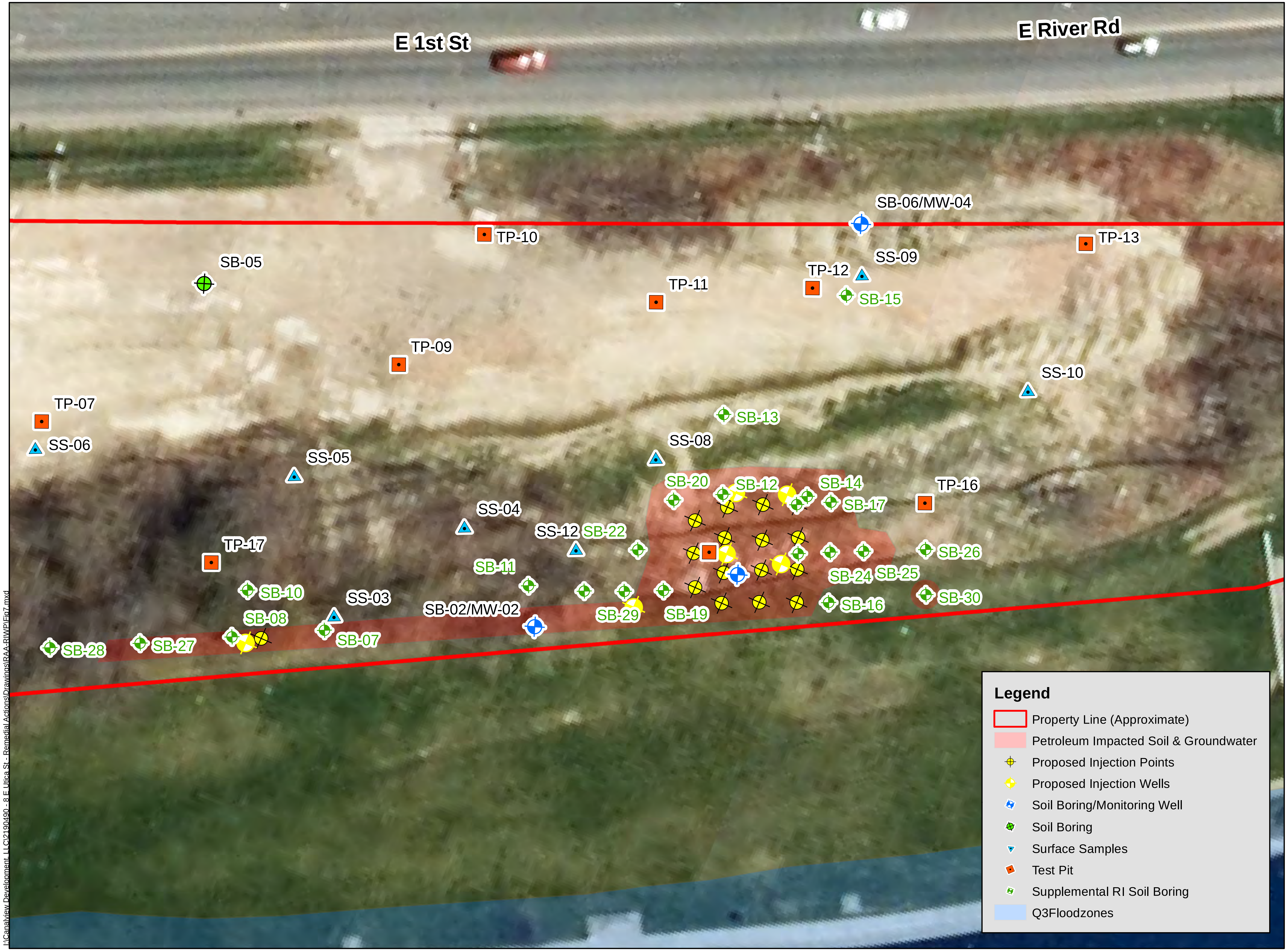
DRAWING NAME:

LOCATION OF COVER SYSTEMS

PROJECT #/DRAWING #/ DATE

2190490

FIGURE 6



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LaBella
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N
E
S
W

1 inch = 30 feet

INTENDED TO PRINT AS: 11" X 17"

CLIENT:

CANALVIEW
DEVELOPMENT, LLC

PROJECT:

REMEDIAL ALTERNATIVES
ANALYSIS / REMEDIAL
ACTION WORK PLAN
FORMER BRENEMAN SITE
8 EAST UTICA STREET
OSWEGO, NEW YORK

DRAWING NAME:

PROPOSED INJECTION
POINTS

PROJECT #/DRAWING #/ DATE

2190490

FIGURE 7

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TABLES

TABLE 1

Former Breneman Site
8 East Utica Street
Oswego, New York

ESTIMATE OF COST FOR REMEDIAL ALTERNATIVES

Alternative	Subcontractor Cost	Laboratory Analytical & Equipment Cost	Professional Services Cost	Site Management Cost	Contingency	Estimated Cost
No Action	$0	$0	$0	$0	$0	$0
Unrestricted Use: BCP Track 1 Cleanup	$695,000	$37,500	$68,250	$0	$200,000	$1,000,750
Restricted Commercial Use: BCP Track 4 Cleanup	$93,000	$13,500	$52,250	$145,000	$75,000	$378,750

TABLE 2

Former Breneman Site
8 East Utica Street
Oswego, New York

Unrestricted Use, BCP Track 1 Alternative

Sub-contractor Costs	
Soil Excavation, AOC #2 & 3 (est. 7,500 CY)	$ 45,000
Soil Transportation and Disposal, Non Haz. (est. 12,000 tons)	$ 450,000
Supply/Install Backfill (est. 12,000 tons)	$ 200,000
Sub-contractor Costs Subtotal	**$ 695,000**
Laboratory & Equipment Costs	
CAMP Monitoring Equipment	$ 3,000
Low-flow Sampling Equipment (8 events @ $500)	$ 4,000
Quarterly VOC Groundwater Samples (estimate 2 years)	$ 5,500
Confirmatory Soil Samples (estimate 55 samples)(1)	$ 25,000
Laboratory & Equipment Costs Subtotal	**$ 37,500**
Professional Costs	
Work Plan	$ 5,000
Oversight and Sampling ($75/hr x 400 hours)	$ 30,000
Quarterly Sampling (initial plus estimate 2 years, total 150 hours x $75/hr)	$ 11,250
Groundwater Monitoring Reports (8 @ $1,500)	$ 12,000
Final Engineering Report	$ 5,000
Environmental Easement	$ 5,000
Professional Costs Subtotal	**$ 68,250**
25% Contingency	*$ 200,000*
Total Estimated Costs	**$1,000,750**

Notes:

(1) Assumes analysis for TCL VOCs and SVOCs, TAL Metals, Cyanide and PCBs.

TABLE 3

Former Breneman Site
8 East Utica Street
Oswego, New York

Restricted Commercial Use, BCP Track 4 Alternative

Sub-contractor Costs	
Direct Push Injection	$ 10,000
Injection Well Installation	$ 7,500
Klozur CR (est. 6,500 lbs @ $5.00/lb.)	$ 32,500
Follow Up Direct Push Sampling	$ 4,000
Follow Up Monitoring Well Installation	$ 4,000
Cover Installation	$ 35,000
Sub-contractor Costs Subtotal	**$ 93,000**
Laboratory & Equipment Costs	
Follow Up Soil Samples (VOCs & SVOCs)	$ 2,000
Follow Up Groundwater Samples	$ 1,500
Low-flow Sampling Equipment (12 events @ $500)	$ 6,000
Groundwater VOC Samples (estimate 5 years*)	$ 4,000
Laboratory Costs Subtotal	**$ 13,500**
Professional Costs	
Work Plan	$ 5,000
Oversight and Sampling ($75/hr x 90 hours)	$ 6,700
Groundwater Sampling (estimate 5 years*, total 100 hours x $75/hr)	$ 7,500
Groundwater Monitoring Reports (12 @ $1,500)	$ 18,000
Final Engineering Report	$ 5,000
Environmental Easement	$ 5,000
Environmental Management Plan (including Health and Safety Plan)	$ 5,000
Total Professional Costs	**$ 52,250**
Annual Site Management Costs	
Cover Inspection and Annual Certification	$ 500
Periodic Review Report	$ 2,000
Total Annual Costs	*$ 2,500*
X 30 years @ 5% Interest	**$ 145,000**
25% Contingency	*$ 75,000*
Total Estimated Costs	**$378,750**

*Anticipate quarterly sampling for a period of approximately 2 years, followed by annual sampling for three additional years.

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APPENDIX 1

November 2018 Surface Soil Sampling in Commercial Area

Notes:
(1) Sample locations determined using Trimble GeoXT global positioning system (GPS) with GeobBeacon.
(2) 2011 Aerial photograph obtained from GIS Clearinghouse.
(3) Material from location of test pits TP-3 adn TP-9 moved from original sample location to area on south of Site
(4) Material from location of surface sample SS-9 covered with material from northern portion of Site.

Legend

▭ BCP Boundary
▨ To Be Reclassified Restricted Residential
▲ Subsample Locations for Composite Samples
⊕ Discrete VOC Sample, 2-6"

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Remedial Action Work Plan

Brownfield Cleanup
Program Site C738046
Former Breneman Site
8 East Utica Street
City of Oswego, New York

Surface Sampling Locations

N E S W

0 15 30 60

1 inch = 50 feet

214001

FIGURE A

Table 1A
Phase II Environmental Site Assessment
8 East Utica Street
Summary of VOCs in Soil
LaBella Project #214001

Sample ID	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	VOC-1		VOC-2		VOC-3		VOC-4	
Sample Depth (ft bgs)				2-12"		2-12"		2-12"		2-12"	
Sample Date				11/29/2018		11/29/2018		11/29/2018		11/29/2018	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile organic compounds											
1,1,1-Trichloroethane	0.68	100	500	ND		ND		ND		ND	
1,1,2,2-Tetrachloroethane	NL	NL	NL	ND		ND		ND		ND	
1,1,2-Trichloroethane	NL	NL	NL	ND		ND		ND		ND	
1,1,2-Trichlorotrifluoroethane (freon 113)	NL	NL	NL	ND		ND		ND		ND	
1,1-Dichloroethane	0.27	26	240	ND		ND		ND		ND	
1,1-Dichloroethene	0.33	100	500	ND		ND		ND		ND	
1,2,4-Trichlorobenzene	NL	NL	NL	ND		ND		ND		ND	
1,2,4-Trimethylbenzene	3.6	52	190	ND		ND		ND		ND	
1,2-Dibromo-3-Chloropropane	NL	NL	NL	ND		ND		ND		ND	
1,2-Dibromoethane	NL	NL	NL	ND		ND		ND		ND	
1,2-Dichlorobenzene	1.1	100	500	ND		ND		ND		ND	
1,2-Dichloroethane	0.02	3.1	30	ND		ND		ND		ND	
1,2-Dichloropropane	NL	NL	NL	ND		ND		ND		ND	
1,3,5-Trimethylbenzene	8.4	52	190	ND		ND		ND		ND	
1,3-Dichlorobenzene	2.4	49	280	ND		ND		ND		ND	
1,4-Dichlorobenzene	1.8	13	130	ND		ND		ND		ND	
2-Hexanone	NL	NL	NL	ND		ND		ND		ND	
4-Methyl-2-Pentanone (MIBK)	NL	NL	NL	ND		ND		ND		ND	
Acetone	0.05	100	500	ND		ND		ND		ND	
Benzene	0.06	4.8	44	ND		ND		ND		ND	
Bromodichloromethane	NL	NL	NL	ND		ND		ND		ND	
Bromoform	NL	NL	NL	ND		ND		ND		ND	
Bromomethane	NL	NL	NL	ND		ND		ND		ND	
Carbon Disulfide	NL	NL	NL	ND		ND		ND		ND	
Carbon tetrachloride	0.76	2.4	22	ND		ND		ND		ND	
Chlorobenzene	1.1	100	500	ND		ND		ND		ND	
Chloroethane	NL	NL	NL	ND		ND		ND		ND	
Chloroform	0.37	49	350	ND		ND		ND		ND	
Chloromethane	NL	NL	NL	ND		ND		ND		ND	
cis -1,2-Dichloroethene	0.25	100	500	ND		ND		ND		ND	
cis-1,3-dichloropropene	NL	NL	NL	ND		ND		ND		ND	
Cyclohexane	NL	NL	NL	ND		ND		ND		ND	
Dibromochloromethane	NL	NL	NL	ND		ND		ND		ND	
Dichlorodifluoromethane	NL	NL	NL	ND		ND		ND		ND	
Ethylbenzene	1	41	390	ND		ND		ND		ND	
Isopropylbenzene	NL	NL	NL	ND		ND		ND		ND	
Methyl Acetate	NL	NL	NL	ND		ND		ND		ND	
Methyl Cyclohexane	NL	NL	NL	ND		ND		ND		ND	
Methyl ethyl ketone (2-butanone)	0.12	100	500	ND		ND		ND		ND	
Methyl tert-butyl ether	0.93	100	500	ND		ND		ND		ND	
Methylene chloride	0.05	100	500	ND		ND		ND		ND	
Naphthalene	NL	NL	NL	ND		ND		ND		ND	
n-Butylbenzene	12	100	500	ND		ND		ND		ND	
n - Propylbenzene	3.9	100	500	ND		ND		ND		ND	
o-xylene	0.26	100	500	ND		ND		ND		ND	
m,p-xylene				ND		ND		ND		ND	
p-Isopropyltoluene	NL	NL	NL	ND		ND		ND		ND	
sec-Butylbenzene	11	100	500	ND		ND		ND		ND	
Styrene	NL	NL	NL	ND		ND		ND		ND	
tert-Butylbenzene	5.9	100	500	ND		ND		ND		ND	
Tetrachloroethene	1.3	19	150	0.0023		ND		ND		0.00074	
Toluene	0.7	100	500	ND		ND		ND		ND	
trans-1,2-Dichloroethene	0.19	100	500	ND		ND		ND		ND	
trans-1,3-dichloropropene	NL	NL	NL	ND		ND		ND		ND	
Trichloroethene	0.47	21	200	0.00022	J	ND		ND		ND	
Trichlorofluoromethane	NL	NL	NL	ND		ND		ND		ND	
Vinyl chloride	0.02	0.9	13	ND		ND		ND		ND	

NOTES:

All values displayed in milligrams per kilograms (mg/kg) or parts per million (ppm)

ND indicates compound was not detected above the indicated laboratory method detection limit (MDL).

