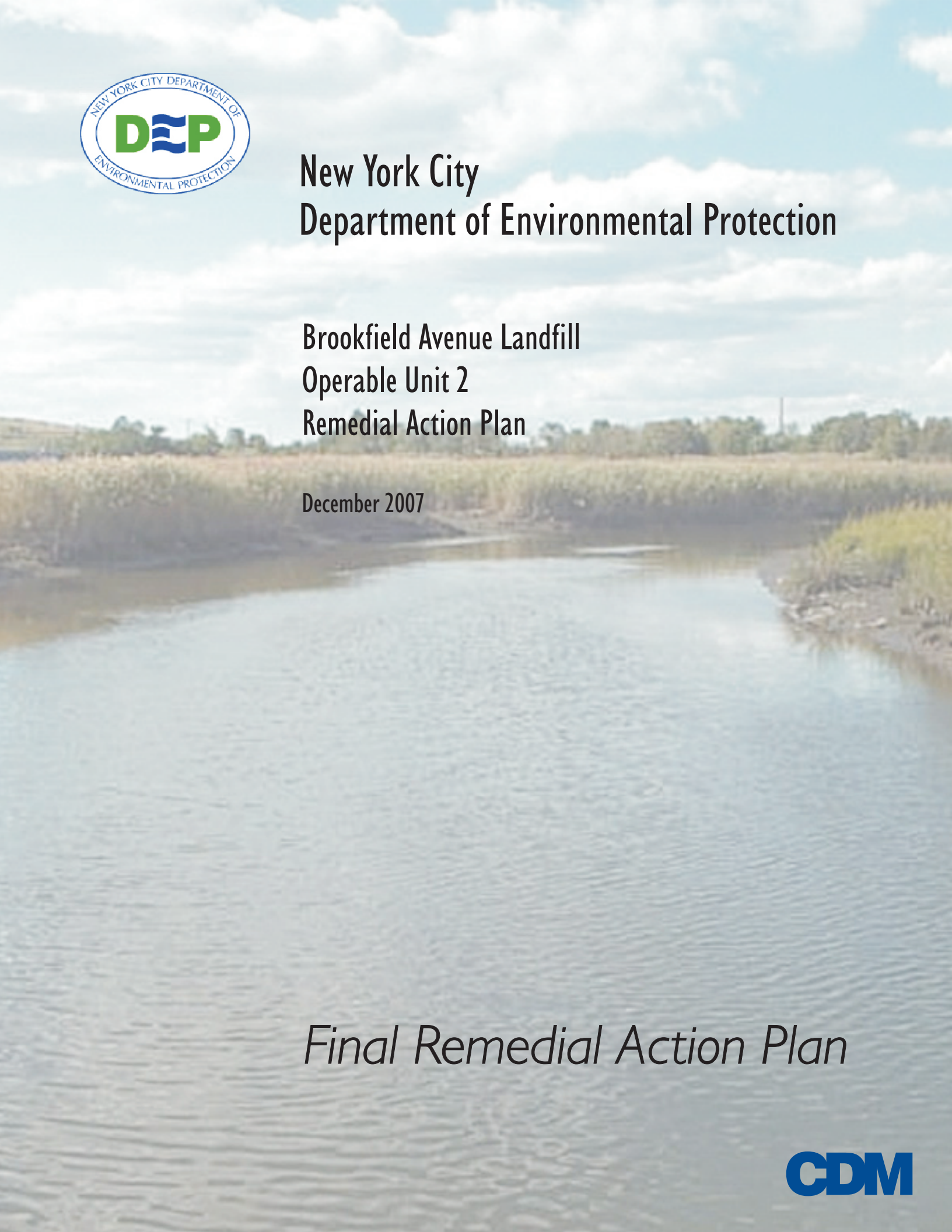

New York City Department of Environmental Protection

Brookfield Avenue Landfill
Operable Unit 2
Remedial Action Plan

December 2007

Final Remedial Action Plan

CDM

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Attachments

***Attachment A* Health and Safety Plan (HASP)**
[Because the monitoring portion of the OU2 remedy will not begin until approximately 2020, a HASP has not been included at this time.]

***Attachment B* Quality Assurance Project Plan (QAPP)**
[Because the monitoring portion of the OU2 remedy will not begin until approximately 2020, a QAPP has not been included at this time.]

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Section 1
Introduction

Camp Dresser & McKee, Inc. (CDM) has prepared this Remedial Action Plan for the Brookfield Avenue Landfill Operable Unit 2 (OU2) on behalf of the New York City Department of Environmental Protection (NYCDEP). The plan is based on the selected remedy specified in the March 2007 Record of Decision (ROD) for OU2 of the Brookfield Avenue Landfill. The monitoring components of the selected remedy include the collection and chemical analysis of surface water and sediment samples from Richmond Creek and its tributaries in the 5th year, 10th year, and 20th year after the OU1 remedy is complete. Monitoring specified in this plan will augment the monitoring conducted as part of the OU1 Site Management Plan. The formal Site management phase for OU2 will begin with approval of this plan. An additional remedial requirement specified in the ROD covers the inclusion of portions of OU2 in the easements established for OU1. The portions of OU2 that will be included in the OU1 easements will be determined following a survey, remapping, and relisting of the site conducted after the constructed elements of the OU1 remedy are in place. In addition, following public comment on the PRAP and FS, the NYCDEP agreed to install a visual demarcation fence between what is currently recognized as OU1 and OU2 and install signage along the demarcation line that provide notification of the current fish consumption advisory that has been placed by the New York State Department of Health (NYSDOH) for waters in New York Harbor. These controls are not a mandated component of the ROD; however, they have been agreed to by the NYCDEP in order to address community concerns and interests.

