Rolling Knolls Landfill Settling Parties

Addendum 1 to the Data Gaps Sampling and Analysis Plan

Rolling Knolls Landfill Superfund Site

Chatham, New Jersey

April 2015

John L. Persico, P.G.
Principal Geologist

Suzanne Walls
Project Manager

Andrew Gutherz
Staff Geologist

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Chatham, New Jersey

Prepared for:
Rolling Knolls Landfill Settling Parties

Prepared by:
ARCADIS U.S., Inc.
8 South River Road
Cranbury
New Jersey 08512
Tel 609 860 0590
Fax 609 860 0491

Our Ref.:
B0033202

Date:
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Acronyms and Abbreviations

Agreement	Administrative Settlement Agreement and Order on Consent
ARCADIS	ARCADIS U.S., Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	Constituents of Concern/Chemicals of Concern
CLP	Contract Laboratory Program
Data Gaps SAP	Data Gaps Sampling and Analysis Plan
GPS	global positioning satellite
GSNWR	Great Swamp National Wildlife Refuge
OCP	organochlorine pesticide
PPNDP	passively placed narrow diameter points
PCB	polychlorinated biphenyl
PID	photoionization detector
QA	quality assurance
QAPP	Quality Assurance Project Plan
SCSR	Site Characterization Summary Report
site	Rolling Knolls Landfill Superfund Site, located in Chatham Township, New Jersey
SOP	Standard Operating Procedure
SRS	Soil Remediation Standard
TestAmerica	TestAmerica Laboratories, Inc.

the Group	Chevron Environmental Management Company, Lucent Technologies Inc., (now known as Alcatel-Lucent USA Inc.) and Novartis Pharmaceuticals Corporation
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
USFWS	United States Fish & Wildlife Service

1. Introduction

On behalf of Chevron Environmental Management Company for itself and on behalf of Kewanee Industries, Inc., Lucent Technologies Inc., (now known as Alcatel-Lucent USA Inc.) and Novartis Pharmaceuticals Corporation (collectively, the Group), ARCADIS U.S., Inc. (ARCADIS) prepared this Addendum 1 to the Data Gaps Sampling and Analysis Plan (Data Gaps SAP) for the Rolling Knolls Landfill Superfund Site (the "site"), located in Chatham Township, New Jersey. The location of the site is shown in Figure 1, and the site features are shown in Figure 2.

The Data Gaps SAP was submitted to USEPA on 17 September 2014 and approved by USEPA on 18 November 2014 (ARCADIS 2014a). Collection and analysis of soil and sediment samples proposed in the Data Gaps SAP was conducted from November 2014 to March 2015. This addendum proposes additional soil and sediment sampling to delineate constituents of concern/chemicals of concern (COCs) detected in samples collected during the initial Data Gaps SAP implementation. Information that was included in the approved November 2014 Data Gaps SAP that is not directly relevant to the proposed new sampling actions is not repeated in this addendum.

1.1 Objectives

The objectives of the sampling proposed herein is to address data gap concerns posed by the USEPA in their April 6, 2015 email - email from Ms. Tanya Mitchell of USEPA to Ms. Suzanne Walls of ARCADIS. The sampling effort will complete delineation of polychlorinated biphenyls (PCBs) and/or metals detected in certain soil and sediment samples collected between November 2014 and March 2015.

The planned sampling locations are as proposed by the USEPA in the referenced April 6, 2015 email. In addition, the Group is proposing additional delineation sampling to that reqested by USEPA. This addendum contains the sampling proposed by both the USEPA and the Group.

1.2 Data Gaps SAP Organization

This Data Gaps SAP is organized as described below.

- Section 2, Additional Soil and Sediment Sampling, presents each new task that will be conducted as part of the Data Gaps SAP and outlines proposed technical activities that will be conducted to complete each task.

- Section 3, Schedule, presents a schedule for the Data Gaps SAP activities.
- Section 4, Project Management, introduces the project team and describes the responsibilities of each project team member.
- Section 5, References, provides references used in the development of this Addendum 1 to the Data Gaps SAP.

A Quality Assurance Project Plan (QAPP), submitted on 19 September 2014 and approved by the USEPA on 18 December 2014 (ARCADIS 2014b), provides supporting information on site conditions, sampling requirements and procedures, and laboratory analytical procedures. Certain worksheets in the QAPP have been revised to accompany this addendum. These include:

- Worksheet 18 – Sampling Locations and Methods; and
- Worksheet 20 – Field QC Summary.

These revised worksheets are submitted as Addendum 1 to the QAPP.

2. Additional Soil and Sediment Sampling

2.1 Soil Sampling

2.1.1 Soil Sample Locations

The proposed soil sampling locations are shown on Figures 3a through 3d, along with previous surface soil sample results that were used to select the proposed locations. Soil sampling locations (sample numbers SS-165 through SS-174) are located off the boundary of the landfill in native soil, near where previous soil samples contained concentrations of one or more COCs exceeding its New Jersey Soil Remediation Standard (SRS). Proposed locations are also summarized in Table 1. All locations are in potentially wet areas and are expected to consist of wetland soil. However, if these locations are below water, they will be designated sediment samples and will be collected using sediment sampling techniques (see Section 2.2).

2.1.2 Soil Sampling Procedures

ARCADIS field personnel will advance soil borings to collect surface soil samples using a hand-driven Macrocore®. At each sampling location, field personnel will use hand tools (e.g., slide-hammer) to advance a 2-inch-diameter by 2-foot-long stainless steel Macrocore® fitted with a dedicated acetate liner to 1 foot below ground surface (bgs). The Macrocore® cutting shoe may be equipped with a disposable, plastic basket to increase recovery of loose material. Other sampling methods (e.g., hand auger, shovel) may be used to collect soil samples if conditions at a proposed sampling location do not allow for advancement of or adequate recovery with a hand-driven Macrocore®.

After the Macrocore® is advanced to the specified depth, field personnel will carefully extract the Macrocore® from the borehole to minimize soil loss, remove the acetate liner containing the soil core from the Macrocore®, cut the acetate liner open, and photograph the soil core. Field personnel will record the length of each recovered soil core in a field log book then score the soil core at 6-inch intervals and field screen with a photoionization detector (PID). PID readings will be recorded in a field log book. If other sampling methods are required to collect soil, field personnel will attempt to remove a volume of soil approximately 1 foot long and 3 to 6 inches thick from the surface interval (i.e., 0.0 to 1.0 foot bgs), while attempting to minimize soil disturbance. Field personnel will process this soil volume in the same manner as a soil core contained in a Macrocore® acetate liner, as described above.

The soil's physical characteristics and other relevant visual observations will be recorded in a field log book. When soil characterization is complete, a composite sample will be collected from the remaining soil in the soil core. Surface soil samples will be collected using decontaminated, non-dedicated stainless steel hand-tools (e.g., spoons, scoops or trowels) and bowls. Field personnel will place surface soil samples in laboratory-supplied containers. Field personnel will document, label, package and ship soil samples in accordance with procedures provided in Worksheet #21 of the QAPP (ARCADIS 2014b). Non-disposable sample equipment (e.g., stainless steel bowls and spoons, Macrocore®, hand-auger, shovel) will be decontaminated between uses at subsequent sampling locations in accordance with the Equipment Decontamination Standard Operating Procedure (SOP) presented in the QAPP (ARCADIS 2014b).

Field personnel will advance the Macrocore® or other hand tool to 1 foot bgs until adequate sample volume is obtained or until it is determined that a surface soil sample cannot be collected due to lack of soil at a sampling location. Field personnel will advance the Macrocore® or other hand tool a maximum of four times within 5 to 10 feet of each proposed sampling location in an attempt to obtain adequate sample volume. If adequate sample volume cannot be obtained after four attempts, the sampling area will be widened until adequate sample volume has been obtained.

Some sampling will take place in potential bog turtle habitat. Field personnel conducting sampling activities in potential bog turtle habitat will implement USFWS-recommended conservation measures as described in Section 3.1.1 of the Data Gaps SAP (ARCADIS 2014a).

The locations of all soil samples will be recorded by ARCADIS using a GPS unit.

2.1.3 Soil Sample Analyses

Soil samples will be analyzed for the COCs outlined in Table 1. All of the proposed soil samples are off the boundary of the landfill in native soil. Since the purpose of these samples is to delineate the extent of COCs detected during implementation of the Data Gaps SAP, and the prior sampling (including the Data Gaps SAP and other sampling discussed in the Site Characterization Summary Report) has identified the COCs at the site, the proposed analyses include only PCBs and/or selected metals as appropriate. Previous site sampling has characterized and delineated the remaining TCL/TAL parameters.

Sample analyses for SS-173 and SS-174 will be held as contingent samples until results from SD-48 and SD-49 have been reviewed. If results from SD-48 and SD-49 indicate a connection to the landfill, SS-173 and SS-174 will be analyzed to further evaluate this connection.

2.2 Sediment Sampling

2.2.1 Sediment Sample Locations

The proposed sediment sampling locations (locations SD-45 through SD-50) are shown on Figures 3a through 3d, and are summarized in Table 1. The order of sampling will be from downstream to upstream locations. The position of sample locations may be adjusted based on accessibility or on other information gathered during field activities.

2.2.2 Sediment Sampling Procedures

Sediment samples will be collected in accordance with sampling procedures developed based on USEPA, USEPA ERT, and NJDEP sediment sample collection guidance documents (USEPA 1995, 1994; NJDEP 2005, 1998).

Sediment samples will be collected by advancing a dedicated Lexan® coring device or stainless steel Macrocore® sampler equipped with a dedicated acetate liner to a minimum of 1 foot beneath the surface water/sediment interface. One of these sampling methods will be selected based on site conditions at the time of sample collection. Each sediment core will be field screened with a PID. PID readings, descriptions of the sediment's physical characteristics, and other relevant visual observations will be recorded in a field log book. Sediment in the 0.0 to 0.5-foot interval will then be homogenized and transferred directly into laboratory-supplied containers for other analytical parameters. Field personnel will document, label, package and ship sediment samples in accordance with procedures provided in Worksheet #21 of the QAPP (ARCADIS 2014b).

2.2.3 Sediment Sample Analysis

Sediment samples will be analyzed for the COCs outlined in Table 1. All of the proposed sediment samples are off the boundary of the landfill in native sediment. Since the purpose of these samples is to delineate the extent of COCs detected during implementation of the Data Gaps SAP, and the prior sampling (including the Data

Gaps SAP and other sampling discussed in the Site Characterization Summary Report) at the site, the proposed analyses include PCBs and/or selected metals, as appropriate. Previous site sampling has characterized and delineated the remaining TCL/TAL parameters. All sediment samples will also be analyzed for pH, total organic carbon, and grain size.

Sample analysis for SD-50 will be held as a contingent sample until results from SD-49 have been reviewed. If results from SD-49 indicate a connection to the landfill, SD-50 will be analyzed to further evaluate this connection.

2.3 Analytical Procedures

All analyses will be performed by TestAmerica Laboratories, Inc. (TestAmerica) using current USEPA methods. TestAmerica is a current participant in the Contract Laboratory Program (CLP). The analytical procedures are included in Table 1. Additional information on TestAmerica and the analytical procedures is provided in the QAPP (ARCADIS 2014b).

3. Schedule

Implementation of the proposed soil and sediment sampling program will begin within 2 weeks after USEPA's approval of this Addendum 1 to the QAPP. Sample collection will require approximately 2 weeks, and sample analyses will be completed 4 weeks after collection of the last sample. Data validation will require an additional 4 weeks. Therefore, the total time to implement this work after USEPA approval is 10 weeks. The schedule for submittal of the final report will depend on the completion of this sampling and other tasks (monitoring well installation and sampling) which are not part of this addendum. The Group will compress this schedule if sampling, laboratory analysis, and/or data validation can be completed in less time than anticipated.

4. Project Management

4.1 Staffing

Implementation of Data Gap SAP activities will require integration of personnel from various organizations, collectively referred to as the "Project Team." Responsibilities of each member of the project team are presented in the QAPP (ARCADIS 2014b).

A list of key project management personnel is provided below.