NL indicates not listed

*indicates no Part 375 value, corresponding CP-51 Supplemental Soil Cleanup Objective is listed

Bold type indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objective (SCO)

Red lettering indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(b) Restricted Residential Use SCO

Yellow highlight indicates that the compound was detected at a concentration above its respective NYCRR Part 375 Commercial Use SCO

VOCs analyzed by USEPA Method 8260

LaBella
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Table 1B
Phase II Environmental Site Assessment
8 East Utica Street
Summary of SVOCs in Soil
LaBella Project #214001

Sample ID	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	COMP-1		COMP-1		COMP-2		COMP-2		COMP-3		COMP-3		COMP-4		COMP-4	
Sample Depth (ft bgs)				0-2"		2-12"		0-2"		2-12"		0-2"		2-12"		0-2"		2-12"	
Sample Date				11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Semivolatile organic compounds																			
Acenaphthene	20	100	500	ND		0.021	J	ND		ND		ND		ND		0.033	J	ND	
Acenapthylene	100	100	500	0.053	J	0.21		0.12	J	ND		0.066	J	0.076	J	0.058	J	0.037	J
Anthracene	100	100	500	0.052	J	0.14		0.14		ND		0.067	J	0.073	J	0.13		0.056	J
Benz(a)anthracene	1	1	5.6	0.26		0.62		0.38		0.078	J	0.22		0.29		0.39		0.20	
Benzo(a)pyrene	1	1	1	0.29		0.73		0.34		0.08	J	0.2		0.28		0.33		0.18	
Benzo(b)fluoranthene	1	1	5.6	0.39		1		0.45		0.1	J	0.26		0.36		0.41		0.22	
Benzo(g,h,i)perylene	100	100	500	0.17		0.53		0.2		0.061	J	0.14	J	0.19		0.2		0.12	J
Benzo(k)fluoranthene	0.8	3.9	56	0.11	J	0.38		0.12		0.031	J	0.09	J	0.13		0.17		0.082	J
Chrysene	1	3.9	56	0.27		0.79		0.38		0.083	J	0.2		0.29		0.39		0.18	
Dibenz(a,h)anthracene	0.33	0.33	0.56	0.038	J	0.11	J	0.052	J	ND		0.034	J	0.039	J	0.052	J	0.024	J
Fluoranthene	100	100	500	0.53		1.6		0.72		0.15		0.38		0.63		0.92		0.4	
Fluorene	30	100	500	0.022	J	0.053	J	0.036	J	ND		0.021	J	0.021	J	0.058	J	0.02	J
Indeno(1,2,3-cd)pyrene	0.5	0.5	5.6	0.19		0.58		0.21		0.058	J	0.14	J	0.2		0.23		0.13	J
Phenanthrene	100	100	500	0.3		0.99		0.46		0.078	J	0.19		0.39		0.66		0.21	
Pyrene	100	100	500	0.44		1.3		0.63		0.13		0.34		0.54		0.73		0.35	

NOTES:

All values displayed in milligrams per kilograms (mg/kg) or parts per million (ppm)

ND indicates compound was not detected above the indicated laboratory method detection limit (MDL).

NL indicates not listed

*indicates no Part 375 value, corresponding CP-51 Supplemental Soil Cleanup Objective is listed

Bold type indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objective (SCO)

Red lettering indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(b) Restricted Residential Use SCO

Yellow highlight indicates that the compound was detected at a concentration above its respective NYCRR Part 375 Commercial Use SCO

SVOCs analyzed by USEPA Method 8270

LaBella
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Table 1C
Phase II Environmental Site Assessment
8 East Utica Street
Summary of Pesticides in Soil
LaBella Project #214001

Sample ID	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	COMP-1		COMP-1		COMP-2		COMP-2		COMP-3		COMP-3		COMP-4		COMP-4	
Sample Depth (ft bgs)				0-2"		2-12"		0-2"		2-12"		0-2"		2-12"		0-2"		2-12"	
Sample Date				11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Pesticides																			
4,4'-DDD	0.0033	13	92	ND		ND		ND		ND		ND		ND		ND		ND	
4,4'-DDE	0.0033	8.9	62	0.00286		**0.00381**	P	**0.00309**	P	ND		0.00202		0.00428		0.00224		0.00230	
4,4'-DDT	0.0033	7.9	47	**0.0057**		**0.00586**		0.00198	J	ND		ND		0.00198	JP	0.00184	J	0.00243	J
Aldrin	0.005	0.097	0.68	ND		ND		ND		ND		ND		ND		ND		ND	
alpha-BHC	0.02	0.48	3.4	ND		ND		ND		ND		ND		ND		ND		ND	
beta-BHC	0.036	0.36	3	ND		ND		ND		ND		ND		ND		ND		ND	
Chlordane (alpha)	0.094	4.2	24	ND		ND		0.0164		ND		ND		ND		ND		0.037000	
cis-Chlordane	NL	NL	NL	ND		ND		ND		ND		ND		0.000918	JIP	0.000813	JIP	0.000916	JIP
delta-BHC	0.04	100	500	ND		ND		ND		ND		ND		ND		ND		ND	
Dieldrin	0.005	0.2	1.4	ND		ND		ND		0.00108	JP	ND		ND		ND		ND	
Endosulfan I	2.4	24	200	ND		ND		ND		ND		ND		ND		ND		ND	
Endosulfan II	2.4	24	200	ND		ND		ND		ND		ND		ND		ND		ND	
Endosulfan sulfate	2.4	24	200	ND		ND		ND		ND		ND		ND		ND		ND	
Endrin	0.014	11	89	ND		ND		ND		ND		ND		ND		ND		ND	
Endrin Aldehyde	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Endrin Ketone	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Heptachlor	0.042	2.1	15	ND		ND		ND		ND		ND		ND		ND		ND	
Heptachlor Epoxide	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Lindane	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Methoxychlor	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Toxaphene	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
trans-Chlordane	NL	NL	NL	0.00121	JIP	ND		0.00091	JIP	ND		ND		ND		ND		0.000786	JIP

NOTES:

All values displayed in milligrams per kilograms (mg/kg) or parts per million (ppm)

ND indicates compound was not detected above the indicated laboratory method detection limit (MDL).

NL indicates not listed

*indicates no Part 375 value, corresponding CP-51 Supplemental Soil Cleanup Objective is listed

Bold type indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objective (SCO)

Red lettering indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(b) Restricted Residential Use SCO

Yellow highlight indicates that the compound was detected at a concentration above its respective NYCRR Part 375 Commercial Use SCO

Pesticides analyzed by USEPA Method 8081

LaBella
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Table 1D
Phase II Environmental Site Assessment
8 East Utica Street
Summary of PCBs in Soil
LaBella Project #214001

Sample ID	**NYCRR Part 375 Unrestricted Use SCOs**	**NYCRR Part 375 Restricted Residential Use SCOs**	**NYCRR Part 375 Commercial Use SCOs**	**SS-05-S**		**SS-05-S**		**SS-05-N**		**SS-05-N**		**COMP-1**		**COMP-1**		**COMP-2**		**COMP-2**		**COMP-3**		**COMP-3**		**COMP-4**		**COMP-4**	
Sample Depth (ft bgs)				**0-2"**		**2-12"**		**0-2"**		**2-12"**		**0-2"**		**2-12"**		**0-2"**		**2-12"**		**0-2"**		**2-12"**		**0-2"**		**2-12"**	
Sample Date				**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**		**11/29/2018**	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
PCBs																											
PCB 1016	See Total	See Total	See Total	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PCB 1221				ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PCB 1232				ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PCB 1242				ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PCB 1248				ND		ND		ND		ND		ND		0.0132	J	ND		ND		ND		ND		ND		ND	
PCB 1254				ND		ND		0.0061	J	0.00445	J	ND		0.0175	JP	ND		ND		ND		ND		ND		ND	
PCB 1260				0.0152	J	ND		0.0168	J	0.02110	J	0.0168	J	0.0113	J	0.0106	J	0.0316	J	0.0128	J	0.0181	J	0.0175	J	0.0138	J
PCB 1262				ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PCB 1268				ND		ND		ND		ND		ND		ND		0.00698	J	ND		ND		ND		ND		ND	
Total PCBs	0.1	1	1	0.0152	J	ND		0.0229	J	0.0256	J	0.0168	J	0.042	J	0.0176	J	0.0316	J	0.0128	J	0.0181	J	0.0175	J	0.0138	J

NOTES:

All values displayed in milligrams per kilograms (mg/kg) or parts per million (ppm)

ND indicates compound was not detected above the indicated laboratory method detection limit (MDL).

NL indicates not listed

*indicates no Part 375 value, corresponding CP-51 Supplemental Soil Cleanup Objective is listed

Bold type indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objective (SCO)

Red lettering indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(b) Restricted Residential Use SCO

Yellow highlight indicates that the compound was detected at a concentration above its respective NYCRR Part 375 Commercial Use SCO

PCBs analyzed by USEPA Method 8082

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Table 1E
Phase II Environmental Site Assessment
8 East Utica Street
Summary of Metals in Soil
LaBella Project #214001

Sample ID	NYCRR Part 375 Unrestricted Use SCOs	NYCRR Part 375 Restricted Residential Use SCOs	NYCRR Part 375 Commercial Use SCOs	COMP-1		COMP-1		COMP-2		COMP-2		COMP-3		COMP-3		COMP-4		COMP-4	
Sample Depth (ft bgs)				0-2"		2-12"		0-2"		2-12"		0-2"		2-12"		0-2"		2-12"	
Sample Date				11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Metals																			
Aluminum	NL	NL	NL	5470		5510		5790		5420		5710		6150		6040		5960	
Antimony	NL	NL	NL	69.1		42.1		7.83		1.03	J	2.93	J	4.53	J	0.592	J	0.828	J
Arsenic	13	16	16	12.9		11.8		5.18		3.38		2.97		3.12		3.75		3.48	
Barium	350	400	400	99.3		103		721		430		56.4		57.4		55.6		53.4	
Beryllium	7.2	72	590	0.407	J	0.373	J	0.296	J	0.26	J	0.206	J	0.283	J	0.305	J	0.309	J
Cadmium	2.5	4.3	9.3	1.45		1.26		1.55		0.376	J	0.382	J	0.368	J	0.407	J	0.382	J
Calcium	NL	NL	NL	6250		4820		13200		21800		38000		14700		13600		10500	
Chromium, trivalent	30	180	1500	15.5		14.4		538		26.9		7.58		9.29		8.86		9.37	
Cobalt	NL	NL	NL	6.46		4.74		3.92		3.87		4.05		5.04		4.37		4.21	
Copper	50	270	270	37.9		38.8		29.3		21.1		23.7		30.6		24.8		23.8	
Iron	NL	NL	NL	13600		12500		11700		11300		12100		13400		12000		11600	
Lead	63	400	1000	401		**266**		10400		**350**		46.9		49.9		**82.4**		**72.4**	
Magnesium	NL	NL	NL	2970		2410		3610		5100		4020		4630		4760		3770	
Manganese	1600	2000	10000	359		277		424		438		442		411		438		397	
Mercury	0.18	0.81	2.8	2.07		2.08		93.3		27.3		0.096		0.073	J	**0.327**		0.22	
Nickel	30	310	310	15.3		11.6		8.47		8.24		8.7		10.6		8.93		8.92	
Potassium	NL	NL	NL	743		582		593		476		406		472		459		425	
Selenium	3.9	180	1500	0.876	J	0.687	J	0.859	J	0.519	J	0.32	J	0.368	J	0.444	J	0.528	J
Silver	2	180	1500	ND		ND		ND		ND		ND		ND		ND		ND	
Sodium	NL	NL	NL	53.2	J	50.1	J	132	J	65.1	J	44.6	J	42.6	J	59.3	J	49.9	J
Thallium	NL	NL	NL	ND		ND		ND		ND		ND		ND		ND		ND	
Vanadium	NL	NL	NL	17.2		18.4		14		14.1		12		13.3		14.4		14	
Zinc	109	10000	10000	**160**		**179**		**2320**		**118**		58.6		64.2		75.6		68.7	

NOTES:

All values displayed in milligrams per kilograms (mg/kg) or parts per million (ppm)

ND Indicates compound was not detected above the indicated laboratory method detection limit (MDL).

NL indicates not listed

*indicates no Part 375 value, corresponding CP-51 Supplemental Soil Cleanup Objective is listed

Bold type indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objective (SCO)

Red lettering indicates that the compound was detected at a concentration above its respective NYCRR Part 375-6.8(b) Restricted Residential Use SCO

Yellow highlight indicates that the compound was detected at a concentration above its respective NYCRR Part 375 Commercial Use SCO

Metals analyzed by USEPA Method 6010/7470

Cyanide analyzed by USEPA Method 9012

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 7
615 Erie Boulevard West, Syracuse, NY 13204-2400
P: (315) 426-7519, (315) 426-7551 | F: (315) 426-2653
www.dec.ny.gov

November 21, 2018

Canalview Development, LLC
Shane Broadwell
70 East First Street
Oswego, NY 13126

Re: Former Breneman Site, Site ID No. C738046
City of Oswego, Oswego County
Surface and Shallow Soil Sampling Plan

Dear Mr. Broadwell:

The New York State Department of Environmental Conservation (Department) and the New York State Department of Health (NYSDOH) have reviewed the surface and shallow soil sampling plan (work plan) for the Former Breneman Site (site) which was prepared by LaBella Associates, DPC (LaBella) on behalf of Canalview Development, LLC (Canalview) and submitted to the Department on November 8, 2018.

The work plan calls for sampling surface soil and shallow sub-surface soil over a 1.17-acre portion of the site to determine if a cover system will be necessary for that area, which is proposed to be a commercial use area.

The work plan calls for collecting composite samples from 0-2 inches below grade and from 2-12 inches below grade to be analyzed for semivolatile organic compounds, pesticides, polychlorinated biphenyls (PCBs), target analyte list metals and total cyanide. That is generally acceptable; however, the sampling frequency must be modified. The composite samples for each depth interval must be composed of three sub-samples from the locations shown on the attached figure, grouped as indicated, for a total of 8 composite samples.