This plan was prepared to be consistent with the guidelines contained in the New York State Department of Environmental Conservation's (NYSDEC*) Draft DER-10 Technical Guidance for Site Investigation and Remediation* dated December 25, 2002. Approval of this plan will allow for completion of the remedy and the initiation of the site management phase for OU2. This plan constitutes the Site Management Plan for OU2.

Section 2
Site Background

2.1 Site Location and Description

The Brookfield Avenue Landfill is located at 40°33'44" latitude and 74°09'38" longitude in Richmond County, Borough of Staten Island, City of New York, in the State of New York. The entire Site is approximately 272 acres in size and is bounded on the north by Richmond Creek, on the east by the Colonial Square Condominium properties, on the south by Arthur Kill Road, and on the west by Richmond Avenue as shown on Figure 2-1. The main entrance to the Site is on Arthur Kill Road.

The Site has been divided into two operable units, OU1 and OU2. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. OU2 includes Richmond Creek, from the Richmond Avenue overpass to the eastern limit of the landfill; several small tributaries that empty into the creek from the south; and tidal wetlands between the creek and the landfill (Figure 2-1). The landfill portion of the Site (OU1) encompasses approximately 132 acres and is divided into two cells, the eastern and western cells, which represent former solid waste disposal areas. The site is currently inactive with a well-established vegetative cover. A paved road bisects the west cell and lies above the 48-inch wastewater interceptor that leads to the Eltingville Pump Station. This wastewater pump station is onsite and lies between the east and west landfill mounds. A three-barrel, 16-foot by 6.5-foot storm sewer originates at Arthur Kill Road and Abingdon Avenue and traverses underground between the east and west cells with a terminus into Richmond Creek.

The Site is enclosed by fencing with the exception of the boundary along Richmond Creek, which is currently unfenced. The site is guarded full time by a security guard stationed in a trailer near the front entrance to the landfill on Arthur Kill Road. For public safety purposes, signs have been placed on the perimeter fence identifying the area as an inactive hazardous waste site. A portion of the east cell of the landfill (approximately 38 acres) was covered with a clay cap in 1983. Localized erosion of the cap is now evident. Along the southern perimeter of the landfill, a 525-foot-long passive methane collection trench was installed to halt the migration of methane gas toward the residences south of the landfill.

The Remedial Investigation (RI) and Feasibility Study (FS) for OU1 were completed in 1998 and 2001 respectively. The OU1 Record of Decision is dated March 2002. The design report for the remedy for OU1 was approved by the NYSDEC on May 29, 2006. Remedial construction on OU1 is expected to start in 2008.

The RI and FS for OU2 were completed in 2004 and 2006 respectively. The OU2 ROD is dated March 2007.

N
W E
S

200 0 200 400 Feet

Fresh Kills Landfill

Richmond Creek

East Cell

West Cell

Colonial Square

Eltingville Pump Station

Holterman's Bakery

United Hebrew Cemetary

Forest Hill Rd
Richmond Ave
Arthur Kill Rd
Newvale Ave
Tanglewood Dr
Corbin Ave
Troy St
Greaves Ave
Palmer St
Elkhart St
Daleham St
Giffords Ave
Gurley Ave
Hereford St
Elverton Ave
Arkansas Ave
Brookfield Ave
Duane Ave
Drumgoole Rd W
Getz Ave
Ladd Ave

LEGEND

- Storm Sewer
- Sanitary Sewer
- Approximate extent of OU2 boundary
- Approximate extent of Site boundary
- Surface water feature

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OU2 Remedial Action Plan
Site Map

Figure 2-1

2.2 OU1 Remedy

The major elements of the OU1 remedy are as follows:

- A Part 360 landfill cap, featuring a gas venting layer, synthetic membrane barrier layer, soil barrier protection layer and vegetated topsoil layer.
- An active gas collection system consisting of a series of perforated pipes set in gravel wells beneath the landfill cap. Landfill gas will be extracted from these wells via blowers to an enclosed flare for combustion.
- A barrier wall along Arthur Kill Road to prevent the discharge of leachate to the southeast and landfill gas migration along Arthur Kill Road.
- A surface water collection system.
- A leachate collection trench along Richmond Creek and pretreatment system.
- Minimization of encroachment into freshwater and tidal wetlands. Wetland restoration and/or mitigation will be provided for any wetland disturbance along the northern edge of the landfill, and along the Richmond Creek edge between the east and west landfill cells.
- Institutional controls consisting of deed restrictions to ensure that groundwater beneath the site is not extracted for potable use and to ensure that any future site construction or other invasive activity is pre-approved by NYSDEC and NYSDOH.
- Initiation of a long term monitoring program to ensure that the contained hazardous waste does not leave the site. This program will allow the effectiveness of the remedy to be monitored. The OU1 long term monitoring program will be a component of the overall Site Management Plan (SMP).

2.3 OU2 Remedy

The selected remedy for OU2 is based on the results of the OU2 RI, the evaluation of alternatives presented in the FS, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. The OU2 remedy calls for monitoring of the chemical characteristics of surface water and sediment to augment monitoring conducted as part of the OU1 Site Management Plan. This will include monitoring the chemical characteristics of surface waters and sediment in the 5th year, 10th year and 20th years after the OU1 remedy is complete.

Under the remedy required for OU1, institutional controls will be applied to the entire listed site including portions of OU2. Following completion of the constructed remedial elements of OU1, the entire site will be surveyed and remapped to redefine the portion of the site that is listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites. The controls that will apply to the listed portion of

the site will include: prohibition from use of groundwater for potable purposes; prohibition from vegetable gardening; performance of site inspections and filing of a periodic certification that the remedy remains in place and continues to perform as designed; and management of residual contamination under a Site Management Plan. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the NYSDEC.