Company/Organization	Title	Name	Phone Number
USEPA	Remedial Project Manager	Tanya Mitchell	212-637-4362
USEPA	QA Manager	TBD	TBD
NJDEP	Case Manager	Jill McKenzie	609-292-1993
The Group	Primary Contact	Gary Fisher	908-582-5771
ARCADIS	Project Officer	John Persico	609-860-0590
ARCADIS	Project Manager	Suzanne Walls	865-777-3502
ARCADIS	QA Manager	Dennis Capria	315-446-2570

TBD – To be determined

4.2 Coordination

Personnel performing RI/FS Work Plan activities will be directed by representatives of the Project Team. A project organizational chart is provided as Figure 4.

5. References

ARCADIS U.S., Inc. 2012. Site Characterization Summary Report.

ARCADIS U.S., Inc. 2014a. Data Gaps Sampling and Analysis Plan. November.

ARCADIS U.S., Inc. 2014b. Quality Assurance Project Plan. December.

New Jersey Department of Environmental Protection. 1998. Guidance for Sediment Quality Evaluations.

New Jersey Department of Environmental Protection. 2005. Field Sampling Procedures Manual.

USEPA. 1995. *Superfund Program Representative Sampling Guidance; Volume 5: Water and Sediment; Part 1 – Surface Water and Sediment*. Office of Emergency and Remedial Response, Office of Solid Waste and Emergency Response.

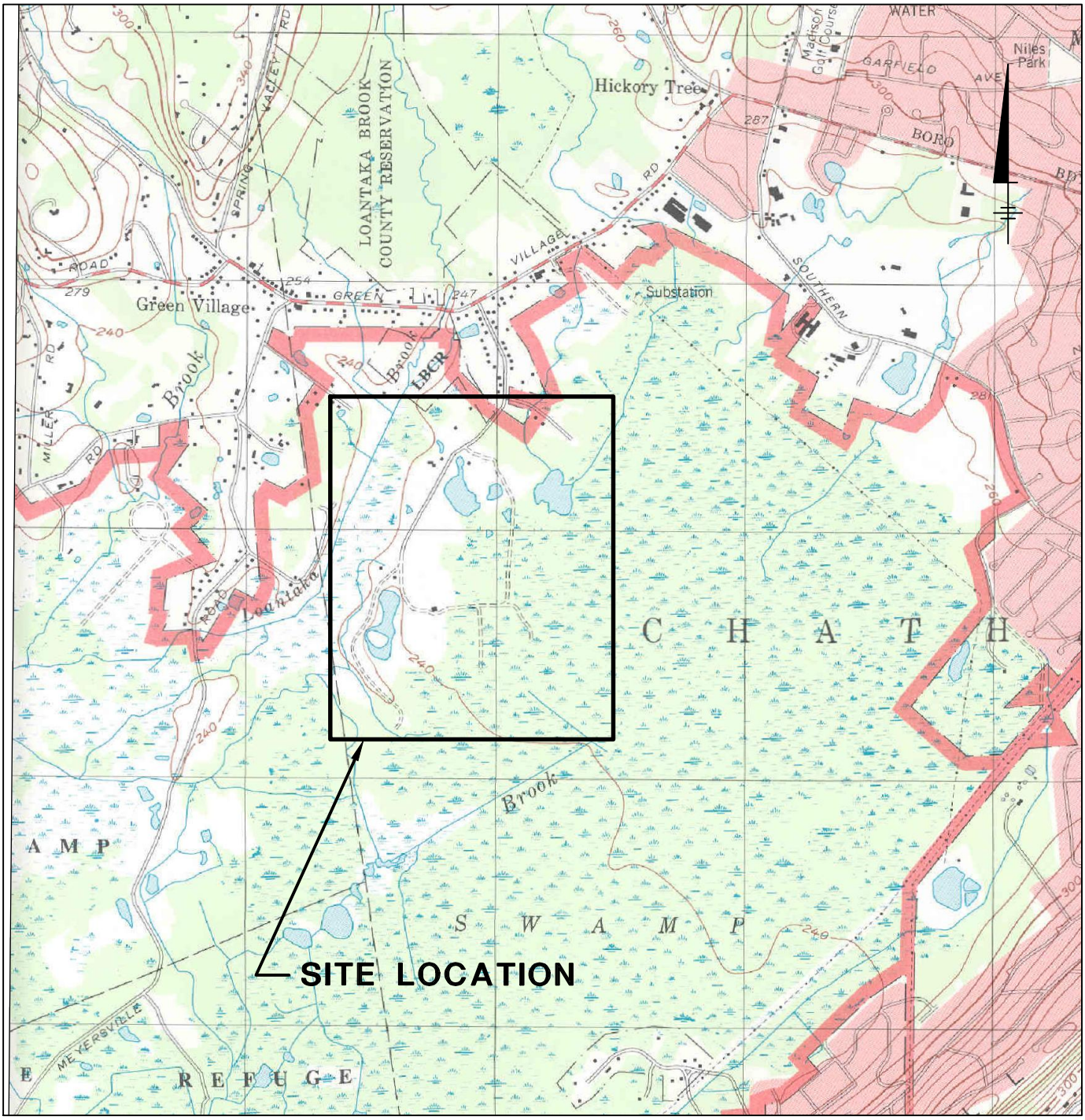
USEPA. 1994. *Sediment Sampling - SOP #: 2016*. Emergency Response Team.

Table 1
Sample Locations, Depths, and Analyses
Data Gaps Sampling and Analysis Plan Addendum 1
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

Sample ID	Sample Media	Depth Interval (Feet)	Sample Collection Method	Laboratory Analyses[1]										Notes
				PCBs (as Aroclors)	PCB Congeners	Arsenic	Cadmium	Copper	Cyanide	Lead	Mercury	Vanadium	pH, TOC, Grain Size	
Soil Samples														
SS-165[2]	Soil	0.0-1.0	Macrocore	X						X		X		
SS-166[2]	Soil	0.0-1.0	Macrocore	X						X		X		
SS-167[2]	Soil	0.0-1.0	Macrocore	X						X		X		
SS-168[2]	Soil	0.0-1.0	Macrocore	X	X			X		X				
SS-169	Soil	0.0-1.0	Macrocore							X				
SS-170	Soil	0.0-1.0	Macrocore							X				
SS-171	Soil	0.0-1.0	Macrocore							X				
SS-172	Soil	0.0-1.0	Macrocore							X				
SS-173	Soil	0.0-1.0	Macrocore	X		X	X	X	X	X	X			Contingent Sample
SS-174	Soil	0.0-1.0	Macrocore	X		X	X	X	X	X	X			Contingent Sample
Sediment Samples														
SD-45[2]	Sediment	0.0 - 1.0	Grab sample	X									X	
SD-46[2]	Sediment	0.0 - 1.0	Grab sample	X		X	X	X	X	X	X		X	
SD-47[2]	Sediment	0.0 - 1.0	Grab sample	X		X	X	X	X	X	X		X	
SD-48	Sediment	0.0 - 1.0	Grab sample	X		X	X	X	X	X	X		X	
SD-49	Sediment	0.0 - 1.0	Grab sample	X		X	X	X	X	X	X		X	
SD-50	Sediment	0.0 - 1.0	Grab sample	X		X	X	X	X	X	X		X	Contingent Sample

Abbreviations:
PCBs = polychlorinated biphenyls
TOC = total organic carbon

1 - Sample analyses will be conducted using the following analytical methods:
PCBs via SOM01.2, *Contract Laboratory Program (CLP Statement of Work for Organic Analysis*
Metals and cyanide via ISM01.3, *CLP Statement of Work for Inorganic Analyses*
PCB Congeners via USEPA Method 1668A, *Chlorinated Biphenyl Congeners in Water, Soil, Sediment and Tissue by HRGC/HI*
pH via USEPA Method 9045D.
TOC via the Lloyd Kahn method.
Grain size via ASTM D-422.
2 - Sample requested by USEPA



SOURCE:
CHATHAM QUADRANGLE, NJ
7.5 MINUTE SERIES
CONTOUR INTERVAL 20 FEET

0 2000' 4000'
GRAPHIC SCALE

NEW JERSEY

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY
DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

SITE LOCATION

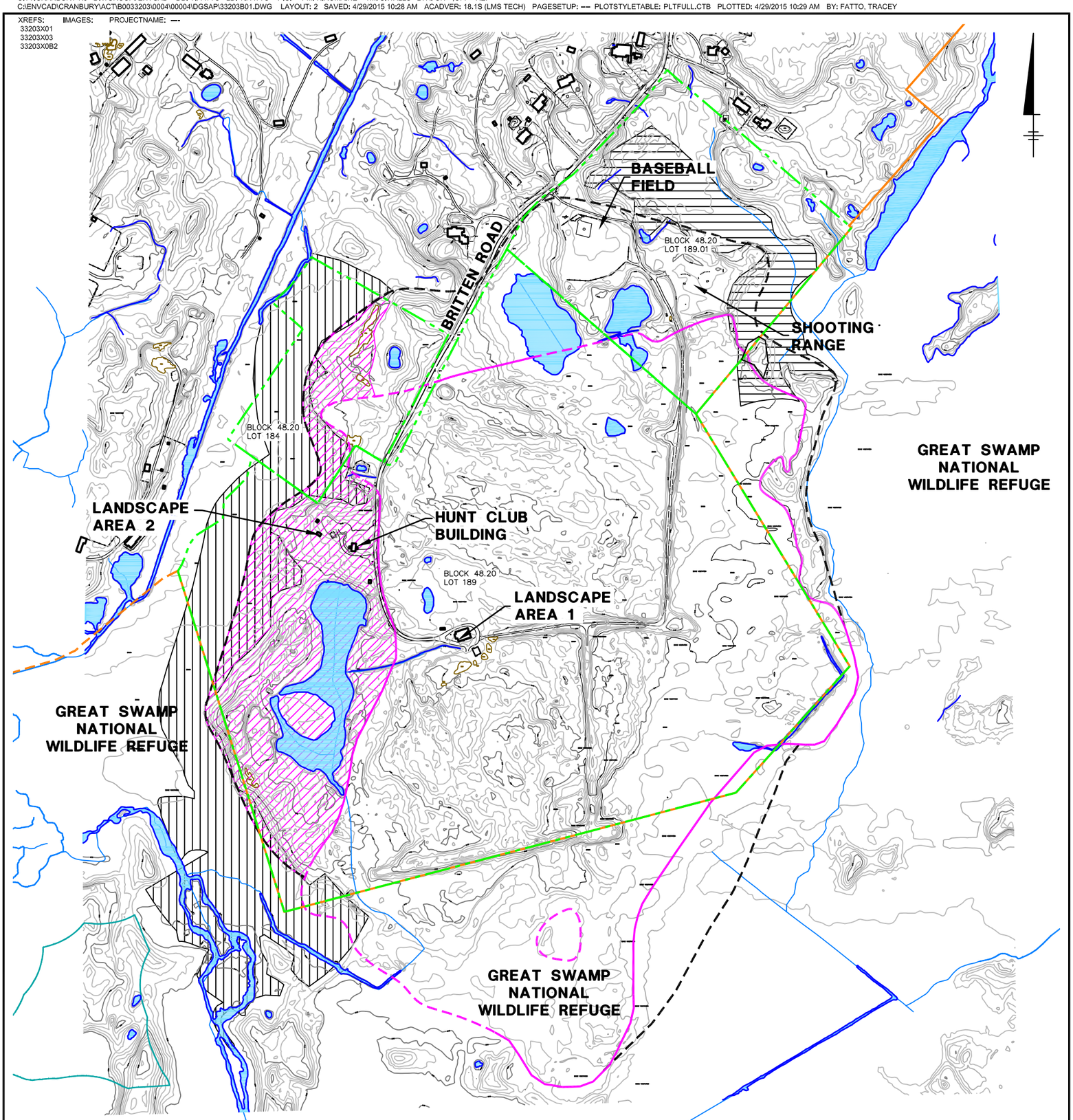
ARCADIS

FIGURE
1

CITY: CRANBURY-NJ DIV/GROUP: ENVCAD DB: TFATTO LD: TFATTO PIC: PM: K.ROMAINE TM:K.ROMAINE LYR: ON=*;OFF=*REF*
C:\ENVCAD\CRANBURY\ACT\B0033203\0004\00004\DGSAP\33203N01.dwg LAYOUT: 1 SAVED: 4/29/2015 10:23 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/29/2015 10:24 AM BY: FATTO, TRACEY
XREFS: IMAGES: 33203X01.jpg PROJECTNAME: ----