The work plan also calls for collecting grab samples for analysis of volatile organic compounds (VOCs) at the locations indicated on the attached figure. That is generally acceptable; however, the VOC samples should be collected from 2-12 inches below grade.

In addition, two sample locations must be added west of the previous sample location SS-05, which contained PCBs at 2.88 parts per million (ppm). The locations must be within the commercial use area and should be approximately 20 feet west of SS-05. One location should be approximately 10-15 feet north of SS-05, and the other approximately

10-15 feet south. Grab samples must be collected for PCB analysis from 0-2 inches below grade and from 2-12 inches below grade at both of those locations.

The sampling must be conducted in accordance with the approved Remedial Investigation Work Plan, including the health and safety plan, community air monitoring plan, sampling protocol, and quality assurance project plan.

Pursuant to 6 NYCRR 375-1.6(d)(3), Canalview must respond in writing within 15 days as to whether the modifications to the work plan will be accepted. If accepted, this letter and Canalview's acceptance letter must be attached to the front of all copies of the work plan.

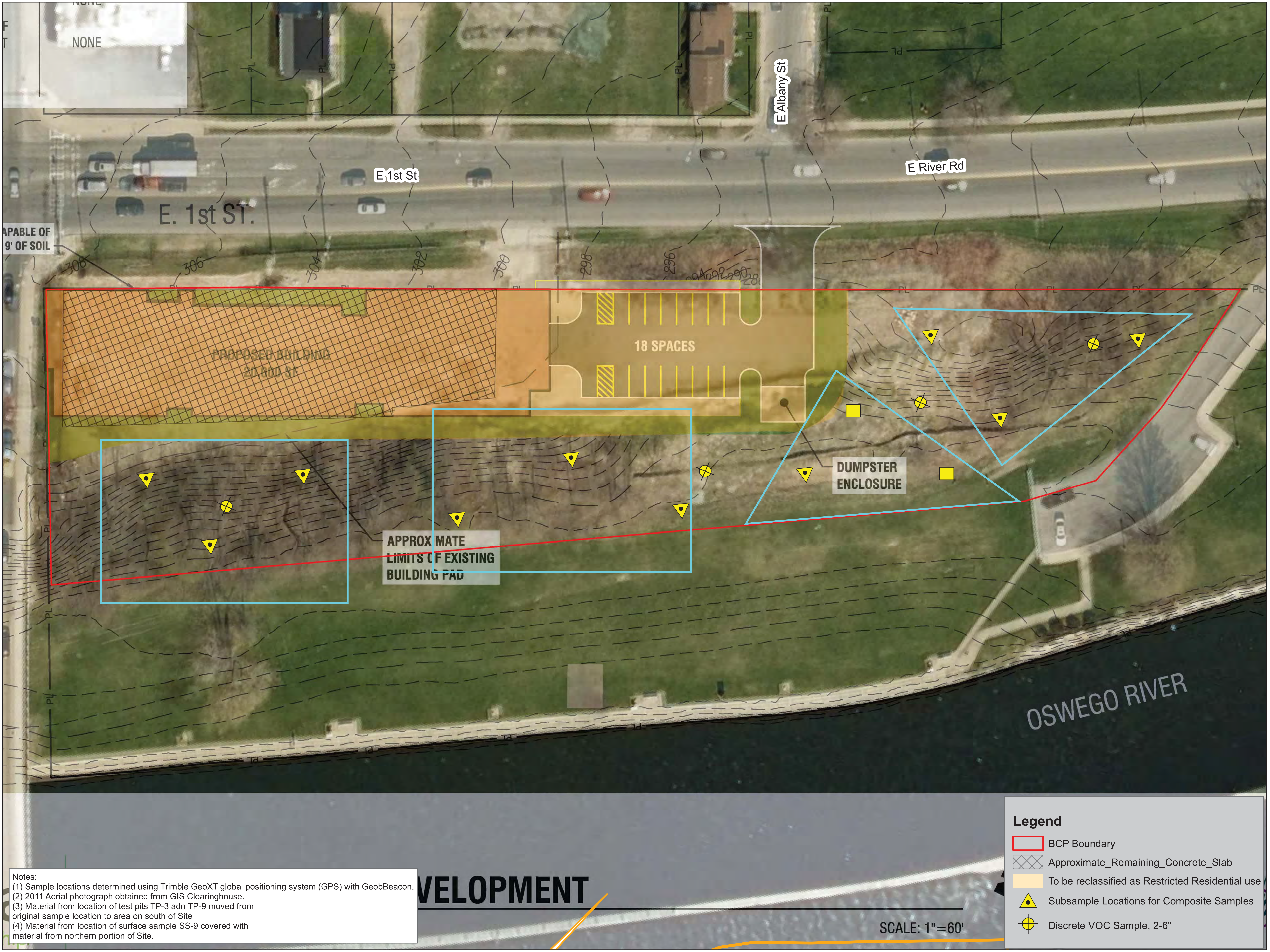
The Department requires notification at least seven days in advance of field work. If you have any questions, please do not hesitate to contact me at 315-426-7411 or joshua.cook@dec.ny.gov.

Sincerely,

Joshua P. Cook, P.E.
Professional Engineer 1

Enclosure

ec: Harry Warner (NYSDEC)
Joshua Cook (NYSDEC)
Maureen Schuck (NYSDOH)
Richard Jones (NYSDOH)
Shane Broadwell (Canalview)
George Broadwell (Canalview)
David Engert (LaBella)



Notes:
(1) Sample locations determined using Trimble GeoXT global positioning system (GPS) with GeobBeacon.
(2) 2011 Aerial photograph obtained from GIS Clearinghouse.
(3) Material from location of test pits TP-3 adn TP-9 moved from
original sample location to area on south of Site
(4) Material from location of surface sample SS-9 covered with
material from northern portion of Site.

Legend

🟥	BCP Boundary
▨	Approximate_Remaining_Concrete_Slab
🟧	To be reclassified as Restricted Residential use
▲	Subsample Locations for Composite Samples
⊕	Discrete VOC Sample, 2-6"

C:\Users\dengert\Documents\Desktop\Updated Breneman Maps\Proposal figure2.mxd

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Remedial Action Work Plan

Brownfield Cleanup
Program Site C738046
Former Breneman Site
8 East Utica Street

Proposed Changes to
Site Classifications &
Sampling Locations

Modified 2018-11-20 by NYSDEC

1. Added two sub-sample locations
2. Added composite sample grouping

🟨	Additional sub-sample location
□	Composite sample grouping

0 15 30 60

1 inch = 25 feet

Intended to print in ANSI D size.

214001

FIGURE A

Engert, Dave

From:	Engert, Dave
Sent:	Thursday, November 8, 2018 4:06 PM
To:	'Cook, Joshua P (DEC)'
Cc:	George Broadwell; shane broadwell
Subject:	Surface soil sampling
Attachments:	Surface sample locations.pdf

Josh,

Per our discussion with George earlier, we are looking into sampling surface soil to determine if a cover system is needed in certain portions of the site prior to the Department issuing a COC. I looked back through our RI data, as it turns out two of the surface samples that we collected from the side of the hill on the northern portion (SS-01 and SS-02) contain mercury at concentrations above restricted residential SCOs. Therefore the best chance to eliminate a cover requirement for the side of the hill would be to keep it commercial.

Attached is a draft figure showing the conceptual site plan and portion of the site that may be reclassified as restricted residential. It measures approximately 38,150 square feet or +/- 0.88 acres. The hatched area on the plan shows the approximate location of the existing concrete building slab, +/- 18,000 square feet. At this point based on our email correspondence I am working on the assumption that the concrete can be considered part of the cover system if the holes are covered with 2 feet of clean material. This leaves +/- 20,000 square feet of restricted residential area that will need to be covered with 2 feet of clean material or sampled to document that cover is not needed. We had one surface soil sample outside the slab (SS-05) with PCBs above commercial SCOs. Also, all of the brick and fill material that was buried in the original building footprint was pushed and buried to the south of the slab. Based on data from test pit samples from this area and experience with fill material in general, it is unlikely that surface/shallow soil samples in this area will sample out below restricted residential SCOs. I would hate to see George spend all the money to do the sampling of the upper 2 feet of this material only to have to bring in cover anyway. As such, I will recommend to him that the cover be placed in the area newly classified as restricted residential and outside of the building slab (+/- 1,500 CY of material required). The proposed development will need crushed stone for beneath slabs/foundations and the parking lot anyway (and maybe to bring up the parking lot grade), if the material is placed as cover prior to issuance of the COC they should be able to rework it for building/pavement base material during development. Perhaps George can get the buyer/developer to purchase the material or give him a credit since they will need it anyway, and if they use crushed stone it will meet the sampling exemption.

The area outside of the orange shaded area will remain commercial use. The plan would be to sample this material per the guidelines you sent before to determine if the top one foot of material meets commercial use SCOs and therefore does not require cover. The area measures approximately 51,000 square feet or +/- 1.17 acres. Based on the information you provided I am proposing to collect 2 composite samples from 0-2" and 2 composite samples from 2-12" for a total of 4 composites. Each composite sample to be made up of 5 discrete samples. Each sample to be analyzed for full suite minus VOCs (i.e., SVOCs, metals, PCBs, pesticides and cyanide). The approximate location of discrete samples are shown on the attached figure. In addition, 4 grab samples for VOCs will be collected from 2-6" in as shown on the map. One of these is in the area around TP-15/SB-03 where the highest concentration of petroleum impacts is located. QA/QC samples will be collected per the QAPP and a DUSR will be prepared.

Please let me know if this approach is acceptable and I will provide pricing to George.

Thanks,
Dave

David Engert, CHMM
LaBella Associates | Remediation & Construction Manager

585-295-6630 **direct**
585-737-3293 **mobile**
300 State Street, Suite 201
Rochester, NY 14614
labellapc.com

APPENDIX 2

Allowable Constituent Levels for Imported Soil or Fill

Appendix 5
Allowable Constituent Levels for Imported Fill or Soil
Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on *Soil Cleanup Guidance*. If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Metals					
Arsenic	13	16	16	16	13
Barium	350	350	400	400	433
Beryllium	7.2	14	47	47	10
Cadmium	2.5	2.5	4.3	7.5	4
Chromium, Hexavalent[1]	1[3]	19	19	19	1[3]
Chromium, Trivalent[1]	30	36	180	1500	41
Copper	50	270	270	270	50
Cyanide	27	27	27	27	NS
Lead	63	400	400	450	63
Manganese	1600	2000	2000	2000	1600
Mercury (total)	0.18	0.73	0.73	0.73	0.18
Nickel	30	130	130	130	30
Selenium	3.9	4	4	4	3.9
Silver	2	8.3	8.3	8.3	2
Zinc	109	2200	2480	2480	109
PCBs/Pesticides					
2,4,5-TP Acid (Silvex)	3.8	3.8	3.8	3.8	NS
4,4'-DDE	0.0033[3]	1.8	8.9	17	0.0033[3]
4,4'-DDT	0.0033[3]	1.7	7.9	47	0.0033[3]
4,4'-DDD	0.0033[3]	2.6	13	14	0.0033[3]
Aldrin	0.005	0.019	0.097	0.19	0.14
Alpha-BHC	0.02	0.02	0.02	0.02	0.04[4]
Beta-BHC	0.036	0.072	0.09	0.09	0.6
Chlordane (alpha)	0.094	0.91	2.9	2.9	1.3
Delta-BHC	0.04	0.25	0.25	0.25	0.04[4]
Dibenzofuran	7	14	59	210	NS
Dieldrin	0.005	0.039	0.1	0.1	0.006
Endosulfan I	2.4[2]	4.8	24	102	NS
Endosulfan II	2.4[2]	4.8	24	102	NS
Endosulfan sulfate	2.4[2]	4.8	24	200	NS
Endrin	0.014	0.06	0.06	0.06	0.014
Heptachlor	0.042	0.38	0.38	0.38	0.14
Lindane	0.1	0.1	0.1	0.1	6
Polychlorinated biphenyls	0.1	1	1	1	1

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Semi-volatile Organic Compounds					
Acenaphthene	20	98	98	98	20
Acenaphthylene	100	100	100	107	NS
Anthracene	100	100	100	500	NS
Benzo(a)anthracene	1	1	1	1	NS
Benzo(a)pyrene	1	1	1	1	2.6
Benzo(b)fluoranthene	1	1	1	1.7	NS
Benzo(g,h,i)perylene	100	100	100	500	NS
Benzo(k)fluoranthene	0.8	1	1.7	1.7	NS
Chrysene	1	1	1	1	NS
Dibenz(a,h)anthracene	0.33 [3]	0.33 [3]	0.33 [3]	0.56	NS
Fluoranthene	100	100	100	500	NS
Fluorene	30	100	100	386	30
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	5.6	NS
m-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
Naphthalene	12	12	12	12	NS
o-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
p-Cresol(s)	0.33	0.33	0.33	0.33	NS
Pentachlorophenol	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]
Phenanthrene	100	100	100	500	NS
Phenol	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	30
Pyrene	100	100	100	500	NS
Volatile Organic Compounds					
1,1,1-Trichloroethane	0.68	0.68	0.68	0.68	NS
1,1-Dichloroethane	0.27	0.27	0.27	0.27	NS
1,1-Dichloroethene	0.33	0.33	0.33	0.33	NS
1,2-Dichlorobenzene	1.1	1.1	1.1	1.1	NS
1,2-Dichloroethane	0.02	0.02	0.02	0.02	10
1,2-Dichloroethene(cis)	0.25	0.25	0.25	0.25	NS
1,2-Dichloroethene(trans)	0.19	0.19	0.19	0.19	NS
1,3-Dichlorobenzene	2.4	2.4	2.4	2.4	NS
1,4-Dichlorobenzene	1.8	1.8	1.8	1.8	20
1,4-Dioxane	0.1 [3]	0.1 [3]	0.1 [3]	0.1 [3]	0.1
Acetone	0.05	0.05	0.05	0.05	2.2
Benzene	0.06	0.06	0.06	0.06	70
Butylbenzene	12	12	12	12	NS
Carbon tetrachloride	0.76	0.76	0.76	0.76	NS
Chlorobenzene	1.1	1.1	1.1	1.1	40
Chloroform	0.37	0.37	0.37	0.37	12
Ethylbenzene	1	1	1	1	NS
Hexachlorobenzene	0.33 [3]	0.33 [3]	1.2	3.2	NS
Methyl ethyl ketone	0.12	0.12	0.12	0.12	100
Methyl tert-butyl ether	0.93	0.93	0.93	0.93	NS
Methylene chloride	0.05	0.05	0.05	0.05	12

Volatile Organic Compounds (continued)					
Propylbenzene-n	3.9	3.9	3.9	3.9	NS
Sec-Butylbenzene	11	11	11	11	NS
Tert-Butylbenzene	5.9	5.9	5.9	5.9	NS
Tetrachloroethene	1.3	1.3	1.3	1.3	2
Toluene	0.7	0.7	0.7	0.7	36
Trichloroethene	0.47	0.47	0.47	0.47	2
Trimethylbenzene-1,2,4	3.6	3.6	3.6	3.6	NS
Trimethylbenzene-1,3,5	8.4	8.4	8.4	8.4	NS
Vinyl chloride	0.02	0.02	0.02	0.02	NS
Xylene (mixed)	0.26	1.6	1.6	1.6	0.26

All concentrations are in parts per million (ppm)
NS = Not Specified

Footnotes:

[1] The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.