Section 3
Project Objectives and Schedule

3.1 Monitoring Objectives

This OU2 Remedial Action Plan details the sampling locations, collection and sample handling procedures, analytical methods, and data reporting required by the OU2 remedy. It also addresses the non-monitoring elements of the remedy. The objectives include:

- The collection and analysis of samples to monitor surface water and sediment quality in the OU2 portion if the Site;
- The collection and analysis of surface water and sediment to supplement data collected as part of on-going and long-term monitoring in the Fresh Kills Estuary system (i.e., The Fresh Kills Monitoring Program). This data is used to understand long-term changes in surface water and sediment quality, considering remediation efforts at this and other contaminant sites in the region; and

3.2 Surveying

Surveying the limits of the hazardous waste site and remapping the listed portion based on all data available from previous investigations will be performed during the development of the Site Management plan for OU-1 and consultation with NYSDEC and NYSDOH. This process will also take place in conjunction with establishment of the easements for OU1.

3.3 Data Quality Objectives

Field data collection will consist of surface water and sediment sampling in the creek, and sediment sampling in the marsh/wetlands located between the creek and the landfill. Every reasonable attempt will be made to obtain a complete set of usable field measurements and analytical data. If a measurement cannot be obtained or is unusable for any reason, the effect of the missing data will be evaluated by the project manager and Quality Assurance (QA) staff.

3.3.1 Surface Water Sampling

Surface water samples will be used to monitor water quality in Richmond Creek. It must be noted that surface water in Richmond Creek is also impacted by sources of contaminants outside of OU1/OU2 (e.g., urban stormwater runoff and Fresh Kills Landfill). Although sample collection has been designed to minimize influence from other sources, the data analysis must consider the impacts from all sources.

Samples will be collected during a period where baseflow represents the greatest percentage of streamflow, such as during the summer months when rainfall is generally low. Samples will be collected during low-tide to minimize the impact of downstream sources (e.g. Fresh Kills Landfill) on water quality at the Site. High-tide

samples will also be collected and compared to the low-tide samples. Surface water analysis will target the contaminants historically detected in OU2 surface water above established standards, criteria, or guidance values (SCGs). These contaminants include metals, pesticides, and volatile organic compounds (VOCs).

Surface water quality data will be compared to SCGs. Laboratory calibration and detection limits will be consistent with appropriate regulatory limits. In New York State, certain regulatory limits for surface water are based on the total hardness of the stream water. Accordingly, each surface water sample will be analyzed for total hardness.

Samplers should avoid collecting water at the surface of the body where volatilization or UV radiation may reduce concentrations. As samples will be collected at both high tide and low tide periods, sampling personnel should limit the suspension of stream sediments during the first event that may impact water quality during the subsequent event.

3.3.2 Sediment Sampling

Sediment samples will be used to monitor sediments in Richmond Creek and in the marsh/wetlands between the landfill and the creek. There must be sufficient quantity of data to characterize changes to lateral and vertical sediment quality over time. Sediment analysis will target the contaminants historically detected in OU2 sediment above SCGs. These contaminants include metals, pesticides, and semi-volatile organic compounds (SVOCs). Target SVOCs include polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

Sediment quality data will be compared to SCGs that are in place at the time of sample collection (see project schedule). Laboratory calibration and detection limits will target appropriate regulatory limits; however, the quantification levels for samples with low percent solids may not attain these limits. Consequently, the samplers will be advised to collect sediment samples with as high percent solids as possible. In New York State, regulatory limits for sediment quality are based on the total organic carbon (TOC) content of the material. Accordingly, each sediment sample will be analyzed for TOC.

3.4 Project Schedule

Surface water and sediment monitoring will be performed in the 5th year, 10th year, and 20th year after the OU1 remedy is complete. Based on the current schedule, the constructed elements of the OU1 remedy are expected to be completed by 2015. Therefore, OU2 monitoring is anticipated to occur in 2020, 2025 and 2035. A site survey will be performed following completion of the constructed remedial elements in OU1. Once the survey is completed, the listed portion of the site will be remapped and the easements specified in the OU1 ROD will be established.