CITY:CRANBURY-NJ DIV/GROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC: PM: K.ROMAINE TM: S.WALLS LYR: ON=*;OFF=*REF*
C:\ENVCAD\CRANBURY\ACT\B0033203\0004\00004\DGSAP\33203B01.DWG LAYOUT: 2 SAVED: 4/29/2015 10:28 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/29/2015 10:29 AM BY: FATTO, TRACEY

XREFS: 33203X01 33203X03 33203X0B2 IMAGES: PROJECTNAME: ----



LEGEND:

- OPEN WATER
- PRE-REMEDIAL INVESTIGATION PROJECTED EDGE OF LANDFILLED MATERIALS
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (DASHED WHERE APPROXIMATE)
- TAX PARCELS
- WASTE AND DEBRIS OBSERVED ON GROUND SURFACE BUT NOT OBSERVED OR ANTICIPATED TO BE BELOW GROUND SURFACE
- POTENTIAL BOG TURTLE HABITAT AREA A (35.31 ACRES)
- POTENTIAL BOG TURTLE HABITAT AREA B (10.89 ACRES)

NOTES:

1. THE PRE-REMEDIAL INVESTIGATION PROJECTED EDGE OF LANDFILLED MATERIALS ON THIS FIGURE IS APPROXIMATE AS DRAWN AND IS BASED ON VISUAL OBSERVATIONS OF THE GROUND SURFACE MADE DURING SITE VISITS CONDUCTED JUNE 20, 2006 THROUGH JULY 14, 2006.
2. THE EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES IS DRAWN BASED ON OBSERVATIONS OF MATERIALS EXCAVATED DURING TEST PIT ACTIVITIES CONDUCTED FROM JULY 26, 2007 TO SEPTEMBER 6, 2007 AND MARCH 26, 2008.
3. THE PORTION OF THE GREAT SWAMP NATIONAL WILDLIFE REFUGE (GSNWR) PROPERTY BOUNDARY ON THIS FIGURE WITHIN CHATHAM TOWNSHIP, NJ WAS OBTAINED FROM CHATHAM TOWNSHIP TAX PARCEL DATA PROVIDED BY CIVIL SOLUTIONS. THE PORTION OF THE GSNWR PROPERTY BOUNDARY ON THIS FIGURE OUTSIDE OF CHATHAM TOWNSHIP IS APPROXIMATE AND WAS OBTAINED FROM THE UNITED STATES FISH AND WILDLIFE SERVICE (GEOGRAPHIC INFORMATION SYSTEMS AND SPATIAL DATA).
4. BLOCK 48.20, LOTS 184 AND 189 ARE OWNED BY ROBERT J. MIELE AS TRUSTEE FOR THE TRUST CREATED BY THE LAST WILL AND TESTAMENT OF ANGELO J. MIELE. BLOCK 48.20, LOT 189.01 IS OWNED BY THE GREEN VILLAGE FIRE DEPARTMENT.

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)
2. TAX PARCEL DATA FOR CHATHAM TOWNSHIP WAS PROVIDED BY CIVIL SOLUTIONS.

0 500' 1000'
GRAPHIC SCALE

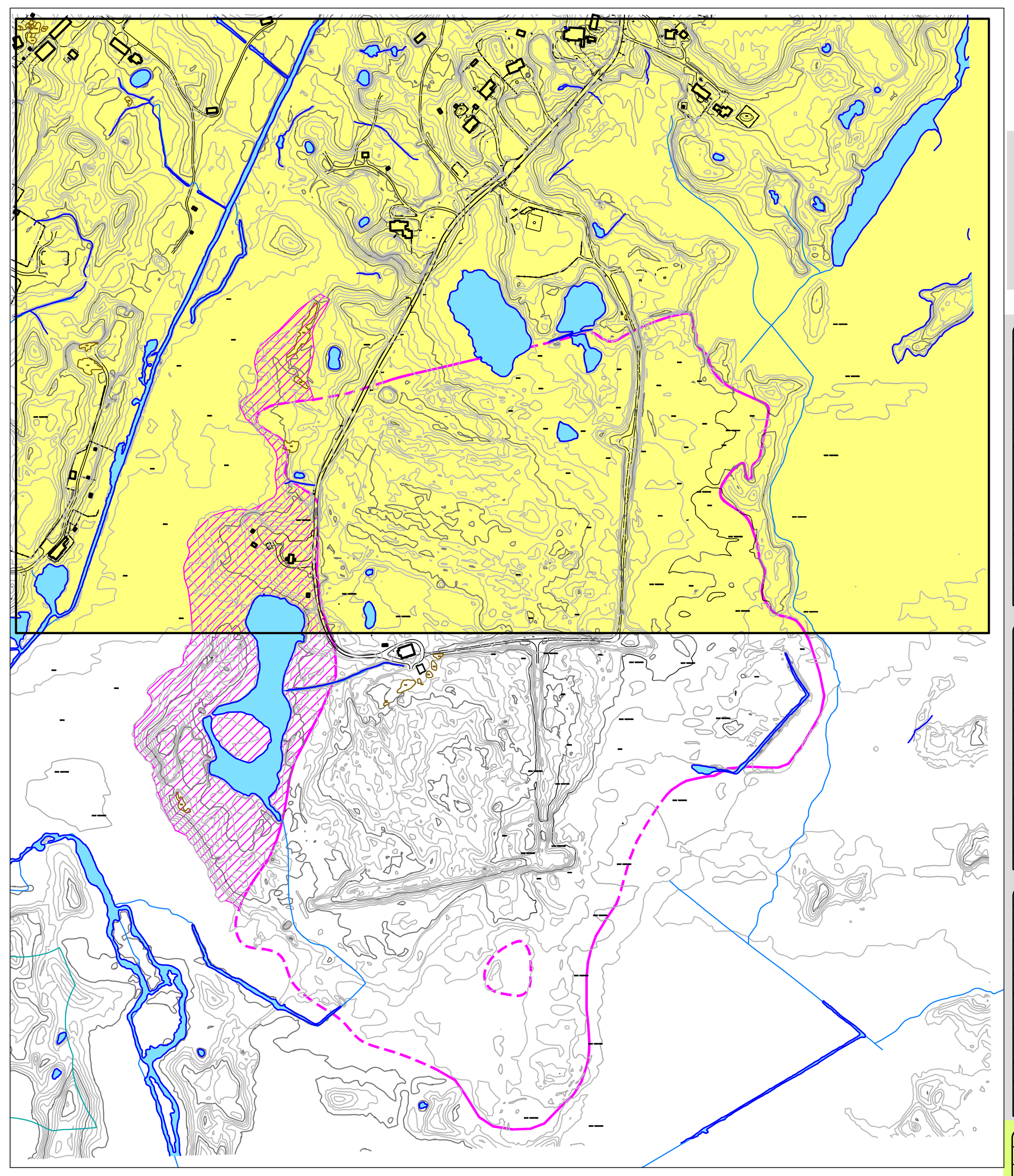
ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY
DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

SITE PLAN

ARCADIS

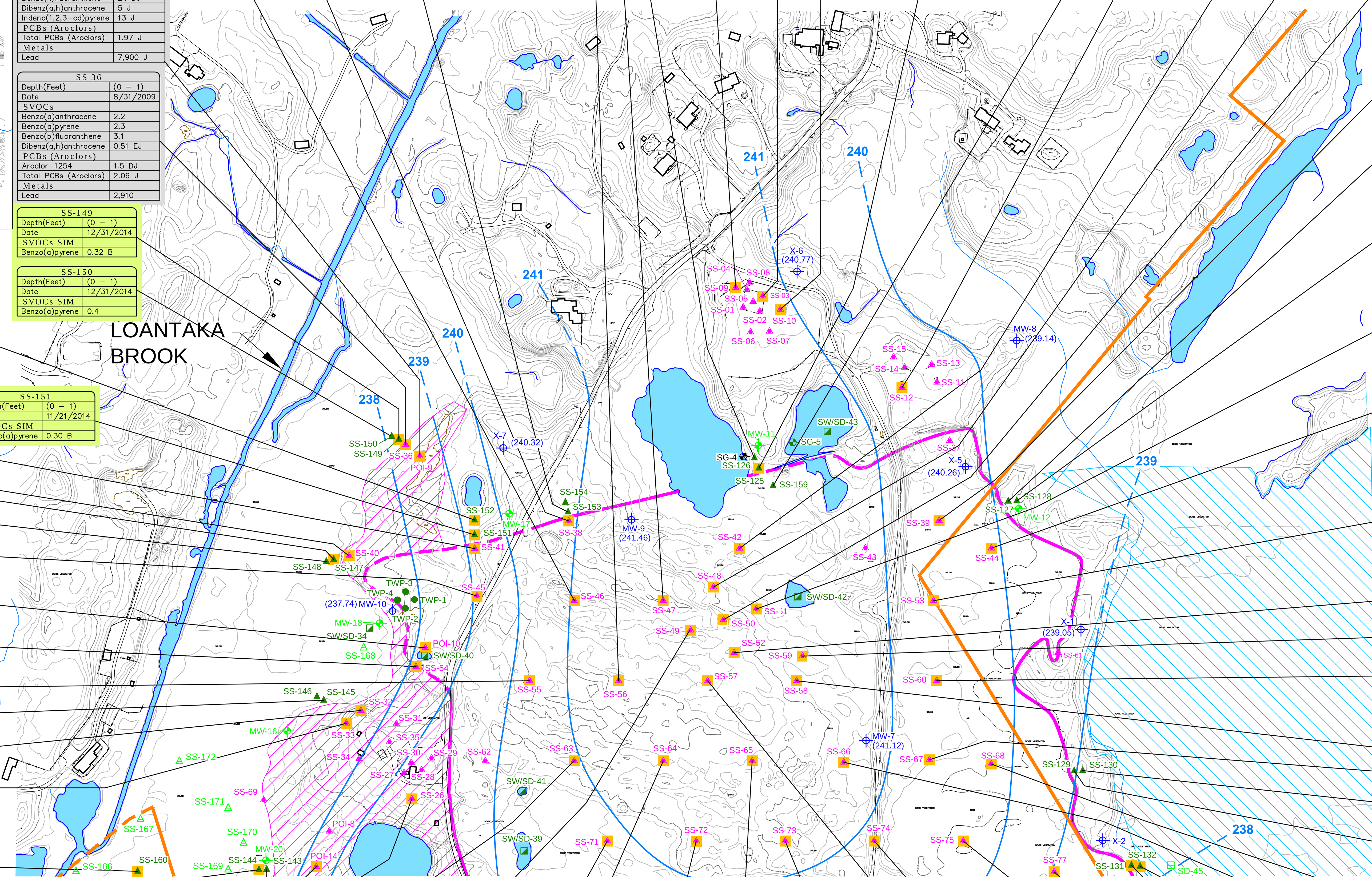
FIGURE **2**

CITY: CRANBURY-NJ DIV/GROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC:(Opt) PM: K.ROMAINE TM: L.HYATT LYR: ON=*;OFF=*REF*
C:\ENVCAD\CRANBURY\ACT\B0033203\0004\00004\DGSAP\B0033203P01.DWG LAYOUT: 3A SAVED: 4/27/2015 8:13 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/27/2015 10:10 AM BY: FATTO, TRACEY
XREFS: 33203X01 B0033203X16 B0033203X15 B0033203X0E B0033203X17 IMAGES: PROJECTNAME: ----



SITE MAP

0 500' 1000'
GRAPHIC SCALE



SS-38		
Depth(Feet)	(0 – 1)	(9 – 10)
Date	9/1/2009	9/1/2009
SVOCs		
Benzo(a)anthracene	5.4 D	0.0036 U
Benzo(a)pyrene	6.2 D	0.0061 UB
Benzo(b)fluoranthene	6.9 D	0.0036 U
Dibenz(a,h)anthracene	0.71	0.0036 U