[2] The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

[3] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

[4] This SCO is derived from data on mixed isomers of BHC.

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APPENDIX 3

Klozur® CR Data

Environmental
Solutions

KLOZUR® CR
Combined Remedy

Product Sheet

An All-In-One Combined Remedy Approach to Address Soil and Groundwater Contamination

Klozur® CR, a Combined Remedy technology, is comprised of a specially formulated mixture of Klozur® Persulfate and PermeOx® Ultra.

Klozur CR is a single, all-in-one formulated product that can be readily applied to either source areas or plumes with mixed petroleum and chlorinated solvents contamination. Klozur CR destroys contaminants in soil and groundwater by promoting three modes of action: Klozur activated persulfate chemical oxidation, aerobic bioremediation and anaerobic bioremediation.

The benefits of Klozur CR

Two field proven technologies formulated into an all-in-one preblended product.

- **The Power of Klozur Activated Persulfate**
  - A built in Klozur persulfate activator delivers proven and powerful chemical oxidation action from generated sulfate and hydroxyl radicals
  - Rapid in situ chemical oxidation to target source and hot spot contaminate zones, typically lasting 3-6 months
- **The Performance of PermeOx Ultra**
  - Engineered calcium peroxide providing extended oxygen release for up to one year; longer than any other oxygen release compound available
  - Longevity delivers enhanced aerobic bioremediation in down gradient plumes

Examples of Contaminants of Concern
CHLORINATED SOLVENTS PCE, TCE, DCE, VC, TCA, DCA
PETROLEUM GRO, DRO, ORO, BTEX
PAHs Creosote, MGP residuals 1,4-dioxane, MTBE, TBA

The sound science of Klozur CR

Klozur CR provides self-activating Klozur persulfation oxidation technology, utilizing the alkalinity generated by calcium peroxide to achieve a pH in the range of 11. In addition, the calcium peroxide will slowly generate hydrogen peroxide allowing for peroxide activation of persulfate. High pH activated persulfate is capable of destroying a wide range of contaminants, including petroleum hydrocarbons and chlorinated solvents.

PeroxyChem

remediation@peroxychem.com | 1.866.860.4760 | peroxychem.com/remediation

Following the initial chemical oxidation phase, Klozur CR will continue to release oxygen to be used as an electron receptor for aerobic bioremeidaiton for up to a year, as a result of the slow hydration of the engineerd calcium peroxide. Diffusion and transport of oxygen downgradient will support contaminant reductions in plume areas, treating BTEX, PAH's and petroleum hydrocarbons.

As a result of the persulfate oxidation with organic compounds, generated sulfate ions can be utilized by sulfate reducting bacteria as an electron acceptor under anaerobic conditions to degrade BTEX, PAH's and petroleum hydrocarbons.

Application Methods

- Direct push injection
- Soil blending
- Direct application in an excavation

For more information and detailed case studies, please visit our website.

Klozur® CR
Demand Calculations

PeroxyChem

12-Jun-2014

Customer:	**Labella PC**	**Prepared by:**	
Contact:	**David K. Engert, CHMM**	**Ravi Srirangam PhD**	
Site Location:	**Breneman Site, Oswego, NY**	**1-312-480-5250**	
Proposal Number:	**PeroxyChem-OPP-2241**	**Ravi.Srirangam@peroxychem.com**	

PRODUCT OVERVIEW

Klozur® CR is a single, formulated product consisting of high pH - activated Klozur® Persulfate and PermeOx® engineered calcium peroxide, uniting the strengths of both products to treat contaminant source zones and down-gradient plumes. The Klozur® CR is formulated to provide a self-activated persulfate oxidation system which couples chemical oxidation with aerobic and anaerobic bioremediation processes that can last up to one year after applied.

Klozur® CR can be utilized as a combined remedy for the treatment of BTEX, MTBE, PAHs and petroleum hydrocarbons, or as a high-pH activated persulfate system for the destruction of chlorinated solvents and pesticides. As a result, the product can be readily applied to either source areas or plumes with mixed petroleum and chlorinated solvents contamination.

The product is supplied as a dry powder in 45-lb (20.4 kg) pails or 1,800-lb (816.5 kg) super sacs.

SITE INFORMATION / ASSUMPTIONS

	Value	Unit	Comment
Area of Treatment	1,250	ft x ft	customer supplied
Treatment Zone Thickness	6	ft	customer supplied
Treatment Volume	7,500	ft3	calculated value
Porosity	30	%	default value
Ground Water Volume	2,250	ft3	calculated value
Soil Density	115	lbs/ft3	default value
Soil Mass	431.25	ton	calculated value
Soil Oxidant Demand	1	g Klozur CR / kg soil	estimated value, it is recommend that this be analytically determined

CONTAMINANTS OF CONCERN (COCs)

Constituent	GW (mg/L)	Soil (mg/kg)	Total COI Mass (lb)
trimethylbenzene	0.1	48.375	41.7
ethylbenzene	0.05	16.625	14.3
toluene	0.05	6.75	5.8
xylene	0.05	48	41.4
propylbenzene	0.05	37.065	32.0

*Unless provided, sorbed concentrations were roughly estimated based on expected groundwater concentrations, foc and Koc values. For a more refined estimate, it is recommended that actual values be verified via direct sampling of the targeted treatment interval.

KLOZUR® CR DEMAND CALCULATIONS

Demand from COCs	4,230	lb
Demand from SOD	863	lb
Total Klozur® CR Demand	5,092	lb

KLOZUR® CR PACKAGING OPTIONS AND PRICING

Available Packaging Types	# of packages per pallet	Mass Klozur CR per pallet (lbs)	# of packages needed [1]
45 # pails	24	1,080	114
1,800 # super sacks	1	1,800	3

Available Packaging Types	Unit Rate [2] ($ / lb)	Total Mass (lbs)	Cost in USD [3, 4] (FOB Tonawanda, NY)
45 # pails	4.25	5,130	$21,802.50
1,800 # super sacks	4.25	5,400	$22,950.00

1) Number of packages needed is rounded up to nearest whole unit.

2) Price valid for 90 days from date at top of document. Terms: net 30 days.

3) Any applicable taxes not included. Please provide a copy of your tax exempt certificate or resale tax number when placing your order. In accordance with the law, applicable state and local taxes will be applied at the time of invoicing if PeroxyChem has not been presented with your fully executed tax exemption documentation.

4) Shipping not included. Freight rates from Tonawanda, NY available upon request. Standard delivery time can vary from 1-3 weeks from time of order, depending upon volume. Expedited transport can be arranged at extra cost.

5) All sales are per PeroxyChem's Terms and Conditions.

Disclaimer:

The estimated dosage and recommended application methodology described in this document are based on the site information provided to us, but are not meant to constitute a guaranty of performance or a predictor of the speed at which a given site is remediated. Klozur® CR demand calculations are based on stoichiometry, and do not take into account the kinetics, or speed of the reaction, and represent the minimum anticipated amount needed to mineralize the contaminants. As a result, these calculations should be used as a general approximation for initial economic assessment. PeroxyChem recommends that oxidant demand and treatability testing be performed to verify the quantities of oxidant needed.

INSTALLATION

The product is supplied as a dry powder which can be mixed with soil or slurried in water. Installation techniques vary widely depending on the application. For example, the powder can be directly mixed into the soil using deep soil mixing equipment or placed into an open excavation where prior soil removal had been conducted. A slurry can be made and the mixture can be injected into the subsurface using techniques such as direct injection through Geoprobe rods or hydraulic fracturing. Injection through fixed wells is not recommended given that the product does not fully dissolve in water.

Klozur CR Slurry Preparation (assuming 45 lb pails packaging)

The Klozur CR slurry can been prepared in a variety of ways, including using paddle mixers, recirculation and manual mixing using a hand-held drill with a mixing attachment. However, particularly for larger projects, we recommend having a mechanical mixing system available on site. In general we recommend continuous mixing in smaller batches (<100 USG / 400 L) to avoid settling of solids at the bottom.

The amount of water to prepare the Klozur CR slurry could be varied depending on the desired injection volume and slurry properties. When applied via direct injection, normally a concentration of between 10 and 30% is typically targeted. The below table shows the amount of water needed per 45-lb pail depepending on the targeted concentration and the resulting total injection volumes and percent pore fill (injection volume to total pore volume).

Target concentration (% solids):	10%	20%	30%
Mass Klozur CR per pail (lbs)	45	45	45
Volume water per pail (USG)	102	49	31
Volume slurry per pail (lbs)	52	24	15
Total mass Klozur CR (lbs)	5,130	5,130	5,130
Total volume water (USG)	11,681	5,533	3,484
Total injection volume (USG)	5,956	2,766	1,713
Resulting injection volume to total pore volume	35.3%	16.4%	10.2%

Preparation of Klozur CR Slurry

Concentration of Klozur CR slurry to inject	20%	by weight
Total volume of water required	2,459	U.S. gallons
Approximate volume of slurry to inject	2,769	U.S. gallons

Injection Details

Injection spacing	10	ft
Number of points required	13	locations
Mass Klozur CR per location	395	lbs
Volume slurry per location	213.0	U.S. gallons
Slurry volume to total pore space volume	16.5%	

SAFETY DATA SHEET
KLOZUR® CR

SDS # : 7775-27-1-2
Revision date: 2015-05-01
Format: NA
Version 1

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name	KLOZUR® CR

Other means of identification

Recommended use of the chemical and restrictions on use

Recommended Use:	In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications
Restrictions on Use:	No uses to be advised against were identified.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

Emergency telephone number

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Acute toxicity - Oral	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Respiratory sensitization	Category 1
Skin sensitization	Category 1
Specific target organ toxicity (single exposure)	Category 3
Oxidizing Solids	Category 2

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H318 - Causes serious eye damage
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H302 - Harmful if swallowed
H272 - May intensify fire; oxidizer

Precautionary Statements - Prevention

P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P271 - Use only outdoors or in a well-ventilated area
P285 - In case of inadequate ventilation wear respiratory protection
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P270 - Do not eat, drink or smoke when using this product
P264 - Wash face, hands and any exposed skin thoroughly after handling
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 - Keep/Store away from clothing/combustible materials
P221 - Take any precaution to avoid mixing with combustibles

Precautionary Statements - Response

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor
P302 + P352 - IF ON SKIN: Wash with plenty of water and soap
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P370 + P378 - In case of fire: Use water for extinction

Precautionary Statements - Storage

P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

Hazards not otherwise classified (HNOC)

No hazards not otherwise classified were identified.

Other Information

Risk of decomposition by heat or by contact with incompatible materials.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS-No	Weight %
Sodium Persulfate	7775-27-1	40-60
Proprietary ingredient	Proprietary	40-60
Calcium Hydroxide	1305-62-0	8 - 12

Synonyms are provided in Section 1.

4. FIRST AID MEASURES

General Advice	Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.
Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.
Inhalation	Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.
Ingestion	Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.
Most important symptoms and effects, both acute and delayed	Itching; Redness; Coughing and/ or wheezing
Indication of immediate medical attention and special treatment needed, if necessary	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Water. Cool containers with flooding quantities of water until well after fire is out.
Unsuitable extinguishing media	Do not use carbon dioxide or other gas filled fire extinguishers; they will have little effect on decomposing persulfate.
Specific Hazards Arising from the Chemical	Decomposes under fire conditions to release oxygen that intensifies the fire.

Explosion data

Sensitivity to Mechanical Impact	Not sensitive.
Sensitivity to Static Discharge	Not sensitive.
Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.
Other	Never add other substances or combustible waste to product residues. Containers of contaminated waste material should be monitored for signs of decomposition (fuming or smoking).

Environmental Precautions Knock down dust with water spray. Avoid penetration into waterways, sewers, soil or groundwater. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment Do not return product to the original storage container/tank due to risk of decomposition. Vacuum, shovel or pump waste into a drum and label contents for disposal. Store in closed container. Do not allow material to enter storm or sanitary sewer system.

Methods for cleaning up Clean up spill area and treat as special waste.

7. HANDLING AND STORAGE

Handling Wear personal protective equipment. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Avoid breathing dust. Remove and wash contaminated clothing before re-use. Reference to other sections.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Incompatible products Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m^3	-	-	-
Calcium Hydroxide 1305-62-0	TWA: 5 mg/m^3	TWA: 15 mg/m^3 TWA: 5 mg/m^3	TWA: 5 mg/m^3	Mexico: TWA 5 mg/m^3
Chemical name	**British Columbia**	**Quebec**	**Ontario TWAEV**	**Alberta**
Sodium Persulfate 7775-27-1	TWA: 0.1 mg/m^3	-	TWA: 0.1 mg/m^3	TWA: 0.1 mg/m^3
Calcium Hydroxide 1305-62-0	TWA: 5 mg/m^3	TWA: 5 mg/m^3	TWA: 5 mg/m^3	TWA: 5 mg/m^3

Appropriate engineering controls

Engineering measures Ensure adequate ventilation.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Eye protection recommended: Tightly fitting safety goggles.