Section 4
Sample Location and Frequency

4.1 Surface Water Sampling

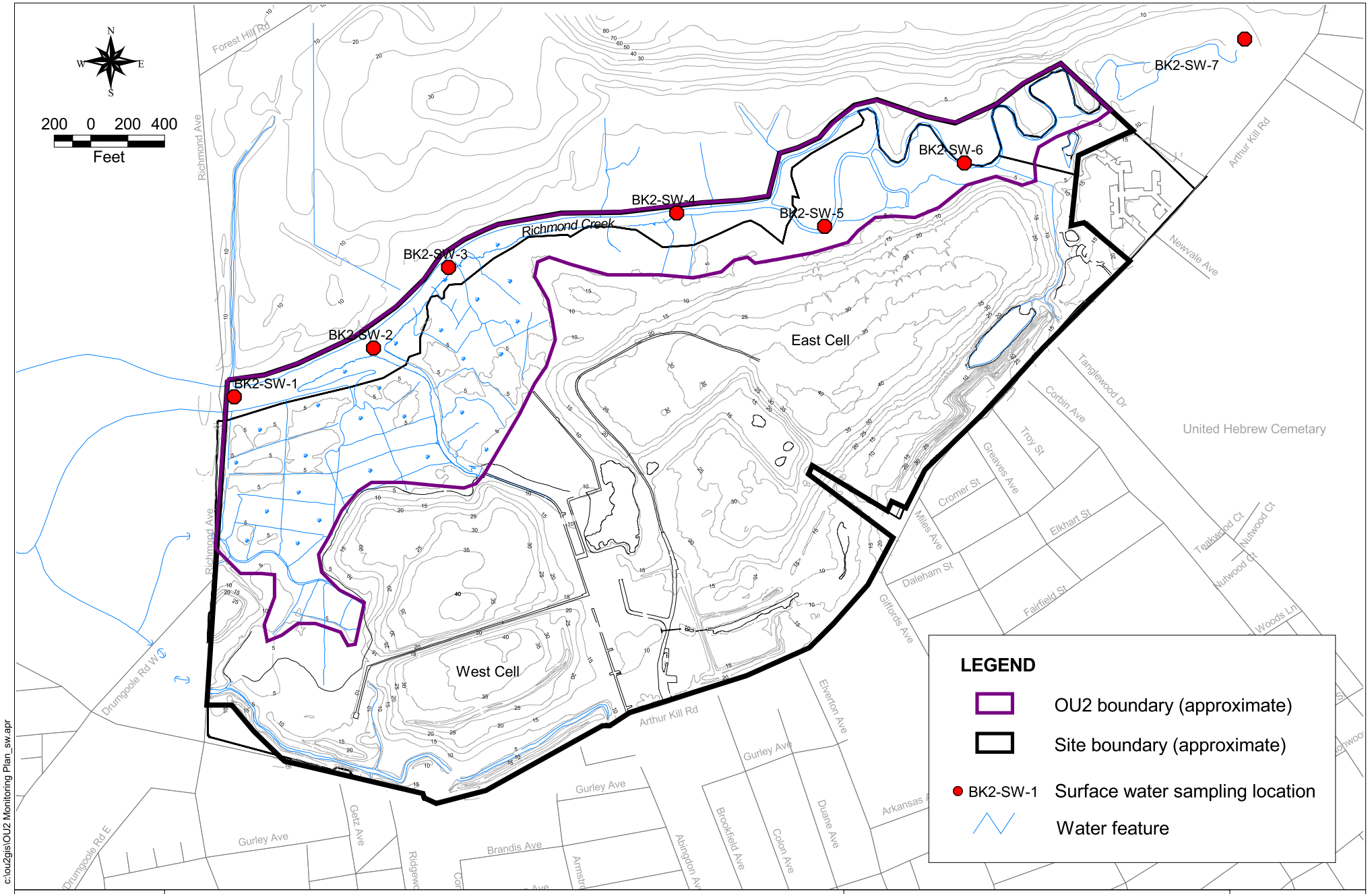
Surface water samples will be collected at seven locations from Richmond Creek, including the background sampling location, as shown in Figure 4-1. Samples will be collected within two hours of mean high tide and within two hours of mean low tide. The total number samples collected per event (not including QA/QC samples) will be 14. Surface water sampling locations in the marsh area of OU2 targeting stormwater discharge points from OU1 will be specified and sampled as part of the OU1 SMP.

Samples will be collected for laboratory analysis of TCL volatiles, semi-volatiles, pesticide/herbicide/PCB parameters, TAL metals, TOC, and total hardness. The field crew will measure the physical/chemical parameters pH, temperature, specific conductance, dissolved oxygen, salinity, and turbidity using direct-reading instruments at the time of sample collection.

4.2 Sediment Sampling

Sediment samples will be collected at 12 locations within Richmond Creek, its tributaries, and the adjacent marsh/wetlands between the creek and the Brookfield Avenue Landfill as shown on Figure 4-2. Where possible, continuous core samples will be collected at each location using a Vibracore® sampling device or other appropriate means. Three discrete samples will be collected from each boring at intervals of 0 to 6 inches, 6 to 12 inches, and 24 to 30 inches. The results of sediment sampling conducted during the OU1 RI and OU2 RI indicated contaminants were most commonly found at these intervals. Contaminant concentrations in excess of SCGs were less frequently found at intervals deeper than 30 inches; therefore, the OU2 monitoring will focus on changes in sediment contaminant concentrations up to 30 inches. The total number samples collected per event (not including QA/QC samples) will be 36.

Samples will undergo laboratory analysis for semi-volatiles, pesticide/herbicide/PCB parameters, TAL metals, and TOC.



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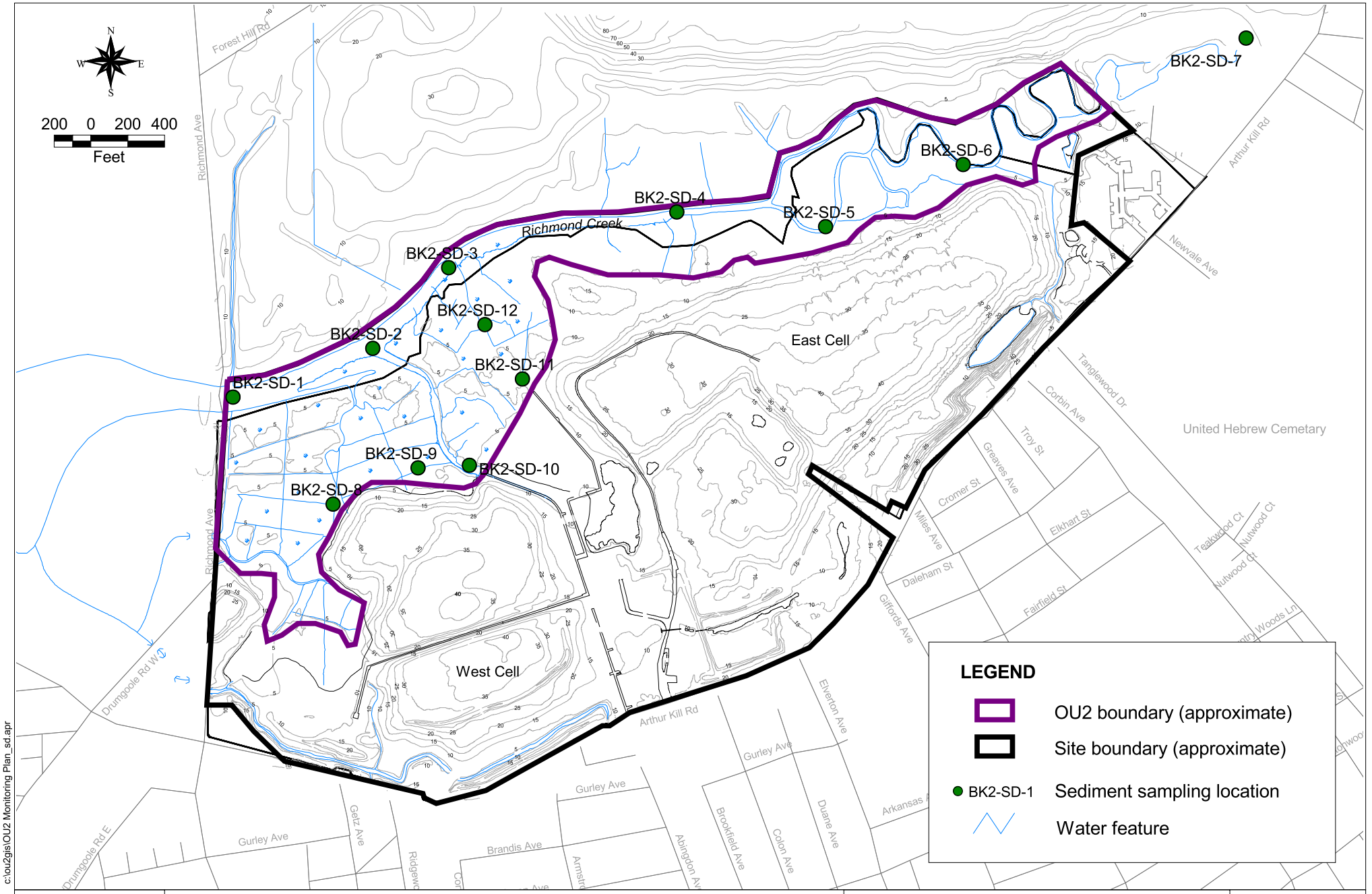
OU2 Remedial Action Plan
Surface Water Sampling Locations