SS-46		
Depth(Feet)	(0 – 1)	(6 – 7)
Date	9/1/2009	9/1/2009
SVOCs		
Benzo(a)pyrene	0.54 J	0.25 EJ
PCBs (Aroclors)		
Aroclor–1242	16 DJ	0.054 U
Aroclor–1254	12 DJ	1.2 D
Aroclor–1260	1.2 J	0.14
Aroclor–1268	2.8 J	0.067
Total PCBs (Aroclors)	32 J	2.03
PCBs (Congeners)		
Total PCBs (Congeners)	95 J	NA
Metals		
Arsenic	7 J	24.5 J
Lead	665	1,460

POI-9	
Depth(Feet)	(0 – 1)
Date	8/27/2009
SVOCs	
Benzo(a)anthracene	30 DJ
Benzo(a)pyrene	33 DJ
Benzo(b)fluoranthene	42 DJ
Benzo(k)fluoranthene	24 DJ
Dibenz(a,h)anthracene	5 J
Indeno(1,2,3–cd)pyrene	13 J
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.97 J
Metals	
Lead	7,900 J

SS-36	
Depth(Feet)	(0 – 1)
Date	8/31/2009
SVOCs	
Benzo(a)anthracene	2.2
Benzo(a)pyrene	2.3
Benzo(b)fluoranthene	3.1
Dibenz(a,h)anthracene	0.51 EJ
PCBs (Aroclors)	
Aroclor–1254	1.5 DJ
Total PCBs (Aroclors)	2.06 J
Metals	
Lead	2,910

SS-149	
Depth(Feet)	(0 – 1)
Date	12/31/2014
SVOCs SIM	
Benzo(a)pyrene	0.32 B

SS-150	
Depth(Feet)	(0 – 1)
Date	12/31/2014
SVOCs SIM	
Benzo(a)pyrene	0.4

SS-152	
Depth(Feet)	(0 – 1)
Date	11/21/2014
SVOCs SIM	
Benzo(a)anthracene	0.69 B
Benzo(a)pyrene	0.79
Benzo(b)fluoranthene	0.87 B
Indeno(1,2,3–cd)pyrene	0.67 B

SS-40	
Depth(Feet)	(0 – 1)
Date	8/31/2009
SVOCs	
Benzo(a)pyrene	0.25 J
PCBs (Aroclors)	
Aroclor–1254	1.3 D
Total PCBs (Aroclors)	1.56
Pesticides	
alpha–Chlordane	2.5 D
gamma–Chlordane	2.3 D
Metals	
Lead	825

SS-41	
Depth(Feet)	(0 – 1)
Date	8/27/2009
SVOCs	
Benzo(a)pyrene	0.26

SS-151	
Depth(Feet)	(0 – 1)
Date	11/21/2014
SVOCs SIM	
Benzo(a)pyrene	0.30 B

SS-147	
Depth(Feet)	(0 – 1)
Date	12/30/2014
SVOCs SIM	
Benzo(a)pyrene	0.80 B
Benzo(b)fluoranthene	0.93

SS-148	
Depth(Feet)	(0 – 1)
Date	12/30/2014
--	No Exceedances

SS-45		
Depth(Feet)	(0 – 1)	(9 – 10)
Date	8/31/2009	8/31/2009
SVOCs		
Benzo(a)pyrene	0.77	0.006

POI-10	
Depth(Feet)	(0 – 1)
Date	8/26/2009
PCBs (Aroclors)	
Aroclor–1254	3.6 JN
Aroclor–1260	88 D
Total PCBs (Aroclors)	91.6 J
PCBs (Congeners)	
Total PCBs (Congeners)	2.05 J
Metals	
Copper	49,900 J
Lead	1,510 J

SS-54	
Depth(Feet)	(0 – 1)
Date	8/31/2009
SVOCs	
Benzo(a)pyrene	0.22 [0.24]

SS-55		
Depth(Feet)	(0 – 1)	(2 – 3)
Date	9/1/2009	9/1/2009
SVOCs		
Benzo(a)pyrene	0.3 J	0.17 J
PCBs (Aroclors)		
Aroclor–1248	1.5 DJ	0.049 U
Aroclor–1254	1.4 D	0.73
Total PCBs (Aroclors)	3.54 J	1.81
Metals		
Antimony	1,960 J	2.8 J
Arsenic	529 J	8.4 J
Lead	16,500	934

SS-145	
Depth(Feet)	(0 – 1)
Date	12/30/2014
--	No Exceedances

SS-32	
Depth(Feet)	(0 – 1)
Date	11/6/2007
SVOCs	
Benzo(a)pyrene	1 J

SS-33	
Depth(Feet)	(0 – 1)
Date	11/6/2007
SVOCs	
Benzo(a)pyrene	0.39

SS-160	
Depth(Feet)	(0 – 1)
Date	12/18/2014
SVOCs SIM	
Benzo(a)pyrene	0.52
Benzo(b)fluoranthene	0.64 B
Metals	
Lead	1250*
Vanadium	87

SS-144	
Depth(Feet)	(0 – 1)
Date	12/30/2014
SVOCs SIM	
Benzo(a)pyrene	0.53
Metals	
Arsenic	35.1 N
Lead	561 *

SS-143	
Depth(Feet)	(0 – 1)
Date	12/30/2014
SVOCs SIM	
Benzo(a)pyrene	0.28 B
Metals	
Vanadium	79.9

POI-14	
Depth(Feet)	(0 – 1)
Date	8/24/2009
Metals	
Arsenic	31.7 J
Lead	9,210 J

SS-26	
Depth(Feet)	(0 – 1)
Date	11/5/2007
SVOCs	
Benzo(a)pyrene	0.23 J

SS-63		
Depth(Feet)	(0 – 1)	(3.5 – 4.5)
Date	8/26/2009	8/26/2009
SVOCs		
Benzo(a)pyrene	0.26	0.19 EJ
PCBs (Aroclors)		
Aroclor–1242	0.24 U	2.8 D
Aroclor–1248	7.7 DJ	0.074 U
Aroclor–1254	5.3 DJ	4 D
Total PCBs (Aroclors)	13.9 J	7.44
PCBs (Congeners)		
Total PCBs (Congeners)	44.1 J	NA
Metals		
Arsenic	19.3 J	24.3 J
Lead	2,020 J	2,520 J

SS-49	
Depth(Feet)	(0 – 1)
Date	8/31/2009
SVOCs	
Benzo(a)pyrene	1.7
Benzo(b)fluoranthene	2.4
Dibenz(a,h)anthracene	0.25 EJ
PCBs (Aroclors)	
Aroclor–1248	1.6 D
Aroclor–1254	2.7 D
Aroclor–1260	1.3 D
Total PCBs (Aroclors)	5.6
Metals	
Arsenic	21.1
Lead	1,010

SS-71	
Depth(Feet)	(0 – 1)
Date	8/26/2009
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.1 J
Metals	
Lead	1,070 J
Vanadium	6,140

SS-64		
Depth(Feet)	(0 – 1)	(5 – 6)
Date	8/27/2009	8/27/2009
SVOCs		
Dibenz(a,h)anthracene	0.21 EJ	0.49 EJ [0.36 EJ]
PCBs (Aroclors)		
Aroclor–1242	0.061 U	0.061 U [2.6 D]
Aroclor–1248	2.1 D	3.2 DJ [0.11 U]
Aroclor–1254	1.5 D	2.3 DJ [4.9 D]
Total PCBs (Aroclors)	3.99	6.32 J [8.24]
Metals		
Lead	1,930 J	1,020 J [1,130 J]

SS-72		
Depth(Feet)	(0 – 1)	(9 – 10)
Date	8/25/2009	8/25/2009
PCBs (Aroclors)		
Aroclor–1242	0.11 U	1.8
Aroclor–1248	2.5 D	0.11 U
Aroclor–1254	3.3 D	3.9 D
Total PCBs (Aroclors)	7.07 J	6.09
PCBs (Congeners)		
Total PCBs (Congeners)	8.65 J	NA
Metals		
Arsenic	26 J	12.6 J
Lead	1,750 J	950 J

SS-73		
Depth(Feet)	(0 – 1)	(6 – 7)
Date	8/25/2009	8/25/2009
SVOCs		
Benzo(a)pyrene	0.12 EJ	0.24 J
PCBs (Aroclors)		
Aroclor–1242	0.11 U	1.7
Aroclor–1248	1.3	0.19 U
Aroclor–1254	2.5 D	1.3 J
Total PCBs (Aroclors)	4.49	3.16 J
Metals		
Lead	1,880 J	3,020 J

SS-65		
Depth(Feet)	(0 – 1)	(5 – 6)
Date	8/27/2009	8/27/2009
SVOCs		
Acetophenone	18 D	0.05 J
Benzo(a)anthracene	66 D	0.86
Benzo(a)pyrene	51 D	0.88
Benzo(b)fluoranthene	49 D	1.2
Benzo(k)fluoranthene	51 D	1.3
Dibenz(a,h)anthracene	4.8 J	0.44 EJ
Indeno(1,2,3–cd)pyrene	12 J	0.15 J
PCBs (Aroclors)		
Aroclor–1242	0.065 U	4.2 DJ
Aroclor–1248	1.8 D	0.15 U
Aroclor–1254	1.5 DJ	3 D
Total PCBs (Aroclors)	3.68 J	7.73 J
Metals		
Lead	1,560 J	3,380 J

SS-74		
Depth(Feet)	(0 – 1)	(6 – 7)
Date	8/24/2009	8/24/2009
SVOCs		
Benzo(a)anthracene	1	2.2
Benzo(a)pyrene	1.1	2.7
Benzo(b)fluoranthene	1.2	3.8 D
Dibenz(a,h)anthracene	0.3 EJ	0.76 EJ
PCBs (Aroclors)		
Aroclor–1254	0.039 U	1.3 D
Total PCBs (Aroclors)	0.211 J	2.17

SS-57		
Depth(Feet)	(0 – 1)	(4 – 5)
Date	8/27/2009	8/27/2009
SVOCs		
Benzo(a)pyrene	2.3	0.38 J
Benzo(b)fluoranthene	3.6	0.58 J
Dibenz(a,h)anthracene	0.17 J	0.69 EJ
PCBs (Aroclors)		
Aroclor–1248	2.8 D	4.2 D
Aroclor–1254	2.7 DJN	4.6 D
Aroclor–1260	7 D	3.3 D
Total PCBs (Aroclors)	12.5 J	12.1
Pesticides		
Heptachlor epoxide	RX	0.33 DJN
Metals		
Lead	795 J	1,060 J

SS-77	
Depth(Feet)	(0 – 1)
Date	9/17/2009
PCBs (Aroclors)	
Aroclor–1248	1.7
Total PCBs (Aroclors)	2.16 J

SS-75	
Depth(Feet)	(0 – 1)
Date	9/15/2009
PCBs (Aroclors)	
Aroclor–1248	1.3
Aroclor–1254	2.3
Total PCBs (Aroclors)	4.17
Metals	
Arsenic	32.3
Lead	1,360

SS-131	
Depth(Feet)	(0 – 1)
Date	12/16/2014
PCBs (Aroclors)	
Aroclor–1242	0.41
Aroclor–1254	0.24 J
Total PCBs (Aroclors)	0.72 J

SS-132	
Depth(Feet)	(0 – 1)
Date	12/16/2014
SVOCs SIM	
Benzo(a)pyrene	0.3
PCBs (Aroclors)	
Aroclor–1242	0.39
Aroclor–1254	0.30 P
Total PCBs (Aroclors)	0.79 J P

SS-66	
Depth(Feet)	(0 – 1)
Date	8/28/2009
SVOCs	
Benzo(a)pyrene	0.28
PCBs (Aroclors)	
Aroclor–1248	15
Aroclor–1254	55 D
Aroclor–1260	8.1
Total PCBs (Aroclors)	78.1
PCBs (Congeners)	
Total PCBs (Congeners)	9.66 J
Metals	
Arsenic	21.9
Lead	2,100