Skin and Body Protection Wear suitable protective clothing. Protective shoes or boots.

Hand Protection Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber

Respiratory Protection Use only with adequate ventilation. Respirator must be worn if exposed to dust.

Hygiene measures Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Fine granules
Physical State	Solid
Color	Off-white
Odor	odorless
Odor threshold	Not applicable
pH	11.2 (1% solution)
Melting point/freezing point	Decomposes
Boiling Point/Range	No information available
Flash point	Not applicable
Evaporation Rate	No information available
Flammability (solid, gas)	Not flammable
Flammability Limit in Air	Not applicable
Upper flammability limit:	
Lower flammability limit:	
Vapor pressure	No information available
Vapor density	No information available
Density	No information available
Specific gravity	1.0 - 1.19 (5 to 30% slurries)
Water solubility	slightly soluble
Solubility in other solvents	No information available
Partition coefficient	No information available (inorganic)
Autoignition temperature	Product is not self-ignitable.
Decomposition temperature	> 100 °C (assume)
Viscosity, kinematic	No information available
Viscosity, dynamic	No information available
Explosive properties	Not explosive
Oxidizing properties	oxidizer
Molecular weight	No information available
Bulk density	51.8 lb/cu ft (loose)

10. STABILITY AND REACTIVITY

Reactivity	Strong oxidizer.
Chemical Stability	Stable under recommended storage conditions.
Possibility of Hazardous Reactions	Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief. Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated. Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.
Hazardous polymerization	Hazardous polymerization does not occur.
Conditions to avoid	Heat (decomposes at temperatures >100 °C); Moisture
Incompatible materials	Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials,
Hazardous Decomposition Products	None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Product Information

Proprietary ingredient and calcium hydroxide are not classified for acute toxicity

LD50 Oral	No data available for the formulation. 895 mg/kg (rat) Sodium Persulfate
LD50 Dermal	No data available for the formulation. > 10,000 mg/kg (rabbit) Sodium Persulfate
LC50 Inhalation	No data available for the formulation. = > 5.1 mg/L (4-hr) (rat) Sodium Persulfate
Sensitization	Sensitizing to skin and respiratory system. Positive in a local lymph node assay. (based on components).

Information on toxicological effects

Symptoms	Dust is irritating eyes, nose, throat, and lungs.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity	Not recognized as carcinogenic by Research Agencies (IARC, NTP, OSHA, ACGIH).
Mutagenicity	This product is not recognized as mutagenic by Research Agencies
Reproductive toxicity	This product is not recognized as reprotox by Research Agencies.
STOT - single exposure	May cause respiratory irritation.
STOT - repeated exposure	No information available.
Target organ effects	Eyes, Skin, Respiratory System.
Aspiration hazard	No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects

Sodium Persulfate (7775-27-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Sodium Persulfate	96 h LC50	Rainbow trout	163	mg/L
Sodium Persulfate	48 h LC50	Daphnia magna	133	mg/L
Sodium Persulfate	96 h LC50	Grass shrimp	519	mg/L
Sodium Persulfate	72 h EC50	Algae Selenastrum capricornutum	116	mg/L

Persistence and degradability	Biodegradability does not pertain to inorganic substances.
Bioaccumulation	Does not bioaccumulate.
Mobility	Dissociates into ions.
Other Adverse Effects	None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods	This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). It must undergo special treatment, e.g. at suitable disposal site, to comply with local

regulations. Containers of contaminated waste material should be monitored for signs of decomposition (fuming or smoking).

US EPA Waste Number	D001
Contaminated Packaging	Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S. (sodium persulfate, calcium peroxide)
Hazard class	5.1 (Oxidizer)
Packing Group	II
Reportable Quantity (RQ)	not applicable

TDG

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S. (sodium persulfate, calcium peroxide)
Hazard class	5.1
Packing Group	II

ICAO/IATA

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S. (sodium persulfate, calcium peroxide)
Hazard class	5.1
Packing Group	II

IMDG/IMO

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S. (sodium persulfate, calcium peroxide)
Hazard class	5.1
Packing Group	II

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic health hazard	No
Fire hazard	Yes
Sudden release of pressure hazard	No
Reactive Hazard	No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

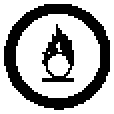
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

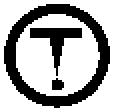
International Inventories

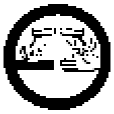
Component	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Sodium Persulfate 7775-27-1 (40-60)	X	X	X	X	X	X	X	X	X
Trade secret (40-60)	X	X	X	X	X	X	X	X	X
Calcium Hydroxide 1305-62-0 (8 - 12)	X	X	X	X	X	X	X	X	X

CANADA

WHMIS Hazard Class	C - Oxidizing materials D2A - Very toxic materials D2B - Toxic materials E - Corrosive material







16. OTHER INFORMATION

NFPA	**Health Hazards** 2	**Flammability** 0	**Stability** 1	**Special Hazards** OX
HMIS	**Health Hazards** 2	**Flammability** 0	**Physical hazard** 0	**Special precautions** J

NFPA/HMIS Ratings Legend	Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0 Protection=J (Safety goggles, gloves, apron, combination dust and vapor respirator)

Revision date:	2015-05-01
Revision note	Initial Release

Disclaimer

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Prepared By:

PeroxyChem

End of Safety Data Sheet

LaBella
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APPENDIX 4

Health & Safety Plan

LaBella
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Site Health and Safety Plan

Location:

Former Breneman Site
8 East Utica Street
Oswego, New York 13126

Prepared For:

Canalview Development, LLC
70 East First Street
Oswego, New York 13126

LaBella Project No. 2190490

March 2019

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SITE HEALTH AND SAFETY PLAN

Project Title: Former Breneman Site - Brownfield Cleanup Program

Project Number: 2190490

Project Location (Site): 8 East Utica Street, Oswego, New York

Environmental Director: Gregory Senecal, CHMM

Project Manager: Dave Engert, CHMM

Plan Review Date: ____

Plan Approval Date: ____

Plan Approved By: ____
Mr. Richard Rote, CIH

Site Safety Supervisor: To Be Determined

Site Contact: To Be Determined

Safety Director: Rick Rote, CIH

Proposed Date(s) of Field Activities: To Be Determined

Site Conditions: Sloping west, encompassing approximately 2.1044 acres

Site Environmental Information Provided By:

- Site Prioritization Report, Weston Solutions Inc., 2005
- Breneman Site Development Projects, Phase I Report, Nussbaumer and Clarke, Inc., 1996
- Final Draft Site Inspection Report, Halliburton NUS Environmental Corporation, 1991
- Preliminary Environmental Assessment of the Former Breneman Building O'Brien and Gere Engineers, Inc. 1991
- Final Site Remediation Report Brenneman Building, Environmental Products and Services, Inc.1990

Air Monitoring Provided By: LaBella Associates, P.C.

Site Control Provided By: Contractor(s)

EMERGENCY CONTACTS

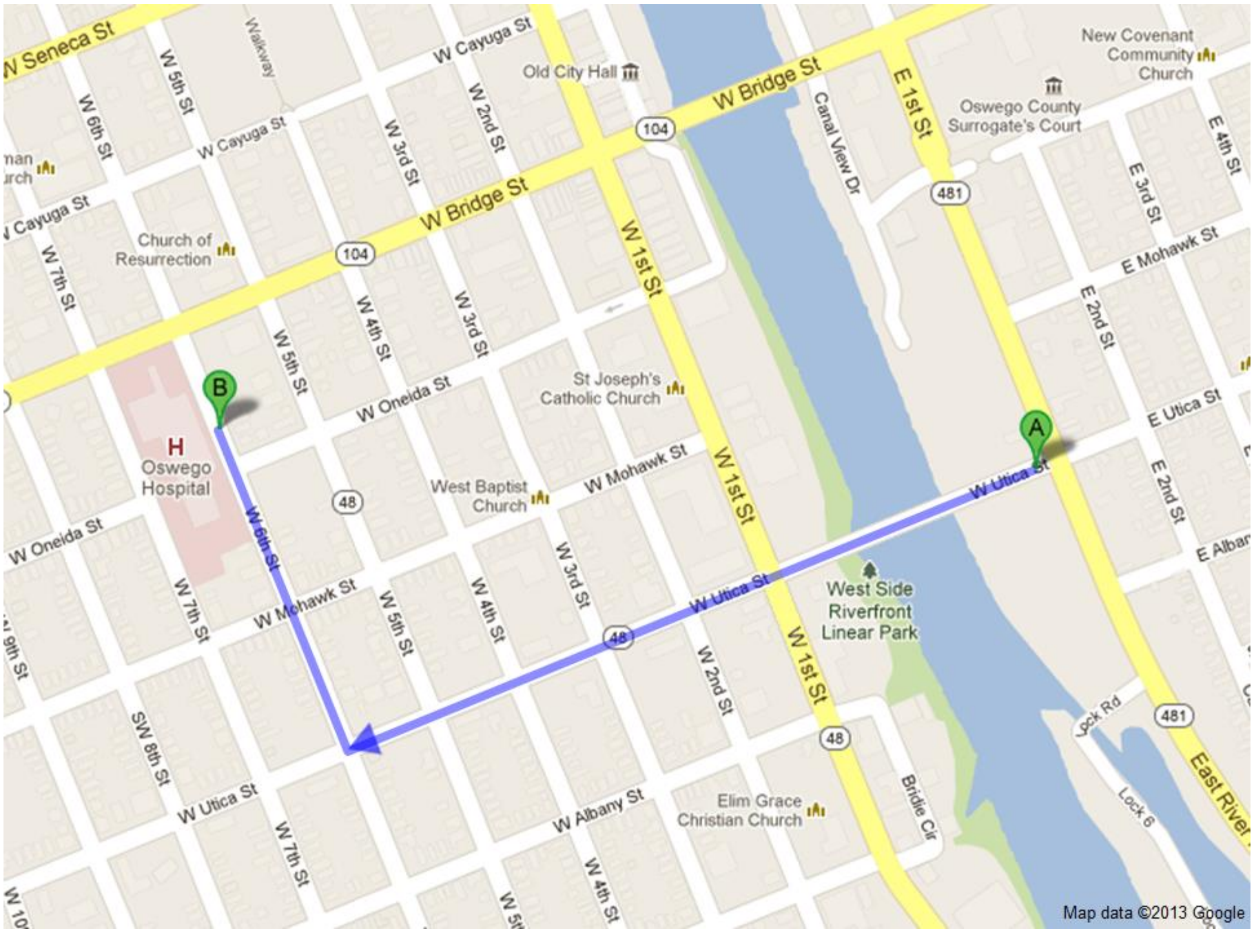
	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Oswego Hospital	315-349-5511
Poison Control Center:	Upstate Medical University	1-800-222-1222
Police (local, state):	Oswego County Sheriff	911
Fire Department:	Oswego Fire Department	911
Site Contact:	Shane Broadwell	315-343-1600
Agency Contact:	NYSDEC – Joshua Cook, P.E.	315-426-7400
	NYSDOH – Richard Jones	315-477-8148
	Poison Control Center	1-800-222-1222
Environmental Director:	Greg Senecal, CHMM	Direct: 585-295-6243 Cell: 585-752-6480 Home: 585-323-2142
Project Manager:	Dave Engert, CHMM.	Direct: 585-295-630 Cell: 585-737-3293
Site Safety Supervisor:	TBD	
Safety Director	Rick Rote, CIH	Direct: 585-295-6241

MAP AND DIRECTIONS TO THE MEDICAL FACILITY - OSWEGO HOSPITAL

Total Time: 4 minutes
Total Distance: 0.7 miles

Start: 8 East Utica Street, Oswego, NY 13126

START	1:	Start out going West on East Utica Street	0.5 mi
➡	2:	Turn RIGHT onto West Fifth Street.	0.2 mi
END	3:	End at 110 West Sixth Street Oswego, NY 13126	



1.0 Introduction

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the Remedial Investigation (RI) at the Site located at the Former Breneman Site, 8 East Utica Street in the City of Oswego, Oswego County, New York. This HASP only reflects the policies of LaBella Associates P.C. The requirements of this HASP are applicable to all approved LaBella personnel at the work site. This document's project specifications and the Community Air Monitoring Plan (CAMP) are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel and their authorized visitors. The Project Manager shall implement the provisions of this HASP for the duration of the project. It is the responsibility of LaBella employees to follow the requirements of this HASP, and all applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following:

- ☐ Management of environmental investigation and remediation activities
- ☐ Environmental Monitoring
- ☐ Collection of samples
- ☐ Management of excavated soil and fill.

4.0 Work Area Access and Site Control

The contractor(s) will have primary responsibility for work area access and site control. However, a minimum requirement for work area designation and control will consist of:

- Drilling (Geoprobe®/Rotary) – Orange cones to establish at least a 10-foot by 10-foot work area
- Test Pitting – Orange cones and orange temporary fencing to establish at least 10-feet of distance between test pit and fencing.

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed.

5.1 *Hazards Due to Heavy Machinery*

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, etc will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses and steel toe shoes are required.

5.2 *Excavation Hazards*

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Excavations that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0).

Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. All excavations will be backfilled by the end of each day. Additionally, no test pit will be left unattended during the day.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.3 *Cuts, Punctures and Other Injuries*

Potential Hazard:
In any excavation or construction, work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer

5.4 *Injury Due to Exposure of Chemical Hazards*

Potential Hazards:
Volatile organic vapors from petroleum products, chlorinated solvents or other chemicals may be encountered during excavation activities at the project work site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Protective Action:
The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of organic vapors are present. Air monitoring (refer to Section 9.0 and to the Modified CAMP in Appendix 7) of the work area will be performed at least every 60 minutes or more often using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained total volatile organic compound (VOC) readings of 25 ppm is encountered personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0).

5.5 *Injuries Due to Extreme Hot or Cold Weather Conditions*

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

5.6 *Potential Exposure to Asbestos*

Potential Hazards:
During ground intrusive activities (e.g., test pitting or drilling) soil containing asbestos may be encountered. Asbestos is friable when dry and can be inhaled when exposed to air.

Protective Action:
The presence of asbestos can be identified through visual observation of a white magnesium silicate material. If encountered, work should be halted and a sample of the suspected asbestos should be collected and placed in a plastic sealable bag. This sample should be sent to the asbestos laboratory at LaBella Associates for analysis.