Figure 4-1



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OU2 Remedial Action Plan
Sediment Sampling Locations

Figure 4-2

Section 5
Sample Designation and Labeling

5.1 Sample Designation

Unique sample codes will identify each surface water and sediment sample. The codes are made up of series of alphanumeric designations that identify the site, sample type, sample location, and sample depth (if appropriate). A two-letter designation "BL" and the numeral "2" are used to identify the Brookfield Avenue Landfill Site Operable Unit 2. The site code is followed by a two-letter designation that is used to identify the specific type of sample being collected; SW for surface water samples, SD for sediment samples, FB for field blanks, and TB for trip blanks. A two-digit numerical station-specific designation is used to identify the location where the sample was collected. A letter indicates the depth of the sample. For example, the sample code BK2-SD-1-A indicates Brookfield Avenue Landfill Site, Operable Unit 2, sediment sample, collected at location number 1, from depth interval A. Field duplicate samples will be prepared as "blind duplicates" and given a sample number in sequence with the type of sample being collected. Samples for matrix spike/matrix spike duplicate analysis will be labeled with a "MS/MSD" following the station code. Table 5-1 provides a list of the samples that will be collected during the three planned OU2 monitoring events. Note that one field duplicate, one trip blank, one field rinsate blank, and one MS/MSD sample will be associated with surface water samples. For sediment samples, two field duplicates, two field rinsate blanks, and two MS/MSD samples are specified for most parameter groups.

5.2 Sample Labeling

All samples will be identified with a waterproof, self-adhesive sample label, which will be attached directly to the sample container. The sample label will be completely covered with clear Mylar tape prior to sampling. This sample label will include the following information:

- Date of sample collection
- Time of sample collection
- Sample number code/location (BKL2-SD-01-A)
- Sampler signature
- Type of analysis to be performed
- Preservatives added to the sample (if applicable).

Table 5-1
Surface Water, Sediment, and Quality Assurance Sample Summary
OU2 Remedial Action Plan

Sample Type	*Parameter*	*Analytical Method*	*Environmental Samples*	*Field Duplicate*	*Field/Rinsate Blank*	*Trip Blank*	*MS/MSD*
Surface Water	TCL VOC	Method 8260/624	14	1	1	1	1
	TCL BNA	Method 8270/625	14	1	1	-	1
	TCL PEST/PCB	Method 8080/608	14	1	1	-	1
	TAL Metals	Method 6020/7000 series	14	1	1	-	-
	Total Hardness	Method 130.2	14	-	-	-	-
Sediment	TCL BNA	Method 8270	36	2	2	-	2
	TCL PEST/PCB	Method 8080	36	2	2	-	2
	TAL Metals	Method 6020/7000 series	36	2	2	-	-
	TOC	Method 9060	36	-	-	-	-

Section 6
Field Equipment and Procedures

6.1 Decontamination Procedures

Decontamination of field equipment and sampling apparatus will be performed to avert cross-contamination of samples between sampling depths and sampling locations. The decontamination procedures for different types of equipment are discussed below. Decontamination rinse water will be containerized in a 55-gallon drum or similar vessel and transported to the landfill to be released to the leachate collection system upstream of the planned oil/water separator.

6.1.1 Personal Protective Equipment

Personal protective equipment will undergo a wash with low phosphate detergent followed by a tap water rinse. Dedicated equipment, such as surgical gloves worn when collecting samples, are disposed of after each use and do not require decontamination. Personal protective equipment required for each task is specified in the Health and Safety Plan (HASP) that will be prepared prior to the first sampling event.

6.1.2 Field Monitoring Equipment

Instruments that will be used to monitor health and safety, and physical/chemical parameters during sample collection should be cleaned per the manufacturer's instructions. The pH meter and conductivity probes cannot be rinsed with solvents. These instruments will be rinsed after each use with deionized/distilled water only.