SS-68	
Depth(Feet)	(0 – 1)
Date	9/2/2009
SVOCs	
Benzo(a)pyrene	0.32 [0.18 EJ]
PCBs (Aroclors)	
Aroclor–1248	1.2 DJ [1.3 DJ]
Aroclor–1254	3.2 D [2.6 D]
Total PCBs (Aroclors)	4.99 J [4.41 J]
PCBs (Congeners)	
Total PCBs (Congeners)	4.91 J [9.46 J]
Metals	
Lead	1,320 [1,150]

SS-129	
Depth(Feet)	(0 – 1)
Date	11/24/2014
--	No Exceedances

SS-130	
Depth(Feet)	(0 – 1)
Date	11/24/2014
--	No Exceedances

SS-67	
Depth(Feet)	(0 – 1)
Date	9/3/2009
SVOCs	
Benzo(a)pyrene	0.49
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.32 J
Metals	
Lead	1,580

SS-58	
Depth(Feet)	(0 – 1)
Date	8/28/2009
PCBs (Aroclors)	
Aroclor–1248	67 D
Aroclor–1254	57 D
Aroclor–1260	1.7
Total PCBs (Aroclors)	126
PCBs (Congeners)	
Total PCBs (Congeners)	157 J
Pesticides	
Aldrin	0.27 DJN
Metals	
Lead	927

SS-60	
Depth(Feet)	(0 – 1)
Date	9/18/2009
PCBs (Aroclors)	
Aroclor–1248	1.2 J
Aroclor–1254	3.6 J
Aroclor–1260	1.2 J
Total PCBs (Aroclors)	6 J
Pesticides	
Dieldrin	0.29 DJ
Metals	
Lead	974

SS-59	
Depth(Feet)	(0 – 1)
Date	8/27/2009
PCBs (Aroclors)	
Aroclor–1242	6.5 D
Aroclor–1254	2.7 D
Total PCBs (Aroclors)	10
Metals	
Lead	1,250 J

SS-52	
Depth(Feet)	(0 – 1)
Date	8/31/2009
SVOCs	
Benzo(a)anthracene	2.7
Benzo(a)pyrene	3.2 J
Benzo(b)fluoranthene	4.2 J
Dibenz(a,h)anthracene	0.58 EJ
PCBs (Aroclors)	
Aroclor–1242	9.4 D
Aroclor–1254	5.3 D
Total PCBs (Aroclors)	15.4
PCBs (Congeners)	
Total PCBs (Congeners)	12.4 J
Metals	
Lead	2,850

SS-53	
Depth(Feet)	(0 – 1)
Date	9/17/2009
SVOCs	
Benzo(a)pyrene	0.57
PCBs (Aroclors)	
Aroclor–1242	4.1
Aroclor–1254	5.6
Aroclor–1260	1.2
Total PCBs (Aroclors)	10.9
Metals	
Lead	1,110 J

SS-44	
Depth(Feet)	(0 – 1)
Date	9/1/2009
PCBs (Aroclors)	
Aroclor–1254	1.1 D
Total PCBs (Aroclors)	1.83
Metals	
Lead	1,580

SS-51	
Depth(Feet)	(0 – 1)
Date	8/28/2009
SVOCs	
Benzo(a)pyrene	0.44
PCBs (Aroclors)	
Aroclor–1248	1.6 D
Aroclor–1254	3 D
Total PCBs (Aroclors)	5.45
Metals	
Lead	2,200

SS-128	
Depth(Feet)	(0 – 1)
Date	11/24/2014
--	No Exceedances

SS-127	
Depth(Feet)	(0 – 1)
Date	11/21/2014
--	No Exceedances

SS-39	
Depth(Feet)	(0 – 1)
Date	9/16/2009
SVOCs	
Benzo(a)pyrene	0.41
PCBs (Aroclors)	
Aroclor–1242	6.1
Aroclor–1254	6.2
Total PCBs (Aroclors)	12.3
PCBs (Congeners)	
Total PCBs (Congeners)	100 J
Metals	
Lead	1,050

SS-50	
Depth(Feet)	(0 – 1)
Date	8/28/2009
PCBs (Aroclors)	
Aroclor–1254	2.3 D
Aroclor–1260	1.1
Total PCBs (Aroclors)	3.4
Metals	
Arsenic	19.1 J

SS-48	
Depth(Feet)	(0 – 1)
Date	8/28/2009
SVOCs	
Benzo(a)pyrene	0.27 EJ
PCBs (Aroclors)	
Aroclor–1248	1.4 D
Aroclor–1254	2.4 D
Total PCBs (Aroclors)	4.4
Metals	
Lead	1,300

SS-42	
Depth(Feet)	(0 – 1)
Date	8/28/2009
PCBs (Aroclors)	
Aroclor–1254	1.3 D
Total PCBs (Aroclors)	1.84

SS-12	
Depth(Feet)	(0 – 1)
Date	9/20/2007
SVOCs	
Benzo(a)pyrene	0.77 D

SS-159	
Depth(Feet)	(0 – 1)
Date	12/18/2014
--	No Exceedances

SS-125	
Depth(Feet)	(0 – 1)
Date	11/20/2014
PCBs (Aroclors)	
Aroclor–1260	0.26
Total PCBs (Aroclors)	0.26

SS-10	
Depth(Feet)	(0 – 1)
Date	9/20/2007
SVOCs	
Benzo(a)pyrene	0.74 D

SS-03	
Depth(Feet)	(0 – 1)
Date	9/19/2007
SVOCs	
Benzo(a)pyrene	0.92

SS-09	
Depth(Feet)	(0 – 1)
Date	9/20/2007
SVOCs	
Benzo(a)pyrene	1

SS-126	
Depth(Feet)	(0 – 1)
Date	11/20/2014
--	No Exceedances

SS-47		
Depth(Feet)	(0 – 1)	(8 – 9)
Date	8/31/2009	8/31/2009
SVOCs		
Benzo(a)pyrene	0.2 J	0.21 J
PCBs (Aroclors)		
Aroclor–1254	3 D	0.61
Aroclor–1260	1.5 D	0.13
Total PCBs (Aroclors)	5.35	1.47 J
Metals		
Arsenic	23.1	5.5 J
Lead	7,140	835

SS-56		
Depth(Feet)	(0 – 1)	(2 – 3)
Date	8/26/2009	8/26/2009
PCBs (Aroclors)		
Aroclor–1242	3 D	4.1 D
Aroclor–1254	7.2 D	4 D
Aroclor–1260	1.2	0.97
Total PCBs (Aroclors)	11.4	9.07
Pesticides		
Dieldrin	0.3 D	0.041 J
Metals		
Arsenic	14.6 J	20.6 J
Lead	2,060 J	1,120 J

SS-153	
Depth(Feet)	(0 – 1)
Date	11/21/2014
--	No Exceedances

NJDEP Soil Remediation Standards		
Constituent	Non–Residential	Residential
VOCs		
Carbon Tetrachloride	2	0.6
Chloroform	2	0.6
SVOCs		
Acetophenone	5	2
Benzo(a)anthracene	2	0.6
Benzo(a)pyrene	0.2	0.2
Benzo(b)fluoranthene	2	0.6
Benzo(k)fluoranthene	23	6
Dibenz(a,h)anthracene	0.2	0.2
Indeno(1,2,3–cd)pyrene	2	0.6
PCBs		
Aroclor–1242	1	0.2
Aroclor–1248	1	0.2
Aroclor–1254	1	0.2
Aroclor–1260	1	0.2
Aroclor–1262	1	0.2
Aroclor–1268	1	0.2
Total PCBs (Aroclors)	1	0.2
PCBs (Congeners)		
Total PCBs (Congeners)	1	0.2
Pesticides		
Aldrin	0.2	0.04
alpha–Chlordane	1	0.2
Dieldrin	0.2	0.04
gamma–Chlordane	1	0.2
Heptachlor	0.7	0.1
Heptachlor epoxide	0.3	0.07
Metals		
Antimony	450	31
Arsenic	19	19
Cadmium	78	78
Copper	45,000	3,100
Lead	800	400
Manganese	5,900	11,000
Mercury	65	23
Vanadium	1,100	78

Ecologically-Based Screening Levels for Sediment	
Constituent	Value
SVOCs	
Bis(2–ethyl hexyl) phthalate	0.182
PCBs	
Aroclor–1260	0.005
Pesticides	
4,4'–DDE	0.005
Heptachlor	0.0006
Metals	
Arsenic	6
Cadmium	0.6
Copper	16
Cyanide	0.0001
Lead	31
Mercury	0.2
Zinc	120

LEGEND:

- OPEN WATER
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (DASHED WHERE APPROXIMATE)
- WASTE AND DEBRIS OBSERVED ON GROUND SURFACE BUT NOT OBSERVED OR ANTICIPATED TO BE BELOW GROUND SURFACE
- AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY
- DATA GAP SAMPLING LOCATION
- SAMPLES COLLECTED PRIOR TO DATA GAP SAMPLING
- SOIL SAMPLING LOCATION
- SOIL SAMPLING LOCATION WITH DETECTED CONCENTRATIONS GREATER THAN NJDEP NONRESIDENTIAL SOIL REMEDIATION STANDARDS
- PROPOSED MONITORING WELL
- EXISTING MONITORING WELL
- DATA GAP TEMPORARY WELL POINT
- DATA GAP SOIL SAMPLE LOCATION
- PROPOSED SOIL SAMPLE LOCATION
- DATA GAP SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE
- PROPOSED SEDIMENT/SOIL SAMPLE (SAMPLE TYPE WILL BE BASED ON FIELD CONDITIONS OBSERVED AT THE TIME OF SAMPLE COLLECTION)
- STREAM GAUGE
- DATA GAP STREAM GAUGE LOCATION
- GROUNDWATER ELEVATION CONTOUR – DECEMBER 2014 (DASHED WHERE INFERRED)
- (236.34) GROUNDWATER ELEVATION – DECEMBER 2014 (FEET ABOVE MEAN SEA LEVEL)

DATA NOTES:

UNITS = MILLIGRAMS PER KILOGRAM

[] = DUPLICATE SAMPLE

() = RESULTS OF SECONDARY ANALYSIS

PCBS = POLYCHLORINATED BIPHENYLS

SVOCS = SEMIVOLATILE ORGANIC COMPOUNDS

VOCS = VOLATILE ORGANIC COMPOUNDS

NA = NOT ANALYZED

B = FOR ORGANICS THE COMPOUND HAS BEEN FOUND IN THE SAMPLE AS WELL AS ITS ASSOCIATED BLANK, ITS PRESENCE IN THE SAMPLE MAY BE SUSPECT.

D = CONCENTRATIONS IDENTIFIED FROM ANALYSIS OF THE SAMPLE AT A SECONDARY DILUTION.

E = FOR ORGANICS THE COMPOUND WAS QUANTITATED ABOVE THE CALIBRATION RANGE.

E = FOR INORGANICS THE REPORTED VALUE IS ESTIMATED BECAUSE OF THE PRESENCE OF INTERFERENCE BASED ON SERIAL DILUTON ANALYSIS.

J = FOR ORGANICS THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

J = FOR INORGANICS THE SAMPLE RESULT IS GREATER THAN THE MDL BUT BELOW THE CRDL.

JN = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION. THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

N = SPIKED SAMPLE RECOVERY IS NOT WITHIN CONTROL LIMITS.

P = DUAL COLUMN ANALYSIS RESULTED IN GREATER THAT 25% DIFFERENCE FOR DETECTED CONCENTRATIONS BETWEEN THE TWO COLUMNS.

q = THE REPORTED RESULT IS THE ESTIMATED MAXIMUM POSIBLE CONCENTRATION OF THE ANALYTE, QUANTITATED USING THE THEORETICAL ION RATIO. THE MEASURED ION RATION DOES NOT MEET QUALITATIVE IDENTIFICATION CRITERIA AND INDICATES A POSSIBLE INTERFERENCE.

RX = THE SAMPLE RESULTS ARE REJECTED DUE TO MATRIX INTERFERENCE.

U = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.

* = DUPLICATE ANALYSIS IS NOT WITHIN THE CALIBRATION RANGE.