5.7 *Potential Exposure to Thorium^{232}*

Potential Hazards:
During ground intrusive activities (e.g., test pitting or drilling) soil containing ^{232}Thorium may be encountered. ^{232}Thorium is a radioactive substance and poses an exposure risk to humans once encountered.

Protective Action:
Each test pit, soil sample, or other soil from the subsurface should initially be screened with the Ludlum meter to check the level of radiation on the soil as compared to the Site background level of radiation. Should the level of radiation on the soil sample exceed 2 times the Site background level, then work should be halted at the specified location and Mr. Rick Rote of LaBella Associates, P.C. should be contacted immediately (see page ii Emergency Contacts).

6.0 Work Zones

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor’s disposal container for disposal of PPE.

8.0 Personal Protective Equipment

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

> **Level D:**
> Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.
>
> **Level C:**
> Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

9.0 Air Monitoring

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring will consist at a minimum of the procedures described in Appendix 7 “Site Specific CAMP”. Please refer to the Site Specific CAMP for further details on air monitoring at the Site.

The Air Monitor will utilize a photoionization Detector (PID) to screen the ambient air in the work areas for total Volatile Organic Compounds (VOCs) and a DustTrak tm Model 8520 aerosol monitor or equivalent for measuring particulates. Work area ambient air will generally be monitored in the work area and downwind of the work area. Air monitoring of the work areas and downwind of the work areas will be performed at least every 60 minutes or more often using a PID, and the DustTrak meter.

If sustained PID readings of greater than 25 ppm are recorded in the breathing zone, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8-hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 25 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

If dust concentrations exceed the upwind concentration by 150 $\mu g/m^3$ (0.15 mg/m^3) consistently for a 10 minute period within the work area or at the downwind location, then LaBella personnel may not re-enter the work area until dust concentrations in the work area decrease below 150 $\mu g/m^3$ (0.15 mg/m^3), which may be accomplished by the construction manager implementing dust control or suppression measures.

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 Employee Training

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the remedial investigation must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

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APPENDIX 5

Community Air Monitoring Plan

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Community Air Monitoring Plan

Location:

Former Breneman Site
8 East Utica Street
Oswego, New York

Prepared For:

Canalview Development, LLC
70 East First Street
Oswego, New York 13126

LaBella Project No. 212038

March 2019

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1.0 INTRODUCTION

This Site Specific Community Air Monitoring Plan (CAMP) has been prepared by LaBella Associates, P.C. on behalf of Canalview Development, LLC (Canalview). This CAMP addresses potential Volatile Organic Vapor (VOC) and particulate emissions that may occur during implementation of the Remedial Investigation Work Plan (RIWP) at the Former Breneman Site, 8 East Utica Street, Oswego, New York which encompasses approximately 2.10 acres in the City of Oswego, Oswego County, New York herein after referred to as the "Site."

1.1 PURPOSE

Various levels of VOCs, semi-VOCs, and metals (collectively refered to as "constituents of concern (COCs)) have been detected in the soil and groundwater at the Site or are suspected to be contained in the soil and/or groundwater at the Site. The presence of these COCs through disturbance of soil and groundwater at the Site can potentially result in nuisance odors or health threats to the neighborhood in the immediate vicinity of the Site as well as to the various occupants of the Site.

This CAMP is specific to activities being conducted as part of the Remedial investigation at the Site. The CAMP describes the air monitoring activities to be completed in order to provide a measure of protection for any downwind receptors including Site occupants and occupants of neighboring properties. This CAMP is not intended to provide action levels for respiratory protection of workers involved with the RI. Rather, a Health & Safety Plan (HASP) has been developed and is included as Appendix 6 to the RIWP to cover workers directly involved with the RI work.

This CAMP includes the requirements of the New York State Department of Health (NYSDOH) Generic CAMP (included as Appendix 1A of the Draft DER-10 New York State Department of Environmental Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation dated December 2002).

Pursuant to the New York State Department of Environmental Conservation (NYSDEC) Technical Administrative Guidance Manual (TAGM) #4031 – Fugitive Dust Suppression and particulate Monitoring Program at Inactive Hazardous Waste Sites, (HWR-89-4031), this CAMP addresses methods that will be utilized to monitor particulate (dust) levels at the perimeter of, and within the work areas of the Site. If elevated levels of particulate emissions are encountered, this CAMP identifies the procedures that will be employed to mitigate elevated particulate levels.

Air monitoring procedures for these COCs are also included in this CAMP. Monitoring for COCs in, or near, the work areas of the Site will also be conducted per the HASP.

2.0 METHODOLOGY

This CAMP has been designed for remedial investigation activities at the Site. The CAMP pertains primarily to remedial investigation activities that disturb soil and groundwater at the Site. The following procedures will be implemented to monitor and, if necessary, mitigate the potential migration of fugitive particulate and/or COC emissions at the Site.

2.1 Site Background Monitoring

Each day of field work during the ground intrusive work a wind sock or flag will be used to monitor wind direction in the work areas. Based upon daily wind conditions three temporary monitoring points, one up wind, one downwind, and one in the direction of the closest sensitive receptor to the work areas, will be identified.

This CAMP will utilize a photoionization Detector (PID) to screen the ambient air in the work areas for total VOCs and a DustTrak tm Model 8530 aerosol monitor or equivalent for measuring particulates.

Each day, prior to the commencement of the ground intrusive work, background concentrations of particulates and VOCs will be measured and recorded as 15 minute averages at the identified three locations (one upwind, one downwind, and one in the direction of the closest sensitive receptor) with the typical equipment engines and any other gas/diesel engines operating on Site. This will be established as the Site background level for the day.

2.2 VOC Monitoring, Response Levels and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis. The PID will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.
4. All 15-minute readings will be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

2.3 Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone and on the east side of the Site at temporary particulate monitoring stations. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.
3. All readings will be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

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APPENDIX 6

Quality Assurance Project Plan

Quality Assurance Project Plan

Location:

Former Breneman Site
8 East Utica Street
Oswego, New York

Prepared For:

Canalview Development, LLC
70 East First Street
Oswego, New York 13126

LaBella Project No. 2190490

March 2019

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1. Introduction

This Quality Assurance Project Plan (QAPP) contains procedures which provide for collected data to be properly evaluated, and which document that quality control procedures have been followed in the collection of samples. The quality control program represents the methodology and measurement procedures used in collecting quality field data. This methodology includes the proper use of equipment, documentation of sample collection, and sample handling practices.

Procedures used in this QAPP are compatible with federal, state, and local regulations, as well as, appropriate professional and technical standards.

This QAPP has been organized into the following areas:

- QC Objectives and Checks
- Field Equipment, Handling, and Calibration
- Sampling Techniques
- Sample Handling and Packaging

It should be noted that the Remedial Investigation (RI) Work Plan may have project specific details that will differ from the procedures in this QC program. In such cases, the RI Work Plan should be followed (subsequent to regulatory approval).

2. Quality Control Objectives

The United States Environmental Protection Agency (EPA) has identified five general levels of analytical data quality as being potentially applicable to site investigations conducted under CERCLA. These levels are summarized below:

- **Level I -** Field screening. This level is characterized by the use of portable instruments, which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sampling locations.
- **Level II -** Field analysis. This level is characterized by the use of portable analytical instruments, which can be used on site or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.
- **Level III -** Laboratory analysis using methods other than the Contract Laboratory Program (CLP) Routine Analytical Services (RAS). This level is used primarily in support of engineering studies using standard EPA-approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP requirements for documentation.
- **Level IV -** CLP Routine Analytical Services. This level is characterized by rigorous QC protocols and documentation and provides qualitative and quantitative analytical data. Some regions have obtained similar support via their own regional laboratories, university laboratories, or other commercial laboratories.
- **Level V -** Non-standard methods. Analyses, which may require method modification and/or

development. CLP Special Analytical Services (SAS) are considered Level V.

Unless stated otherwise, all data will be generated in accordance with Level IV. When CLP methodology is not available, federal and state approved methods will be utilized. Level III will be utilized, as necessary, for non-CLP RAS work which may include ignitability, corrosivity, reactivity, EP toxicity, and other state approved parameters for characterization. Level I will be used throughout the RI for health and safety monitoring activities.

All measurements will be made to provide that analytical results are representative of the media and conditions measured. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations reporting similar data to allow comparability of data bases among organizations. Data will be reported in µg/L and mg/L for aqueous samples, and µg/kg and mg/kg (dry weight) for soils, or otherwise as applicable.

The characteristics of major importance for the assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. Application of these characteristics to specific projects is addressed later in this document. The characteristics are defined below.

2.1. Accuracy

Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

2.2. Precision

Precision is the degree of mutual agreement among individual measurements of a given parameter.

2.3. Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

2.4. Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition

Careful choice and use of appropriate methods in the field will ensure that samples are representative. This is relatively easy with water or air samples since these components are homogeneously dispersed. In soil and sediment, contaminants are unlikely to be evenly distributed, and thus it is important for the sampler and analyst to exercise good judgment when removing a sample.

2.5. Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data sets may be inter- or intra- laboratory.

3.0 Measurement of Data Quality

3.1. Accuracy

Accuracy of a particular analysis is measured by assessing its performance with "known" samples. These "knowns" take the form of EPA standard reference materials, or laboratory prepared solutions of target analytes spiked into a pure water or sample matrix. In the case of GC or GC/MS analyses, solutions of surrogate compounds, which can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination, are used.

In each case the recovery of the analyte is measured as a percentage, correcting for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA supplied known solutions, this recovery is compared to the published data that accompany the solution.

For the firm's prepared solutions, the recovery is compared to EPA-developed data or the firm’s historical data as available. For surrogate compounds, recoveries are compared to EPA CLP acceptable recovery tables.

If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate. The analyst or his supervisor must initiate an investigation of the cause of the problem and take corrective action. This can include recalibration of the instrument, reanalysis of the QC sample, reanalysis of the samples in the batch, or flagging the data as suspect if the problems cannot be resolved. For highly contaminated samples, recovery of the matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

3.2. Precision

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field and transported to the laboratory as distinct samples. Their identity as duplicates is sometimes not known to ASC and usually not known to bench analysts, so their usefulness for monitoring analytical precision at bench level is limited. For most purposes, precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample). Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantitation of precision is impossible. For EPA CLP analyses, replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD).

- Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix spike duplicate analyses.
- RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non homogeneity, analysis of check samples, etc. Follow-up action may include sample reanalysis or flagging of the data as suspect if problems cannot be resolved.
- During the data review and validation process (see Section 9), field duplicate RPDs are assessed as a measure of the total variability of both field sampling and laboratory analysis.

3.3. Completeness

Completeness for each parameter is calculated as follows:

- The firm's target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the site managers. In planning the field sample collection, the site manager will plan to collect field duplicates from identified critical areas. This procedure should assure 100% completeness for these areas.

3.4. Representativeness

The characteristic of representativeness is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representativeness of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representative of the site and the specific area. Within the laboratory, precautions are taken to extract from the sample bottle an aliquot representative of the whole sample. This includes premixing the sample and discarding pebbles from soil samples.

4. QC Targets

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and RPD of duplicates/replicates are included in the QAPP, Analytical Procedures. Note that tabulated values are not always attainable. Instances may arise where high sample concentrations, non homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the firm will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

5. Sampling Procedures

This section describes the sampling procedures to be utilized for each environmental medium that will be collected and analyzed in accordance with appropriate state and federal requirements. All procedures described are consistent with EPA sampling procedures as described in SW-846, third edition, September 1986. All samples will be delivered to the laboratory within 24 to 28 hours of collection.

6. Soil & Groundwater Investigation

The groundwater sampling plan outlined in this subsection has been prepared in general accordance with RCRA Groundwater Monitoring Technical Enforcement Guidance Document 9950.1 (September 1986), Office of Solid Waste and Emergency Response.

Prior to drilling, all drill sites will be cleared with appropriate utility companies to avoid potential accidents relating to underground utilities.

6.1. Test Borings and Well Installation

6.1.1. Drilling Equipment

<u>Direct Push Geoprobe® Soil Borings:</u>

Borings will be advanced with a Geoprobe® direct push sampling system. The use of direct push technology allows for rapid sampling, observation, and characterization of relatively shallow overburden soils. The Geoprobe® utilizes a four or five-foot macro-core sampler, with disposable polyethylene sleeves. Soil cores will be retrieved in four or five-foot sections, and can be easily cut from the polyethylene sleeves for observation and sampling. The macro-core sampler will be decontaminated between samples and borings using an alconox and water solution.

6.1.2. Drilling Techniques

<u>Direct Push Geoprobe® Advanced Borings:</u>

Prior to initiating drilling activities, the Geoprobe®, macro cores, drive rods, pertinent equipment, well pipe and screens will be steam cleaned or washed with an alconox and water solution followed by a clean water rinse. This cleaning procedure will also be used between each boring. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used to create a designated decontamination area. The drilling rig and all equipment will be steam cleaned upon completion of the investigation and prior to leaving the site.

Test borings will be advanced with 2-inch direct push macro-cores through overburden soils. Drilling fluids, other than water from a NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative.

It will be the responsibility of the consultant to arrange for the appropriate drilling equipment to be present at the site. Standby time to arrange for additional equipment or a water supply will not be allowed unless caused by unexpected site conditions.

During the drilling, a Photoionization detector (PID) will be used to monitor the gases exiting the hole. Macro-core cuttings will be contained if the PID meter readings are greater than 5 ppm above background or the cuttings show visible evidence of contamination, or as specified in the RI Work Plan.

6.1.3. Well Casing (Riser)

<u>Direct Push Geoprobe® Groundwater Monitoring Wells:</u>

Direct Push Geoprobe® advanced groundwater-monitoring wells will use 2.25-inch threaded flush joint PVC pipe.

6.1.4. Well Screen

<u>Direct Push Geoprobe® Groundwater Monitoring Wells:</u>

Direct Push Geoprobe® advanced groundwater-monitoring wells utilized 2.25-inch diameter well screen. Groundwater-monitoring wells will be set to intersect the top of the shallow overburden groundwater table. Each Geoprobe® advanced well will be equipped with 5 to 10 feet (based on anticipated groundwater level) of 0.020 inch slotted PVC screen connected to an appropriate length of PVC riser to complete the well installation.