6.1.3 Sampling Apparatus

Sampling apparatus must be properly decontaminated prior to their use in the field. Dedicated equipment will be used to the extent possible. The equipment will be pre-cleaned in a laboratory situation whenever possible using the following procedures. If the duration of the sampling event prohibits pre-cleaning in a laboratory, then equipment may be decontaminated in the field using the same procedures.

a. Wash thoroughly with low phosphate detergent

b. Tap water rinse

c. A methanol rinse (pesticide grade or better)

d. Deionized, distilled water rinse

e. Air dry, and

f. Wrap in aluminum foil (shiny side out) for transport.

Tap water must be from a source with verifiable quality, such as a municipal water system. The use of an untreated potable water supply is not an acceptable substitute.

6.2 Sampling and Measurement Procedures

6.2.1 Surface Water Sampling

Surface water samples will be collected at seven locations within Richmond Creek adjacent to the Brookfield Avenue Landfill. Samples will be collected at both high and low tide at each of the locations for a total of 14 samples. Samples will be collected for laboratory analysis of TCL volatile, semi-volatile, pesticide/herbicide/PCB parameters, TAL metals, TOC, total hardness, and salinity. The field crew will measure the physical/chemical parameters pH, temperature, specific conductance, dissolved oxygen, and turbidity using direct-reading instruments at the time of sample collection.

6.2.1.1 Field Equipment

1. Sample containers
2. Sample shipping container with ice packs
3. Paper work and packaging
4. Sample preservatives
5. Horiba U-10 Multiparameter Water Quality Checker (or similar)
6. Organic Vapor Monitor (PID)
7. Stainless steel tape measure and measuring rod
8. Wheaton Dip Sampler
9. Kemmerer Sampler
10. Field notebook
11. Camera and film
12. Deionized, distilled water
13. Global Positioning System

6.2.1.2 Procedures

1. Prior to initiating any field activities, review applicable sections of the Health and Safety Plan, and thoroughly check monitoring and protective equipment.
2. Surface water samples will be collected from the seven locations in or adjacent to Richmond Creek within two hours of mean high tide and again within two hours of mean low tide. This provides a four hour sampling window for each tidal event. Samples will be collected beginning with the furthest upstream or "background" sample location and ending with the furthest downstream (east to west).
3. At each location, screen with the PID as required by the Health and Safety Plan. Note any odors or visual evidence of landfill leachate, and evidence of dead vegetation or animals. Record results in the field logbook.

4. Measure the horizontal coordinates (State planar) of each sample station using GPS. Record the locations in the field logbook, and on a scaled Site drawing (preferably Site topographic map).
5. The sampling location should be approached from the downstream direction, depending on tidal currents, being careful not to disturb the sediments.
6. Measure the depth of water at each location using a surveyor's rod or graduated sounding tape. Record the depth in the field logbook.
7. Thoroughly rinse temperature, pH, specific conductance, dissolved oxygen probes, and the turbidity meter with distilled/deionized water. Measure these parameters by immersing the probes in the stream just downstream of the sample location. Measure the dissolved oxygen within the upper one foot of the water column, and at a level midway between the water surface and the streambed. Duplicate samples and measurements will be taken at one sampling station to check on the instrument precision.
8. The surface water samples shall be grab samples collected by submerging the sample containers below the surface of the water and allowing water to flow smoothly into the container. Only unpreserved containers will be used. Chemical preservatives will be added after the sample has been collected.
9. A wooden stake with colored flagging will be driven into the ground to the side of the sample location to mark each location.
10. Sampling locations and activities will be photographed.
11. One matrix spike/matrix spike duplicate water sample will be appropriately identified in the notebook and will be labeled as such on the sample bottle labels and the chain-of-custody forms. Enough sample (triple the volume) should be collected for the laboratory to perform matrix spike and matrix spike duplicates.
12. For each sample collected, attach sample labels and tags to each sample container. Completely fill out the chain-of-custody form for each group of samples shipped to the laboratory. Make sure the appropriate analyses for each sample is clearly labeled on the chain-of-custody form.

Sample Bottle Filling Procedures for Volatile Organics

1. Remove the cap from a 40-ml septum vial. Avoid contact with the inner surface.
2. Immerse the entire vial into the water just below the water surface if possible without disturbing the sediments and completely fill the

container. Replace the cap on the sample bottle making sure no air bubbles are present.

3. Invert bottle and inspect bottle for air bubbles. If air bubbles are present, refill the bottle again. Adjust the pH of the sample to <2 by carefully adding 1:1 HCl drop by drop to the required 2 (40 ml) VOA sample vials. The number of drops of 1:1 HCl required should be determined on a third portion of sample water of equal volume. If acidification of the sample causes effervescence, do not preserve sample except for cooling to 4°C. This must be noted on the chain of custody. This sample should be appropriately noted when present. Clean nitrile gloves must be worn when preservatives are used.

Sample Bottle Filling Procedures for Extractable Organics and PCBs

1. Remove the Teflon-lined cap from a 1-liter amber bottle. Avoid contact with the inner surface of the cap.
2. Immerse the container in the stream so that the mouth of the bottle is just below the water surface.
3. Replace the cap on the sample bottle and place the sample in a cooler, on ice.
4. Fill the rest of the bottles by repeating steps 1 through 3.
5. Record all appropriate data in a field notebook.

Sample Bottle Filling Procedures for Inorganics

1. One sample for metals analysis will be collected from each location. This sample will provide data on total metals; this sample will not be filtered.
2. Fill the bottle approximately 7/8 full and preserve to a pH of less than 2 with HNO3. Mix sample thoroughly by shaking, then test pH using pH paper by pouring excess sample into a separate container.
3. Replace the cap on the sample bottle and place the sample in the cooler.
4. Record all appropriate data in field notebook.