NOTES:

1. ANALYTICAL RESULTS GIVEN IN MILLIGRAMS PER KILOGRAM FOR SOIL SAMPLES WITH DETECTED CONCENTRATIONS GREATER THAN NEW JERSEY NON–RESIDENTIAL SOIL REMEDIATION STANDARDS (DATED OCTOBER 2011). ANALYTICAL RESULTS GREATER THAN NEW JERSEY NON–RESIDENTIAL REMEDIATION STANDARDS ARE POSTED FOR PREVIOUS SAMPLES. DATA GAP ANALYTICAL RESULTS ARE COMPARED TO THE RESIDENTIAL AND NON–RESIDENTIAL REMEDIATION STANDARDS.
2. THE EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES IS DRAWN BASED ON OBSERVATIONS OF MATERIALS EXCAVATED DURING TEST PIT ACTIVITIES CONDUCTED FROM JULY 26, 2007 TO SEPTEMBER 6, 2007 AND MARCH 26, 2008. THE EDGE OF THE LANDFILL WAS REFINED BASED ON OBSERVATIONS PRESENTED IN THE FIELD CHANGE REQUEST (FCR–02) APPROVED BY USEPA ON DECEMBER 29, 2014.
3. THE EXTENT OF AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY IS BASED ON FIELD OBSERVATIONS MADE THROUGHOUT THE PERIOD OF INVESTIGATION ACTIVITIES. THE EXTENT OF THE AREA SHOWN IS APPROXIMATE.
4. CONDITIONS ENCOUNTERED AT LOCATIONS SS–162, SS–163, AND SS–164 WERE REPRESENTATIVE OF SEDIMENT. RESULTS FOR THESE SAMPLES ARE PRESENTED WITH THE SEDIMENT RESULTS.
5. DATA GAP ANALYTICAL RESULTS HAVE NOT BEEN VALIDATED.

0 200' 400'
GRAPHIC SCALE

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)
2. TAX PARCEL DATA FOR CHATHAM TOWNSHIP WAS PROVIDED BY CIVIL SOLUTIONS.

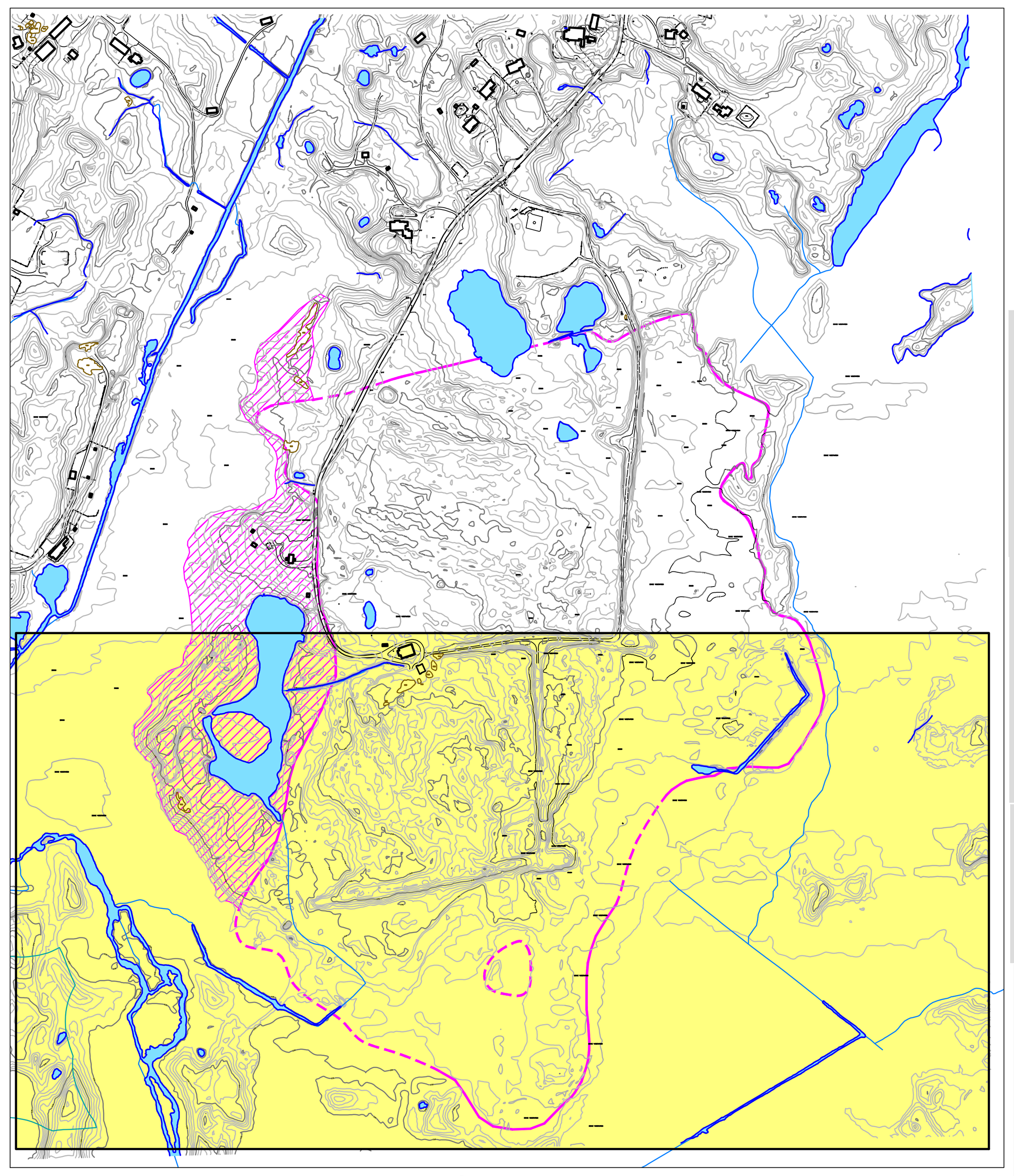
ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

PROPOSED SAMPLE LOCATIONS - NORTH

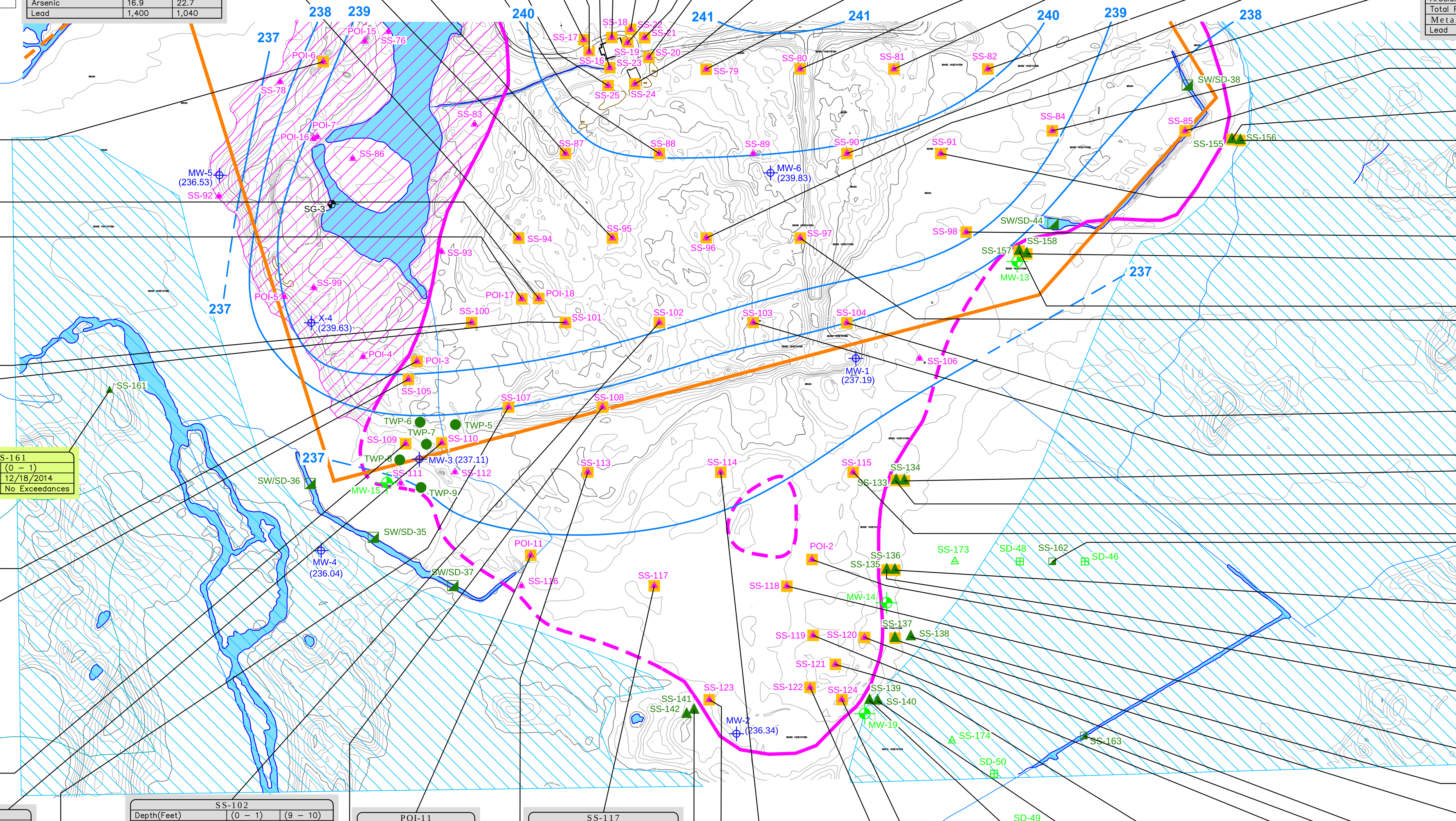
ARCADIS

FIGURE
3a



SITE MAP

0 500' 1000' GRAPHIC SCALE



SS-17

Depth(Feet)	(0 – 1)
Date	11/2/2007
SVOCs	
Benzo(a)pyrene	1.2
Metals	
Lead	901 DJ

SS-16

Depth(Feet)	(0 – 1)
Date	11/1/2007
SVOCs	
Benzo(a)pyrene	1.1 EJ

SS-23

Depth(Feet)	(0 – 1)
Date	11/2/2007
SVOCs	
Benzo(a)pyrene	0.75

SS-18

Depth(Feet)	(0 – 1)
Date	11/1/2007
SVOCs	
Benzo(a)pyrene	0.77 J

SS-25

Depth(Feet)	(0 – 0.85)
Date	11/5/2007
SVOCs	
Benzo(a)pyrene	0.21

SS-22

Depth(Feet)	(0 – 1)
Date	6/21/2007
SVOCs	
Benzo(a)anthracene	2.3 [3.3]
Benzo(a)pyrene	2.3 J [3.1]
Benzo(b)fluoranthene	3.3 J [4.5]

SS-19

Depth(Feet)	(0 – 0.8)
Date	11/2/2007
SVOCs	
Benzo(a)anthracene	2.9
Benzo(a)pyrene	2.9
Benzo(b)fluoranthene	4.4
PCBs (Aroclors)	
Aroclor–1254	2.8 D
Total PCBs (Aroclors)	2.8
PCBs (Congeners)	
Total PCBs (Congeners)	6.41 J
Metals	
Lead	1,090 DJ

SS-88

Depth(Feet)	(0 – 1)	(7 – 8)
Date	9/9/2009	9/9/2009
SVOCs		
Benzo(a)pyrene	0.51 J [0.72 J]	0.88 J
Dibenz(a,h)anthracene	0.21 EJ [0.54 EJ]	0.23 EJ
PCBs (Aroclors)		
Aroclor–1248	1.1 J [0.42 JN]	0.26 U
Aroclor–1254	4.8 J [2.4]	1.6
Total PCBs (Aroclors)	7.29 J [3.39 J]	2.01
Metals		
Arsenic	17.7 [19.8]	17.1
Lead	1,630 [2,370]	1,440

SS-21

Depth(Feet)	(0 – 1)
Date	6/21/2007
SVOCs	
Benzo(a)anthracene	4.3
Benzo(a)pyrene	4.3 J
Benzo(b)fluoranthene	6.2 J
Indeno(1,2,3–cd)pyrene	2.6 J