6.1.5. Artificial Sand Pack

Granular backfill will be chemically and texturally clean (as determined using a 10x hand lens), inert, siliceous, and of appropriate grain size for the screen slot size and the host environment. Sand pack grain size will be selected based on sieve analyses of formation samples. The sand pack will be installed using a tremie pipe and the casing will be equipped with centralizers (wells 16 ft. or deeper only) to minimize the tendency for particle separation and bridging. Prior to casing and screen insertion, a minimum of 6-in of gravel-pack bedding will be placed in the bottom of the hole. The well screen and casing will be installed, and the sand pack placed around the screen and casing to a depth extending at least 25 percent of the screen length above the top of the screen, where possible.

6.1.6. Bentonite Seal

A minimum 2-foot thick seal of tamped bentonite pellets will be placed directly on top of the sand pack, and care will be taken to avoid bridging. The seal will be measured immediately after placement, without allowance for swelling. In the event that the bentonite seal cannot be 2-ft. thick due to a shallow water table, a seal at least 1-ft. thick will be set.

6.1.7. Grout Mixture

Upon completion of the bentonite seal, the well will be grouted with a non-shrinking cement grout (e.g., Volclay^{R}) mix to be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of Portland cement (ASTM C 150) and water, in the proportion of not more than 7 gallons of clean water per bag of cement (1 cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added, if permitted.

6.1.8 Surface Protection

At all times during the progress of the work, precautions shall be used to prevent tampering with or the entrance of foreign material into the well. Upon completion of the well, a suitable lockable cap shall be installed to prevent material from entering the well. The PVC well riser shall be protected by a flush mounted road box set into a concrete pad. A concrete pad, sloped away from the well, shall be constructed around the flush mount road box at ground level.

Any well that is to be temporarily removed from service or left incomplete due to delay in construction shall be capped with a watertight cap and equipped with a "vandal-proof" cover, satisfying applicable NYSDEC regulations or recommendations.

6.1.9. Surveying

Coordinates and elevations will be established for each monitoring well and sampling location. Elevations to the closest 0.01 foot shall be used for the survey. These elevations shall be referenced to a regional, local, or project-specific datum. USGS benchmarks will be used whenever available. The location, identification, coordinates, and elevations of the wells will be plotted on maps with a scale large enough to show their location with reference to other structures at each site.

6.1.10. Well Development

After completion of the well, but not sooner than 24 hours after grouting is completed, development will be accomplished using pumping, bailing, or surge blocking. No dispersing agents, acids, disinfectants, or other additives will be used during development or introduced into the well at any other time. During development, water will be removed throughout the entire water column by periodically lowering and raising the pump intake (or bailer stopping point).

Well development will include washing the entire well cap and the interior of the well casing above the water table, using only water from the well itself. As a result of this operation, the well casing will be free of extraneous materials (grout, bentonite, and sand) inside the riser, well cap, and blank casing between top of the well casing and water table. This washing will be conducted before and/or during development; not after development. Development water will be either properly contained and treated as waste until the results of chemical analysis of samples are obtained or discharged on site as determined by the site-specific work plans and/or consultation with the NYSDEC representatives on site.

Development will be completed by removing the approximate volume of water introduced during drilling (if any) and an additional five (5) well volumes. Well development will be performed using dedicated bailers and/or pumping equipment (depending on volumes), and will continue until groundwater turbidity reaches 50 National Turbidity Units (NTUs), or lower. In the event that 50 NTUs is not reached after removing a reasonable number of well volumes (10), the NYSDEC will be contacted to request ceasing development. If dedicated equipment is not used, then the equipment will be decontaminated between each well (alconox wash with potable water rinse). If the NYSDEC Project Manager agrees that removal of this volume of water is impractical, then LaBella will work with NYSDEC to develop an alternate well development protocol.

7. Geologic Logging and Sampling

At each soil boring location, the boring will be advanced through overburden using either a drill rig and hollow-stem auger or direct push technology; soils will be visually inspected for stains and monitored with a PID to help determine potential for vertical migration of contaminants. Soil samples will be collected continuously in both the unsaturated soil zone and the saturated zone. Selected wells will be sampled continuously over the entire depth of the well. The sampling device will be decontaminated according to procedures outlined in the Decontamination section of this document. Soil samples will be screened in the field for volatile organic vapors using a PID, classified in accordance with Unified Soil Classification System (USCS) specifications, and logged. Samples will be stored in glass jars until they are needed for testing or the project is complete.

Hydrogeologic suitability for well emplacement will be determined by the supervising geologist in consultation with NYSDEC, based on thickness and estimated hydraulic conductivity of the saturated zone encountered. If necessary, the borehole will be advanced to water or abandoned.

8. Hydraulic Conductivity Testing Procedures

If necessary, single-well, rising head tests will be performed in order to determine the in-place hydraulic conductivity of unconsolidated and/or consolidated geologic materials, which occur in the monitoring interval of newly installed wells. The tests will be performed by a qualified hydrogeologist. These tests involve lowering the water level in the well and measuring the change in head with respect to time as the well is allowed to recover. In wells which are slow to recover, the water level will be bailed down as described below. The measurements in these wells will be taken manually. Wells which recover too quickly for this method will be tested by removing one bailer of water and the recovery measured by means of a pressure transducer system.

The rising head tests for wells with rapid recovery rates will be conducted as follows:

- The static water level in the well to be tested is measured and recorded;
- A pressure transducer is placed in the well to a minimum depth of three feet below the static water level;
- Readings are made using the data logger until three consecutive readings are the same (equilibrium conditions);
- The data logger is then calibrated to read 0.00 feet at static conditions. A pre-cleaned bailer is then lowered into the well and placed just below the water surface.
- Water level measurements are made until the water level returns to static conditions following introduction of the bailer. If static conditions are not reached within 15 minutes following introduction of the bailer, the well will be tested using the procedures described below for slow recovery wells;
- Once static conditions are reestablished, the bailer is rapidly removed from the water column thereby creating an instantaneous decline of the water level in the well. Coincident with the withdrawal of the bailer, automatic logging of the water levels is initiated using the data logger. The primary goal in the recovery test is to "instantaneously" remove a volume of water that will result in a measurable head decline, the recovery of which (to static conditions) can be monitored over time. Such an instantaneous withdrawal results in recovery due to contributions of flow from the surrounding formation. This flow is controlled by its hydraulic conductivity and not by other factors such as storage effects;
- The water level measurements will continue until water levels recover to within a minimum of 10 percent of the original static water level (90 percent recovery), or an elapsed time of one hour. If the well has not recovered to static conditions after one hour at the discretion of the hydrogeologist, the transducer will be removed and the well will be tested at a later date using the procedures described below for slow recovery wells.
- Data stored in the data loggers will be "dumped" to a hard copy printout using a field printer or to a magnetic disk using a portable computer. If field printouts are used, they will be dated and signed by the hydrogeologist.

For wells with slow recovery rates, the following procedures will be used:

- The static water level is measured and recorded;
- The well is bailed by hand until the depth to water appears to stabilize based on the depth of travel of the bailer rope or to the top of the open or screened interval in wells which are screened below the standing water level;
- The bailer is then removed and water level measurements are collected by hand (measuring tape or electronic water level indicator) at a frequency, which will provide approximately 15 to 20 data, points during recovery (to within 10 percent of the total drawdown), if feasible. Water level measurements are recorded on the hydraulic conductivity testing report.
- A pre-cleaned bailer (one for each well) will be used in the rising head testing. All equipment entering the well, such as the transducer and transducer cable, will be cleaned prior to reuse in accordance with the Decontamination section below. All well water and rinse water generated by the tests will be collected in appropriate containers and disposed of in accordance with the Investigation Derived Materials section below.
- The data from both types of rising head tests will be reduces and evaluated.

- The following equation will be used to calculate the in-situ hydraulic conductivity of the formation opposite the interval of the piezometer (Hvorslev, 1951).

$$k = d^2 \ln \frac{\left[\frac{2mL}{D}\right]}{8L(t_2 - t_1)} \ln \frac{H_1}{H_2}$$

Where:

K = hydraulic conductivity (ft./min.)
d = casing diameter (ft.)
L = intake length (ft.)
D = intake diameter (ft.)
t_1 = time 1 from semilog graph (min.)
t_2 = time 2 from semilog graph (min.)
H_1 = residual head (ft.) corresponding to t_1
H_2 = residual head (ft.) corresponding to t_2
m = square root of the ratio of horizontal to vertical permeability (an estimated value)

9. Groundwater Sampling Procedures

The groundwater in all new and existing monitoring wells will be allowed to stabilize for 7 days following development and permeability testing. Water levels will be measured to within 0.01 feet prior to purging and sampling. A temporary staff gauge or other surface water elevation measuring device will be established on any nearby surface water body, which may significantly influence groundwater movement. The surface elevation of these water bodies will be checked whenever groundwater elevations are measured. Purging and sampling of each well will be accomplished using precleaned dedicated PVC bailers on new polypropylene line. Purging will be less aggressive than development to avoid turbidity problems (e.g., avoid "free-falling" bailers). In general, wells will be purged until the pH, conductivity, temperature, and turbidity of the water being pumped from the well have stabilized. All wells will be purged of at least three well-bore volumes or to dryness.

Groundwater samples will be collected according to the following procedures and in the volumes specified in Table 5-1:

- Water clarity will be quantified during sampling with a turbidity meter;
- When transferring water from the bailer or pump line to sample containers, care will be taken to avoid agitating the sample, since agitation promotes the loss of volatile constituents;
- Any observable physical characteristics of the groundwater (e.g., color, sheen, odor, turbidity) at the time of sampling will be recorded; and
- Weather conditions (i.e., air temperature, sky condition, recent heavy rainfall, drought conditions) at the time of sampling will be recorded.

All groundwater samples and their accompanying QC samples will be run for volatile organic chemicals using NYSDEC ASP 91-1.

10. Geotechnical Sampling

If necessary, a grain size analysis will be conducted by sieving for two non-cohesive units, and Atterberg limits for one cohesive unit, (ASTM methods D 4318-84 and D 422-63, respectively) in each borehole. Grain size analysis by hydrometer will be performed on soils where 20 percent of the sample is less than No. 200 sieve size (i.e., silt or clay). Site-specific work plans indicate specific sampling requirements for physical or geotechnical testing.

Remolded permeability samples will be analyzed in accordance with ASTM D-5084.

11. Management of Investigative-Derived Waste

Purpose:

The purposes of these guidelines are to ensure the proper holding, storage, transportation, and disposal of materials that may contain hazardous wastes. Investigation-derived waste (IDW) included the following:

- Drill cuttings, discarded soil samples, drilling mud solids, and used sample containers;
- Well development and purge waters and discarded groundwater samples;
- Decontamination waters and associated solids;
- Soiled disposable personal protective equipment (PPE);
- Used disposable sampling equipment;
- Used plastic sheeting and aluminum foil;
- Other equipment or materials that either contain or have been in contact with potentially-impacted environmental media.
- Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated id characterization analytical results indicate the absence of these constituents.

Procedure:

1. Contain all investigation-derived wastes in Department of Transpiration (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.
2. Contain wastes from separate borings or wells in separate containers (i.e. do not combine wastes from several borings/wells in a single container, unless it is a container used specifically for transfer purposes, or unless specific permission to do so has been provided by the LaBella Project Manager. Unused samples from surface sample locations within a given area may be combined.
3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Pending transfer, all containers will be covered and secured when not immediately attended,
6. Label all containers with regard to contents, origin, and date of generation. Use indelible ink for all labeling.

7. Collect samples for waste characterization purposes, use boring/well sample analytical data for characterization.

8. For wastes determined to be hazardous in character, be aware on accumulation time limitations. Coordinate the disposal of these wastes with the Owner and NYSDEC.

9. Dispose of investigation-derived wastes as follows;

   - Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels consistent with background, may be spread on-site or otherwise treated as a non0-waste material.
   - Soils, water, and other environmental media in which organic compounds are detected or metals are present above background will be disposed as industrial waste. Alternate disposition must be consistent with applicable State and Federal laws.

   - Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate disposal as industrial wastes

12. Decontamination

Sampling methods and equipment have been chosen to minimize decontamination requirements and to prevent the possibility of cross-contamination. Decontamination of equipment will be performed between discrete sampling locations. Equipment used to collect composite samples will not require decontamination between sub-sample collection; however decontamination of equipment will be performed between separate composite samples. All drilling equipment will be decontaminated prior to drilling, after drilling each monitoring well, and after the completion of all drilling. Special attention will be given to the drilling assembly, augers, and PVC casing and screens.

Drilling decontamination will consist of:

- Steam cleaning;
- Scrubbing with brushes, if soil remains on equipment; and
- Steam rinse.

Split spoons and other non-disposable equipment will be decontaminated between each sampling event. The sampler will be cleaned prior to each use, by one of the following procedures:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner;

OR

- Initially cleaned of all foreign matter;
- Scrubbed with brushes in trisodium phosphate or alconox solution;
- Rinsed with deionized water;
- Rinsed with pesticide grade methanol;
- Triple rinsed with deionized water; and
- Allowed to air dry.

13. Sample Containers

The volumes and containers required for the sampling activities are included in pre-washed sample containers will be ordered directly from a firm, which prepares the containers in accordance with EPA bottle washing procedures.

Table 1

Water Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics	40-ml glass vial with Teflon-backed septum	Two (2); fill completely, no air space	Cool to 4° C (ice in cooler), Hydrochloric acid to pH <2	7 days
Semivolatile Organics	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Pesticides	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
PCBs	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Metals	500-ml polyethylene	One (1); fill completely	Cool to 4° C (Nitric acid to pH <2	6 months

* Holding time is based on verified time of sample receipt at laboratory.

Note: *All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992*

TABLE 2

Soil Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics, Semivolatile Organics, PCBs, and Pesticides	8-oz, glass jar with Teflon-lined cap	Two (2), fill as completely as possible	Cool to 4° C (ice in cooler)	7 days
RCRA Characterization	8-oz. glass jar with Teflon-lined cap	One (1); fill completely	Cool to 4° C (ice in cooler)	Must be extracted within 10 days; analyzed with 30 days

* Holding time is based on the times from verified time of sample receipt at the laboratory.