Sampling for Total Organic Carbon:

1. Remove caps from two 40 ml vials.
2. Fill to the top.
3. Add H2SO4 or HCl to pH <2.
4. Replace cap on sample bottle.

5. Record all appropriate data in field logbook.

6.2.2 Sediment Sampling

Sediment samples will be collected at 12 locations within Richmond Creek and the adjacent marsh/wetlands inclusive of the background sample. Where conditions allow, up to three-foot continuous core samples will be collected at each location using a Vibracore® sampling device or similar means. Vibracore® collection of sediment core will be performed by a firm with specialized expertise in this area. After the core has been retrieved and opened field personnel will describe the core and collect samples for laboratory analysis. Three discrete samples will be collected from each boring. Samples will undergo laboratory analysis of semi-volatile, pesticide/herbicide/PCB parameters, TAL metals, and TOC. For all of these sediment cores collected, where physically possible, sediment from the 0 to 6 inch, 6 to 12 inch, and 24 to 30 inch intervals will be submitted for laboratory analysis.

6.2.2.1 Field Equipment

1. Sample containers
2. Sample shipping container with ice packs
3. Paper work and packaging
4. Vibracore® unit
5. Stainless Steel tubing
6. Generator
7. HPDE liner
8. Polyethylene sheeting
9. Stainless steel trowels and bowls
10. Tape measure and measuring rod
11. Organic Vapor Monitor (PID)
12. Global Positioning System
13. Camera and film
14. Field notebook
15. Deionized, distilled water

6.2.2.2 Procedures for Collecting Sediment Samples

1. At each sample location, calculate the length of the core sample. This should include the depth of any standing water, the depth of investigation, and an additional 2 foot to allow for sample loss when retrieving the core tube.
2. Insert a section of new HDPE liner into a decontaminated core tube, and attach the drive shoe and core retainer.
3. Set the core tube at the designated sample location and attach it to the Vibracore® device.
4. Turn on the Vibracore® device and drive the core tube to a point approximately two feet past the designated sample depth, or until

refusal is encountered, whichever comes first. Refusal is defined as the point at which there is no further penetration of the core tube for a period of 1 minute.

5. Turn the Vibracore® device off and attempt to retrieve the core tube using cable and a hydraulic winch.
6. If the core tube cannot be retrieved in this manner, restart the Vibracore® device until the tube comes loose, and then remove it the rest of the way using the hydraulic winch.
7. Detach the drive shoe and core retainer, and extrude the liner and core from the core tube.
8. Drain excess water by making a small hole in the liner above the sediment/water interface.
9. Cut the liner and core sample lengthwise.
10. Scan the core with the PID.
11. Measure the length of core recovery. Describe the lithology, color and saturation level with depth. Note any visual evidence of contamination or odors.
12. Photograph the core sample using a sampling trowel or ruler for scale.
13. Using a dedicated sampling trowel(s) and a clean pair of surgical gloves, collect sample(s) for volatile organic analysis at the designated depth(s) or at intervals where PID readings indicate the presence of elevated levels of non-methane organic vapors.
14. Label the containers and place in a cooler with ice as soon as possible.
15. Using the dedicated trowels, collect sample for SVOC, pesticide/PCB, TOC, and metals analysis from the designated depth(s) and place in a dedicated stainless steel bowl.
16. Homogenize the sample and remove any gravel or vegetative material.
17. Transfer sample to appropriate sample containers using dedicated trowel.
18. Attach custody seals and place samples in a polyethylene bag.
19. Record the coordinates of the sample location (in State plane coordinates) using a global positioning system.
20. Identify, package, and ice samples for shipment.
21. Maintain chain-of-custody.
22. Discard the remaining core in a 55-gallon steel drum.
23. Document the entire sampling process in the field logbook.

24. Transport drum(s) of excess core material for storage at the landfill, pending receipt of analytical results that would prevent regular disposal.

Section 7
Sample Handling and Analysis

7.1 Sample Handling

Surface water and sediment samples that will be collected in Richmond Creek are anticipated to fall into the DOT shipping category of low-level environmental samples. Environmental samples will be shipped by overnight delivery service in "cargo only" aircraft.

Packaging

- Check to ensure that the sample is properly filled; tighten cap securely.
- Enclose and seal sample containers in a clear plastic bag or bubble pack bag if provided by the analytical laboratory.
- Place freezer packages or ice in large ziplock plastic bags and place the bags in a sample cooler so that ice is not in direct contact with sample bottles. Sufficient ice will be added to cool the samples to 4°C.
- Pack noncombustible, absorbent packing material around bottles and ice to avoid sample breakage during transport.
- Complete Chain-of-Custody Records and other shipping/sample documentation including air bill numbers for each shipment of samples using a ballpoint pen. Seal documentation in a waterproof plastic bag and tape the bag inside the shipping container under the container lid. Include a return address for the cooler.
- Close the container and seal it with fiber tape and custody seals in such a manner that the custody seals would be broken if the cooler were opened.
- Cover any sharp edges (e.g. tears in the plastic housing of the cooler) and the cooler drain with duct tape.

Marking/Labeling

- Attach return address labels to the inside of the cooler in a clearly visible location.
- The outside of the cooler must be marked "Environmental Samples" if the samples are designated "Low-Level." No DOT marking or labeling is required for low-level samples.
- The appropriate side of the container must be marked "This End Up" and arrows placed accordingly.

7.2 Sample Analysis

Laboratory analysis of surface water and sediment samples will be performed by a NYSDEC CLP-certified laboratory. Table 7-1 presents a summary of the analytical methods for surface water and sediment samples. Samples will undergo analysis on the standard 28-day laboratory turnaround schedule. The laboratory will use analytical methods as outlined in the most recent release of the NYSDEC Analytical Services Protocol (ASP) for their contract laboratory program.

If an SW-846 method or other method is modified during sample analysis, then the laboratory will also be required to perform the following protocol to demonstrate their ability to analyze for the non-standard parameters or methods.