SS-87

Depth(Feet)	(0 – 1)	(6 – 7)
Date	9/10/2009	9/10/2009
SVOCs		
Benzo(a)pyrene	0.28	0.36
PCBs (Aroclors)		
Aroclor–1254	7.3 J	0.52 J
Aroclor–1260	1.4 J	0.23 J
Aroclor–1268	0.92 U	2.3 J
Total PCBs (Aroclors)	8.7 J	3.26 J
Metals		
Arsenic	22.6	28.2
Lead	1,640	886

SS-20

Depth(Feet)	(0 – 1)
Date	11/2/2007
SVOCs	
Benzo(a)anthracene	2.7
Benzo(a)pyrene	2.4
Benzo(b)fluoranthene	3.4

SS-80

Depth(Feet)	(0 – 1)	(9 – 10)
Date	9/2/2009	9/2/2009
SVOCs		
Benzo(a)anthracene	11 D	5.1 D
Benzo(a)pyrene	11 D	5.8 D
Benzo(b)fluoranthene	13 DJ	6 D
Dibenz(a,h)anthracene	1.1 J	0.48 J
Indeno(1,2,3–cd)pyrene	2.5 J	1.5 J
PCBs (Aroclors)		
Aroclor–1254	0.32	1.5
Total PCBs (Aroclors)	0.407	3.18
Metals		
Lead	2,490	1,010

SS-82

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Aroclor–1254	2.3
Total PCBs (Aroclors)	3.1 J
Metals	
Arsenic	22.4 J
Lead	4,010

SS-24

Depth(Feet)	(0 – 1)
Date	11/5/2007
SVOCs	
Benzo(a)pyrene	0.65 J
PCBs (Aroclors)	
Aroclor–1248	2.6 D
Aroclor–1260	2.1 D
Total PCBs (Aroclors)	4.7
PCBs (Congeners)	
Total PCBs (Congeners)	6.89 J
Metals	
Lead	1,080 DJ

SS-95

Depth(Feet)	(0 – 1)	(6 – 7)
Date	9/10/2009	9/10/2009
PCBs (Aroclors)		
Aroclor–1254	1.7 J	2.1
Total PCBs (Aroclors)	2.46 J	3.73 J
Metals		
Lead	1,550	1,110

SS-79

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Aroclor–1254	2.7 J
Total PCBs (Aroclors)	4 J
Metals	
Lead	1,900

SS-81

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Aroclor–1242	0.6 U [3.1]
Aroclor–1248	1.7 J [0.6 U]
Aroclor–1254	5 [3.8]
Aroclor–1260	1.1 [0.87]
Total PCBs (Aroclors)	7.8 J [7.77]
Metals	
Lead	2,290 [3,190]

SS-90

Depth(Feet)	(0 – 1)	(6 – 7)
Date	9/8/2009	9/8/2009
SVOCs		
Benzo(a)pyrene	0.082 J	0.49
PCBs (Aroclors)		
Aroclor–1242	2.4 U	1.3
Aroclor–1248	17 J	0.6 U
Aroclor–1254	12 J	2.3
Aroclor–1262	2.4 U	3.9
Total PCBs (Aroclors)	29 J	7.5
Metals		
Lead	1,540	1,620 J

SS-94

Depth(Feet)	(0 – 1)	(9 – 10)
Date	9/9/2009	9/9/2009
SVOCs		
Benzo(a)pyrene	0.077 EJ	0.22 EJ
PCBs (Aroclors)		
Aroclor–1248	1.3 J	0.16 J
Aroclor–1254	2.9 J	0.38
Total PCBs (Aroclors)	5.03 J	0.67 J
Metals		
Arsenic	16.9	22.7
Lead	1,400	1,040

SS-96

Depth(Feet)	(0 – 1)	(9 – 10)
Date	9/9/2009	9/9/2009
PCBs (Aroclors)		
Aroclor–1254	1	1.8 J
Aroclor–1260	1	1.4 J
Total PCBs (Aroclors)	2	3.61 J
Metals		
Lead	2,700	1,230

SS-84

Depth(Feet)	(0 – 1)
Date	9/2/2009
SVOCs	
Benzo(a)pyrene	0.47 J
PCBs (Aroclors)	
Aroclor–1254	9.4 D
Aroclor–1260	1.2
Total PCBs (Aroclors)	10.6
PCBs (Congeners)	
Total PCBs (Congeners)	125 J
Metals	
Lead	4,510

SS-85

Depth(Feet)	(0 – 1)
Date	9/2/2009
PCBs (Aroclors)	
Aroclor–1254	2.2
Total PCBs (Aroclors)	3.74
Metals	
Arsenic	22.8 J
Lead	2,360

POI-6

Depth(Feet)	(0 – 1)
Date	8/25/2009
SVOCs	
Benzo(a)pyrene	0.28 J
Metals	
Lead	2,570 J

SS-155

Depth(Feet)	(0 – 1)
Date	12/16/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.24 J

SS-156

Depth(Feet)	(0 – 1)
Date	12/16/2014
SVOCs SIM	
Benzo(a)pyrene	0.22
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.22 J

POI-18

Depth(Feet)	(5 – 6)
Date	1/14/2010
PCBs (Aroclors)	
Aroclor–1248	1.1 DJ
Aroclor–1254	2.5 D
Total PCBs (Aroclors)	4.07 J
Metals	
Arsenic	21.2 J
Lead	1,540

SS-91

Depth(Feet)	(0 – 1)
Date	9/17/2009
SVOCs	
Benzo(a)pyrene	0.59
PCBs (Aroclors)	
Aroclor–1254	3.1
Total PCBs (Aroclors)	4.58 J

SS-98

Depth(Feet)	(0 – 1)
Date	9/18/2009
PCBs (Aroclors)	
Aroclor–1248	2.4 J
Aroclor–1254	4.6
Total PCBs (Aroclors)	7.51 J
Metals	
Arsenic	25.7
Lead	2,710

SS-97

Depth(Feet)	(0 – 1)	(6 – 7)
Date	9/4/2009	9/4/2009
SVOCs		
Benzo(a)pyrene	0.31 D	0.042 D
PCBs (Aroclors)		
Aroclor–1242	5.7	20 J
Aroclor–1254	10	4.8
Total PCBs (Aroclors)	15.7	24.8 J
PCBs (Congeners)		
Total PCBs (Congeners)	50.2 J	NA
Metals		
Arsenic	8.4 J	28.4 J
Lead	1,430	648

POI-17

Depth(Feet)	(5 – 6)
Date	1/13/2010
PCBs (Aroclors)	
Aroclor–1254	2.1 D [3.1 D]
Aroclor–1260	3.2 D [0.86 J]
Total PCBs (Aroclors)	5.67 [5.15 J]
Metals	
Arsenic	41.9 J [57.7 J]
Lead	1,900 [1,940]

SS-158

Depth(Feet)	(0 – 1)
Date	12/31/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.25 J P

SS-157

Depth(Feet)	(0 – 1)
Date	12/31/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.40 J

SS-100

Depth(Feet)	(0 – 1)
Date	9/10/2009
PCBs (Aroclors)	
Aroclor–1254	2.6
Total PCBs (Aroclors)	4.06 J
Metals	
Lead	2,650

SS-104

Depth(Feet)	(0 – 1)
Date	9/2/2009
PCBs (Aroclors)	
Aroclor–1248	3.3 D
Aroclor–1254	1.9 D
Total PCBs (Aroclors)	5.57 J
PCBs (Congeners)	
Total PCBs (Congeners)	5.83 J
Metals	
Arsenic	22 J

SS-103

Depth(Feet)	(0 – 1)	(4 – 5)
Date	9/2/2009	9/2/2009
PCBs (Aroclors)		
Aroclor–1248	1.9 DJ	2.3 D
Aroclor–1254	3.1 D	4.1 D
Total PCBs (Aroclors)	5.55 J	7.01
Metals		
Arsenic	20.4 J	15 J
Cadmium	38.1 J	22,500 J
Lead	13,800	951

SS-101

Depth(Feet)	(0 – 1)	(4 – 5)
Date	9/9/2009	9/9/2009
SVOCs		
Benzo(a)pyrene	0.21 EJ	0.16 J
PCBs (Aroclors)		
Aroclor–1242	1.4	0.63 U
Aroclor–1248	0.61 U	1.9 J
Aroclor–1254	4.4	3.4 J
Aroclor–1260	1.5	2.7 J
Total PCBs (Aroclors)	7.3	8 J
PCBs (Congeners)		
Total PCBs (Congeners)	10.6 J	NA
Metals		
Arsenic	19.5	13
Lead	1,380	3,010

SS-161

Depth(Feet)	(0 – 1)
Date	12/18/2014
--	No Exceedances

SS-134

Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.27 J P

POI-3

Depth(Feet)	(0 – 1)	(0.5 – 1)
Date	8/25/2009	8/25/2009
VOCs		
Carbon Tetrachloride	NA	4.4
Chloroform	NA	4.5 D
SVOCs		
Benzo(a)pyrene	0.22 J	NA
Metals		
Arsenic	29.3 J	NA
Lead	1,720 J	NA
Manganese	13,600 J	NA
Mercury	85.1	NA

SS-133

Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.21 J P

SS-115

Depth(Feet)	(0 – 1)
Date	9/14/2009
SVOCs	
Benzo(a)pyrene	1.5
Dibenz(a,h)anthracene	0.29 EJ
Metals	
Arsenic	33
Lead	6,170

SS-162

Date	1/9/2015
SVOCs	
Bis(2–ethyl hexyl) phthalate	0.61 J B [0.52 J B]
PCBs (Aroclors)	
Aroclor–1260	0.018 J
Metals	
Arsenic	8.2
Cadmium	1.2
Copper	49.7
Cyanide	0.13 J
Lead	73.6
Mercury	0.65

SS-105

Depth(Feet)	(0 – 1)
Date	8/26/2009
PCBs (Aroclors)	
Aroclor–1248	4.6 D
Aroclor–1254	4.4 D
Total PCBs (Aroclors)	9.31
PCBs (Congeners)	
Total PCBs (Congeners)	22.7 J
Metals	
Lead	1,070 J

SS-136

Depth(Feet)	(0 – 1)
Date	12/17/2014
SVOCs SIM	
Benzo(a)anthracene	0.65
Benzo(a)pyrene	0.6
PCBs (Aroclors)	
Aroclor–1254	0.46 P
Total PCBs (Aroclors)	0.62 J P
Metals	
Arsenic	28.5

SS-135

Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Aroclor–1254	0.32
Total PCBs (Aroclors)	0.41 J P

POI-2

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Total PCBs (Aroclors)	2.18
Metals	
Lead	1,490

Ecologically-Based Screening Levels for Sediment

Constituent	Value
SVOCs	
Bis(2–ethyl hexyl) phthalate	0.182
PCBs	
Aroclor–1260	0.005
Pesticides	
4,4'–DDE	0.005
Heptachlor	0.0006
Metals	
Arsenic	6
Cadmium	0.6
Copper	16
Cyanide	0.0001
Lead	31
Mercury	0.2
Zinc	120

SS-109

Depth(Feet)	(0.5 – 1)
Date	8/31/2009
VOCs	
Chloroform	1,900 DJ

SS-118

Depth(Feet)	(0 – 1)
Date	9/15/2009
SVOCs	
Benzo(a)pyrene	0.4 D
PCBs (Aroclors)	
Aroclor–1242	11 J
Aroclor–1254	7.7 J
Aroclor–1260	4.3 J
Total PCBs (Aroclors)	23 J
Metals	
Lead	2,560

SS-138

Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Congeners)	
Total PCBs (Congeners)	0.224

SS-110

Depth(Feet)	(0 – 1)
Date	9/1/2009
SVOCs	
Benzo(a)pyrene	0.83
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.28 J

SS-102

Depth(Feet)	(0 – 1)	(9 – 10)
Date	9/10/2009	9/10/2009
PCBs (Aroclors)		
Aroclor–1254	2.5	2.1
Total PCBs (Aroclors)	4.22 J	3.75
Metals		
Lead	1,870	4,700