Note: *All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992.*

TABLE 3

List of Major Instruments for Sampling and Analysis

- MSA 360 0_2 /Explosimeter
- S.E. International Radiation Monitor Model 4C
- Photovac Micro Tip FID or PID
- Organic Vapor Analyzer Foxboro (128)
- Hollige Series 963 Nephlometer (turbidity meter)
- EM-31 Geomics Electromagnetic Induction Device
- pH/Temperature/Conductivity Meter - Portable
- Hewlett Packard (HP) 1000 computer with RTE-6 operating system; and HP 9144 computer with RTE-4 operating system equipped with Aquarius software for control and data acquisition from gas chromatograph/mass spectrometer (GC/MS) systems; combined wiley and National Bureau of Standards (NBS) mass spectral library; and data archiving on magnetic tape
- Viriam 6000 and 37000 gas chromatrographs equipped with flame ionization, electron capture, photoionization and wall detectors as appropriate for various analyses,, and interfaced to Variam DS604 or D5634 data systems for processing data.
- Spectra-Physics Model SP 4100 and SP 4270 and Variam 4270 cam puting integrators
- Perkin Eimer (PE) 3000% and 3030% fully Automated Atomic Absorption Spectrophotometers (AAS) with Furnace Atomizer and background correction system
- PE Plasma II Inductively Coupled Argon Plasma (ICAP) Spectre meter with PE7500 laboratory computer
- Dionex 20001 ion chromatograph with conductivity detector for anion analysis, with integrating recorder

14. Sample Custody

This section describes standard operating procedures for sample identification and chain-of-custody to be utilized for all Phase II field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during their collection, transportation, and storage through analysis. All chain-of-custody requirements comply with standard operating procedures indicated in EPA sample handling protocol.

Sample identification documents must be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks,
- Sample label,
- Custody seals, and
- Chain-of-custody records.

15. Chain-of-Custody

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

15.1. Field Custody Procedures

- As few persons as possible should handle samples.
- Sample bottles will be obtained precleaned from a source such as I-Chem. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.
- The sample collector will record sample data in the notebook.
- The site manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

15.2. Sample Tags

Sample tags attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample tags are to be placed on the bottles so as not to obscure any QC lot numbers on the bottles; sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the logbook. For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as "real" samples.

15.3. Transfer of Custody and Shipment

- The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain-of-custody record. This record documents sample custody transfer
- Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the chain-of-custody record and traffic reports.
- All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment. The other copies are distributed appropriately to the site manage.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bill of lading are retained as part of the permanent documentation.

15.4. Chain-of-Custody Record

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the "Remarks" section of the record.

15.5. Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identification number matches that on the chain-of-custody record and traffic reports, if required. Pertinent information as to shipment, pickup, and courier is entered in the "Remarks" section.

15.6. Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. On receipt at the laboratory, the custodian must check (and certify, by completing the package receipt log and LABMIS entries) that seals on boxes and bottles are intact. Strapping tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

16. Documentation

16.1. Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container (labels are to be covered with Mylar tape):

XX-YY-O/D

- XX This set of initials indicates the specific Phase II sampling project
- YY These initials identify the sample location. Actual sample locations will be recorded in the task log.
- O/D An "O" designates an original sample; "D" identifies it as a duplicate.

Each sample will be labeled, chemically preserved, if required and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers and protected with Mylar tape. The sample label will give the following information:

- Name of sampler,
- Date and time of collection,
- Sample number,
- Analysis required,
- pH, and
- Preservation.

16.2. Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct event that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. All daily logs will be kept in a bound waterproof notebook containing numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason. Corrections will be made according to the procedures given at the end of this section. The daily logs will include a site log and task log.

The site log is the responsibility of the site manager and will include a complete summary of the day's activity at the site.

The **Task Log** will include:

- Name of person making entry (signature).
- Names of team members on-site.
- Levels of personnel protection:
  - Level of protection originally used;
  - Changes in protection, if required; and
  - Reasons for changes.
- Time spent collecting samples.
- Documentation on samples taken, including:
  - Sampling location and depth station numbers;
  - Sampling date and time, sampling personnel;
  - Type of sample (grab, composite, etc.); and
  - Sample matrix.
- On-site measurement data.
- Field observations and remarks.
- Weather conditions, wind direction, etc.
- Unusual circumstances or difficulties.

- Initials of person recording the information.

17. Corrections to Documentation

17.1. Notebook

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

17.2. Sampling Forms

As previously stated, all sample identification tags, chain-of-custody records, and other forms must be written in waterproof ink. None of these documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the corrected information. The incorrect information should not be obliterated. Any subsequent error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

17.3. Photographs

Photographs will be taken as directed by the site manager. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be noted in the task log concerning photographs:

- Date, time, location photograph was taken;
- Photographer (signature);
- Weather conditions;
- Description of photograph taken;
- Reasons why photograph was taken;
- Sequential number of the photograph and the film roll number; and
- Camera lens system used.

After the photographs have been developed, the information recorded in the field notebook should be transferred to the back of the photographs

18. Sample Handling, Packaging, and Shipping

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulation, 49 CFR 171 through 177. All samples will be delivered to the laboratory with 24 to 48 hours from the day of collection.

All chain-of-custody requirements must comply with standard operating procedures in the EPA sample handling protocol. All sample control and chain-of-custody procedures applicable to the Consultant are presented in the Field Personnel Chain-of-Custody Documentation and Quality Control Procedures Manual, January 1992.

18.1. Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample volume level can be marked by placing the top of the label at the appropriate sample height, or with a grease pencil. This procedure will help the laboratory to determine if any leakage occurred during shipment. The label should not cover any bottle preparation QC lot numbers.
- All sample bottles are placed in a plastic bag to minimize the potential for vermiculite contamination.
- Shipping coolers must be partially filled with packing materials and ice when required, to prevent the bottles from moving during shipment.
- The sample bottles must be placed in the cooler in such a way as to ensure that they do not touch one another.
- The environmental samples are to be cooled. The use of "blue ice" or some other artificial icing material is preferred. If necessary, ice may be used, provided that it is placed in plastic bags. Ice is not to be used as a substitute for packing materials.
- Any remaining space in the cooler should be filled with inert packing material. Under no circumstances should material such as sawdust, sand, etc., be used.
- A duplicate custody record and traffic reports, if required must be placed in a plastic bag and taped to the bottom of the cooler lid. Custody seals are affixed to the sample cooler.

18.2. Shipping Containers

Shipping containers are to be custody-sealed for shipment as appropriate. The container custody seal will consist of filament tape wrapped around the package at least twice and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking a seal.

Field personnel will make arrangements for transportation of samples to the lab. When custody is relinquished to a shipper, field personnel will telephone the lab custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis. The lab must be notified as early in the week as possible, and in no case later than 3 p.m. (EST) on Thursday, regarding samples intended for Saturday delivery.

18.3. Marking and Labeling

- Use abbreviations only where specified.
- The words "This End Up" or "This Side Up" must be clearly printed on the top of the outer package. Upward pointing arrows should be placed on the sides of the package. The words "Laboratory Samples" should also be printed on the top of the package.

- After a sample container has been sealed, two chain-of-custody seals are placed on the container, one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over then.
- If samples are designated as medium or high hazard, they must be sealed in metal paint cans, placed in the cooler with vermiculite and labeled and placarded in accordance with DOT regulations.
- In addition, the coolers must also be labeled and placarded in accordance with DOT regulations if shipping medium and high hazard samples.

19. Calibration Procedures and Frequency

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Documentation of all routine and special maintenance and calibration information will be maintained in an appropriate logbook or reference file, and will be available on request. Table 7-1 lists the major instruments to be used for sampling and analysis. Brief descriptions of calibration procedures for major field and laboratory instruments follow.

20. Field Instrumentation

20.1. Photovac Micro Tip Flameionizer (FID)

Standard operating procedures for the FID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

20.2. Photovac/MiniRea Photoionization Detector (PID)

Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

20.3. Organic Vapor Analyzer

Organic vapor analyzers (OVAs) are calibrated and routine maintenance performed every six months when the units are not in use. Calibration is performed and the major system checks are performed prior to the instrument being released for field use.

Calibration of the OVA 128 GC must be performed by a factory-authorized service representative. The instrument is removed from its protective case and the probe is connected to the base unit. After checking for an airtight seal in the sample line (plugging the sample inlet to stop the pump), the hydrogen supply is turned on and the pressure is set to 10 psi. The electronics are turned on and the instrument is allowed to warm up for at least 5 minutes. After warm up, the instrument is zeroed on the "X10" scale using the adjust knob. The flame is then lit and a gas-tight sample bag is filled with a mixture of 100 ppm methane in air. The sample bag is then attached to the probe inlet and the internal pump is allowed to draw in as much sample as is needed. R32 on the control board is adjusted to read 100 ppm on the "X10" scale and then the hydrogen supply is shut down. The pump can now be turned off and the sample bag removed. Using the adjust knob, the meter is set to read 4 ppm on the "X1" scale. Switching back to the "X10" scale the adjust knob is again used to set the meter to 40 ppm. The scale is then set to "X100" and R33 is adjusted until the meter reads 40 ppm on the "X100" scale.

The OVA has a detection limit of 0.1 ppm in methane equivalents and a working range of 0 to 1,000 ppm. During daily field use, system checks are performed which involve calibration and maintenance of the pump systems, gases, and filters. Care is taken to check for and prevent clogging or leaks. Quad rings and the burner chamber are examined on a weekly basis. Routine biannual maintenance includes a thorough cleaning as well as a re-examination of the pump system for leaks and wear. Parts are replaced as necessary. Instrument operation is verified by calibrating and running the OVA for 4 to 6 hours. An instrument specific logbook is maintained with the OVA to document its use and maintenance.

20.4. Conductance, Temperature, and pH Tester

Temperature and conductance instruments are factory calibrated. Temperature accuracy can be checked against an NBS certified thermometer prior to field use if necessary. Conductance accuracy may be checked with a solution of known conductance and recalibration can be instituted, if necessary.

To recalibrate conductance, remove the black plug revealing the adjustment potentiometer screw. Add standard solution to cup, discard and refill. Repeat procedure until the digital display indicates the same value twice in a row. Adjust the potentiometer until the digital display indicates the known value of conductance. To increase the digital display reading, turn the adjustment potentiometer screw counter-clockwise (clockwise to decrease).

To standardize the pH electrode and meter, place the pH electrode in the 7.0 buffer bottle. Adjust the "ZERO" potentiometer on the face of the tester so that the digital display indicates 7.00.

Then place the pH electrode in the 4.0 or 10.0 buffer bottle (depending on where you expect the actual measurement to be). Adjust the "SLOPE" potentiometer on the face of the tester so that the digital display indicates the value of the buffer chosen.

Note: There is interaction between the "ZERO" and "SLOPE" adjustments, so the procedure should be repeated several times.

Do not subject the pH electrode to freezing temperatures.

It is good practice to rinse the electrode in distilled water when going from one buffer to another. When not in use the cap should be kept on the electrode. Keeping the cotton in the cap moist will keep the electrode ready to use. Moisten the cotton frequently (once a week, usually).

20.5. 0_2/Explosimeter

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt (V) nickel cadmium battery. The battery is recharged by removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V AC outlet.

The battery can also be recharged using a 12V DC source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours.

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the LEL meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow; remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.
6. Close the flow control valve.
7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease, or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate, or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

20.6. Nephelometer (Turbidity Meter)

The Series 95 nephelometer is calibrated before each use. Allow the instrument to warm up for approximately 2 hours. Using turbidity-free deionized water, zero the meter. Set the scale to 100, fill with a 40 NTU standard (AEPA-1 turbidity standard from Advanced Polymer Systems, Inc.), and insert into the instrument. Adjust the standardize control to give a readout of 200. Re-zero the instrument and repeat these steps with the scale set at 10 and 1 using 4.0 and 0.4 NTU standards, respectively. These standards are prepared by diluting aliquots of the 40 NTU standard.

20.7. S.E. International Radiation Monitor Model 4EC

This radiation monitor detects alpha, beta, gamma, and X-rays. The analog meter is scaled in CPM (counts per minute) or mR/hr (milli-Roentgens per hour), and the X1, X10, X100 switch extends the effective measurement range. This handheld unit is powered by a single 9-volt battery that offers up to 2,000 hours of operation.

21. Internal Quality Control Checks

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of field equipment. Field-based QC will comprise at least 10% of each data set generated and will consist of standards, replicates, spikes, and blanks. Field duplicates and field blanks will be analyzed by the laboratory as samples and will not necessarily be identified to the laboratory as duplicates or blanks. For each matrix, field duplicates will be provided at a rate of one per 10 samples collected or one per shipment, whichever is greater. Field blanks which consist of trip, routine field, and rinsate blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater.

Calculations will be performed for recoveries and standard deviations along with review of retention times, response factors, chromatograms, calibration, tuning, and all other QC information generated. All QC data, including split samples, will be documented in the site logbook. QC records will be retained and results reported with sample data.

21.1. Blank Samples

Blank samples are analyzed in order to assess possible contamination from the field and/or laboratory so that corrective measures may be taken, if necessary. Field samples are discussed in the following subsection:

21.2. Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. The following types of blanks may be used: the trip blank, the routine field blank, and the field equipment blank. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination. Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

- **Routine Field Blanks** or bottle blanks are blank samples prepared in the field to access ambient field conditions. They will be prepared by filling empty sample containers with deionized water and any necessary preservatives. They will be handled like a sample and shipped to the laboratory for analysis.
- **Trip Blanks** are similar to routine field blanks with the exception that they are **not** exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. For the RI/FS, one trip blank will be collected with every batch of water samples for volatile organic analysis. Each trip blank will be prepared by filling a 40-ml vial with deionized water prior to the sampling trip, transported to the site, handled like a sample, and returned to the laboratory for analysis without being opened in the field.
- **Field Equipment Blanks** are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

21.3. Field Duplicates

Field duplicate samples consist of a set of two samples collected independently at a sampling location during a single sampling event. In some instances the field duplicate can be a blind duplicate, i.e., indistinguishable from other analytical samples so that personnel performing the analyses are not able to determine which samples are field duplicates. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

21.4. Quality Control Check Samples

Inorganic and organic control check samples are available from EPA free of charge and are used as a means of evaluating analytical techniques of the analyst. Control check samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized.

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