A. A method detection limit (MDL) study following the description given in 40 CFR Part 136, Appendix B.

B. A calibration of no less than four standards including the blank. The standards preparation method and calculations, from neat or original standard to working standards, must be provided with the first submission of data for the new analyte.

C. Verification of standard calibration with a second source, if feasible, or at a minimum an independently prepared standard at the mid-range of concentration.

D. Accuracy and precision studies using blank spikes/blank spike duplicates, matrix spike/matrix spike duplicates and matrix spike/duplicates.

E. A run sequence comparable to those normally described in EPA methodologies, i.e., calibration, initial calibration verification, instrument blank, method blank, ten samples (including QC), continuing calibration verification, instrument/method blank, and so on.

F. All QC requirements in the method cited for the analysis, whether suggested, recommended, or required must be implemented.

A summation of the MDL study will be included with the data package. All laboratory data deliverables shall conform to Category B as defined in the most recent ASP. The laboratory will supply a detailed example calculation that clearly demonstrates the manner in which the final result was derived. Where applicable, each component of the calculation will be explained (i.e., if the calculation includes a dilution factor, it must be clear where, why, and how each dilution occurred). The laboratory will supply any and all information required to reproduce, during an independent data review, all reported results.

In addition, a Data Usability Summary Report should be prepared by a party independent from the laboratory performing the analysis.

Table 7-1
Surface Water and Sediment Sample Analysis Summary
OU2 Remedial Action Plan

Sample Type	*Parameter*	*Analytical Method*	*Preservative*	*Holding Time*	*Container*	*Volume*
Surface Water	TCL VOC	Method 8260/624	HCL to pH<2/Cool to 4oC	10 days	Glass w/teflon-lined septa	3 x 40-ml
	TCL BNA	Method 8270/625	Cool to 4oC	5 days extraction 40 days analysis	Glass w/teflon-lined cap	2 x 1-liter
	TCL PEST/PCB	Method 8080/608	Cool to 4oC	5 days extraction 40 days analysis	Glass w/teflon-lined cap	2 x 1-liter
	TAL Metals	Method 6020/7000 series	HNO3/Cool to 4oC	6 months Hg - 26 days	Polyethylene w/teflon-lined cap	1-liter
	Total Hardness	Method 130.2	HNO3 to pH<2	6 months	Polyethylene w/teflon-lined cap	1-liter
Sediment	TCL BNA	Method 8270	Cool to 4oC	5 days extraction 40 days analysis	Glass w/teflon-lined cap	1x8-oz. glass
	TCL PEST/PCB	Method 8080	Cool to 4oC	5 days extraction 40 days analysis	Glass w/teflon-lined cap	1x8-oz. glass
	TAL Metals	Method 6020/7000 series	Cool to 4oC	6 months Hg - 26 days	Glass w/teflon-lined cap	1x8-oz. glass
	TOC	Method 9060	H2SO4 to pH/2Cool to 4oC	26 days	Glass w/teflon-lined cap	1x8-oz. glass

Section 8
Reporting

8.1 Electronic Data Deliverables

The analytical laboratory performing sample analysis is required to submit sample results in both a hardcopy and an electronic format. The information submitted in electronic format must correspond exactly to information submitted in the hardcopy data package and on the hardcopy data package forms. For all conventional analyses, the laboratory must submit the documentation specified in the NYSDEC ASP protocol.

MS Excel and ASCII (comma delimited) are both acceptable formats for the electronic data deliverables (Given that the first sampling event is years into the future, additional formats may be considered at that time). MS Excel is preferred. One row should be used for each parameter analyzed. Separate columns must be used for parameter name, sample ID, sample date, result, and data qualifier. Additional columns may be necessary for other data including lab ID, analysis date, etc. Column headings must be provided in the first row in each column.

8.2 Report Format and Content

OU2 Monitoring Reports will be submitted within 90 days of sample collection. Each report will include the following information:

1) The valid Department site identification number, plus the municipality and county, in the title of the report;

2) A location map;

3) A site map;

4) A map showing sampling locations, and significant analytical values at sampling locations (e.g. analytical values above current SCGs);

5) A brief description of the applicable standard test methods run;

6) Summary tables include detected compounds, along with the applicable SCGs and with any exceedences of SCGs highlighted;

7) Cumulative data summary tables;

8) Comments, conclusions and recommendations based on an evaluation of the analytical results;

9) Comments, conclusions and recommendations based on an engineering evaluation of the information included in the report, which must be prepared by a professional engineer in accordance with section 1.5 (a) 9, of DER-10; and

Reports prepared summarizing conditions in OU2 after the 5th, 10th and 20th year following OU1 closure will be submitted in an electronic format acceptable to the NYSDEC and a bound (paper) format.

Section 9
Implementation of Other Remedial Elements

9.1 Environmental Easements

Under the remedy required for OU1, institutional controls will be applied to the entire listed site including portions of what is now recognized as OU2. Following completion of the constructed remedial elements of OU1, the entire site will be surveyed and remapped to redefine the portion of the site that is listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites. This activity will be performed in close consultation with the NYSDEC and NYSDOH and take into account the results of all previous remedial investigations performed at the site.

The controls that will apply to the listed portion of the site will include: prohibition from use of groundwater for potable purposes; prohibition from vegetable gardening; performance of site inspections and filing of a periodic certification that the remedy remains in place and continues to perform as designed; and management of residual contamination under a SMP. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the NYSDEC.

9.2 Fencing and Signage

Following public comment on the PRAP and FS, the NYCDEP agreed to install a visual demarcation fence between what is currently recognized as OU1 and OU2 and install signage along the demarcation line that provide notification of the current fish consumption advisory that has been placed by the New York State Department of Health (NYSDOH) for waters in New York Harbor. These controls are not a mandated component of the ROD; however, they have been agreed to by the NYCDEP in order to address community concerns and interests. These controls will be implemented following completion of the major constructed elements of the OU1 remedy, and prior to opening of the site for public use.