POI-11

Depth(Feet)	(0 – 1)
Date	9/1/2009
SVOCs	
Benzo(a)pyrene	0.23 J

SS-117

Depth(Feet)	(0 – 1)
Date	9/17/2009
PCBs (Aroclors)	
Aroclor–1254	1.8 J
Total PCBs (Aroclors)	2.66 J
Metals	
Arsenic	28.5
Lead	1,420 J

SS-137

Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Aroclors)	
Aroclor–1254	0.31 P [0.22 J P]
Total PCBs (Aroclors)	0.55 P [0.387 J P]
PCBs (Congeners)	
Total PCBs (Congeners)	1.178 q [1.184 q]

NJDEP Soil Remediation Standards

Constituent	Non–Residential	Residential
VOCs		
Carbon Tetrachloride	2	0.6
Chloroform	2	0.6
SVOCs		
Acetophenone	5	2
Benzo(a)anthracene	2	0.6
Benzo(a)pyrene	0.2	0.2
Benzo(b)fluoranthene	2	0.6
Benzo(k)fluoranthene	23	6
Dibenz(a,h)anthracene	0.2	0.2
Indeno(1,2,3–cd)pyrene	2	0.6
PCBs		
Aroclor–1242	1	0.2
Aroclor–1248	1	0.2
Aroclor–1254	1	0.2
Aroclor–1260	1	0.2
Aroclor–1262	1	0.2
Aroclor–1268	1	0.2
Total PCBs (Aroclors)	1	0.2
PCBs (Congeners)		
Total PCBs (Congeners)	1	0.2
Pesticides		
Aldrin	0.2	0.04
alpha–Chlordane	1	0.2
Dieldrin	0.2	0.04
gamma–Chlordane	1	0.2
Heptachlor	0.7	0.1
Heptachlor epoxide	0.3	0.07
Metals		
Antimony	450	31
Arsenic	19	19
Cadmium	78	78
Copper	45,000	3,100
Lead	800	400
Manganese	5,900	11,000
Mercury	65	23
Vanadium	1,100	78

SS-107

Depth(Feet)	(0 – 1)	(5 – 6)
Date	9/8/2009	9/8/2009
SVOCs		
Benzo(a)anthracene	4 D	2.4
Benzo(a)pyrene	3.6 D	2.7
Benzo(b)fluoranthene	4.2 D	3.1 D
Dibenz(a,h)anthracene	0.69 EJ	0.16 J
Metals		
Lead	792	1,070

SS-108

Depth(Feet)	(0 – 1)	(4 – 5)
Date	9/8/2009	9/8/2009
SVOCs		
Benzo(a)anthracene	2.7	2.8
Benzo(a)pyrene	3.1	2.9
Benzo(b)fluoranthene	4.5 DJ	3.4 DJ
Dibenz(a,h)anthracene	0.27 J	0.24 J
PCBs (Aroclors)		
Aroclor–1254	0.29	2.5 DJ
Aroclor–1260	0.12	4.8 D
Total PCBs (Aroclors)	0.481	7.81 J
Metals		
Arsenic	9.8 J	28.3 J
Lead	6,270	3,340

SS-113

Depth(Feet)	(0 – 1)
Date	9/16/2009
PCBs (Aroclors)	
Aroclor–1254	1.4
Total PCBs (Aroclors)	2.29 J
PCBs (Congeners)	
Total PCBs (Congeners)	3.55
Metals	
Antimony	881 J
Arsenic	33.9
Lead	2,280

SS-141

Depth(Feet)	(0 – 1)
Date	12/17/2014
--	No Exceedances

SS-123

Depth(Feet)	(0 – 1)
Date	9/15/2009
PCBs (Aroclors)	
Aroclor–1254	1.3
Aroclor–1260	1.2
Total PCBs (Aroclors)	3.15
Metals	
Lead	1,370

SS-114

Depth(Feet)	(0 – 1)
Date	9/14/2009
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.17
Metals	
Lead	2,540

SS-122

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.28
Metals	
Lead	1,270

SS-124

Depth(Feet)	(0 – 1)
Date	9/15/2009
PCBs (Aroclors)	
Total PCBs (Aroclors)	1.48 J

SS-139

Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Congeners)	
Total PCBs (Congeners)	0.230

SS-121

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Aroclor–1254	1.7 J
Aroclor–1260	6.9 J
Total PCBs (Aroclors)	8.6 J
PCBs (Congeners)	
Total PCBs (Congeners)	12.3 J
Metals	
Arsenic	30.2 J
Lead	1,340

SS-140

Depth(Feet)	(0 – 1)
Date	1/2/2015
--	No Exceedances
PCBs (Congeners)	
--	Data Not Yet Received

SS-119

Depth(Feet)	(0 – 1)
Date	9/3/2009
SVOCs	
Benzo(a)pyrene	1.5
Benzo(b)fluoranthene	3.2
Dibenz(a,h)anthracene	0.33 EJ
PCBs (Aroclors)	
Aroclor–1254	1.3
Total PCBs (Aroclors)	2.3
Pesticides	
Heptachlor	1.1 D
Metals	
Lead	1,070

SS-163

Date	1/9/2015
SVOCs	
Bis(2–ethyl hexyl) phthalate	0.66 J B
Metals	
Arsenic	14.5
Cadmium	1.4
Copper	36.2
Lead	81.1
Mercury	0.53
Zinc	156

SS-120

Depth(Feet)	(0 – 1)
Date	9/3/2009
PCBs (Aroclors)	
Aroclor–1254	1.8
Aroclor–1260	1.6
Total PCBs (Aroclors)	3.4
Metals	
Arsenic	25.3 J
Lead	1,310

SS-164

Date	1/9/2015
SVOCs	
Bis(2–ethyl hexyl) phthalate	0.57 J B [0.54 J B]
PCBs (Aroclors)	
Aroclor–1260	0.025 J
Pesticides	
4,4'–DDE	0.0057 J
Heptachlor	0.00079 J B
Metals	
Arsenic	8.6
Cadmium	1.3
Copper	35.7
Cyanide	0.076 J
Lead	101
Mercury	0.55

LEGEND:

- OPEN WATER
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (DASHED WHERE APPROXIMATE)
- WASTE AND DEBRIS OBSERVED ON GROUND SURFACE BUT NOT OBSERVED OR ANTICIPATED TO BE BELOW GROUND SURFACE
- AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY
- DATA GAP SAMPLING LOCATION
- SAMPLES COLLECTED PRIOR TO DATA GAP SAMPLING
- SOIL SAMPLING LOCATION
- SOIL SAMPLING LOCATION WITH DETECTED CONCENTRATIONS GREATER THAN NJDEP NONRESIDENTIAL SOIL REMEDIATION STANDARDS
- PROPOSED MONITORING WELL
- EXISTING MONITORING WELL
- DATA GAP TEMPORARY WELL POINT
- DATA GAP SOIL SAMPLE LOCATION
- DATA GAP SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT/SOIL SAMPLE LOCATION (SAMPLE TYPE WILL BE BASED ON FIELD CONDITIONS OBSERVED AT THE TIME OF SAMPLE COLLECTION)
- STREAM GAUGE
- DATA GAP STREAM GAUGE LOCATION
- GROUNDWATER ELEVATION CONTOUR – DECEMBER 2014 (DASHED WHERE INFERRED)
- (236.34) GROUNDWATER ELEVATION – DECEMBER 2014 (FEET ABOVE MEAN SEA LEVEL)

DATA NOTES:

UNITS = MILLIGRAMS PER KILOGRAM

[] = DUPLICATE SAMPLE

() = RESULTS OF SECONDARY ANALYSIS

PCBS = POLYCHLORINATED BIPHENYLS

SVOCS = SEMIVOLATILE ORGANIC COMPOUNDS

VOCS = VOLATILE ORGANIC COMPOUNDS

NA = NOT ANALYZED

B = FOR ORGANICS THE COMPOUND HAS BEEN FOUND IN THE SAMPLE AS WELL AS ITS ASSOCIATED BLANK, ITS PRESENCE IN THE SAMPLE MAY BE SUSPECT.

D = CONCENTRATIONS IDENTIFIED FROM ANALYSIS OF THE SAMPLE AT A SECONDARY DILUTION.

E = FOR ORGANICS THE COMPOUND WAS QUANTITATED ABOVE THE CALIBRATION RANGE.

E = FOR INORGANICS THE REPORTED VALUE IS ESTIMATED BECAUSE OF THE PRESENCE OF INTERFERENCE BASED ON SERIAL DILUTON ANALYSIS.

J = FOR ORGANICS THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

J = FOR INORGANICS THE SAMPLE RESULT IS GREATER THAN THE MDL BUT BELOW THE CRDL.

JN = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION. THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

N = SPIKED SAMPLE RECOVERY IS NOT WITHIN CONTROL LIMITS.

P = DUAL COLUMN ANALYSIS RESULTED IN GREATER THAT 25% DIFFERENCE FOR DETECTED CONCENTRATIONS BETWEEN THE TWO COLUMNS.

q = THE REPORTED RESULT IS THE ESTIMATED MAXIMUM POSIBLE CONCENTRATION OF THE ANALYTE, QUANTITATED USING THE THEORETICAL ION RATIO. THE MEASURED ION RATION DOES NOT MEET QUALITATIVE IDENTIFICATION CRITERIA AND INDICATES A POSSIBLE INTERFERENCE.

RX = THE SAMPLE RESULTS ARE REJECTED DUE TO MATRIX INTERFERENCE.

U = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.

NOTES:

1. ANALYTICAL RESULTS GIVEN IN MILLIGRAMS PER KILOGRAM FOR SOIL SAMPLES WITH DETECTED CONCENTRATIONS GREATER THAN NEW JERSEY NON–RESIDENTIAL SOIL REMEDIATION STANDARDS (DATED OCTOBER 2011). ANALYTICAL RESULTS GREATER THAN NEW JERSEY NON–RESIDENTIAL REMEDIATION STANDARDS ARE POSTED FOR PREVIOUS SAMPLES. DATA GAP ANALYTICAL RESULTS ARE COMPARED TO THE RESIDENTIAL AND NON–RESIDENTIAL REMEDIATION STANDARDS.
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3. THE EXTENT OF AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY IS BASED ON FIELD OBSERVATIONS MADE THROUGHOUT THE PERIOD OF INVESTIGATION ACTIVITIES. THE EXTENT OF THE AREA SHOWN IS APPROXIMATE.
4. CONDITIONS ENCOUNTERED AT LOCATIONS SS–162, SS–163, AND SS–164 WERE REPRESENTATIVE OF SEDIMENT. RESULTS FOR THESE SAMPLES ARE PRESENTED WITH THE SEDIMENT RESULTS.
5. DATA GAP ANALYTICAL RESULTS HAVE NOT BEEN VALIDATED.

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)
2. TAX PARCEL DATA FOR CHATHAM TOWNSHIP WAS PROVIDED BY CIVIL SOLUTIONS.

0 200' 400' GRAPHIC SCALE

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

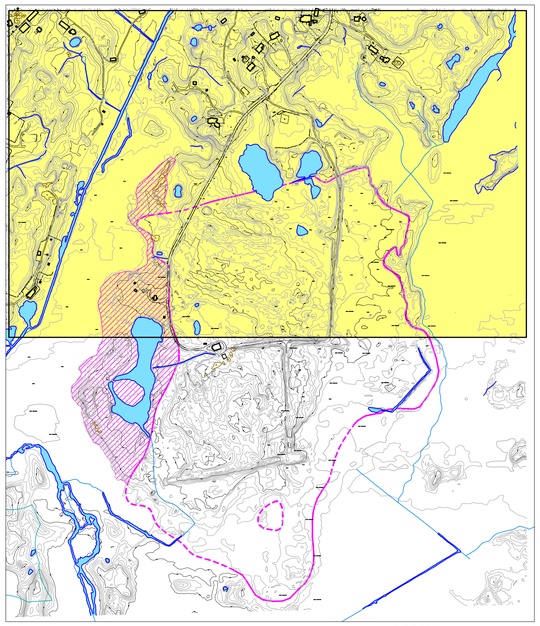
DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

PROPOSED SAMPLE LOCATIONS - SOUTH

ARCADIS

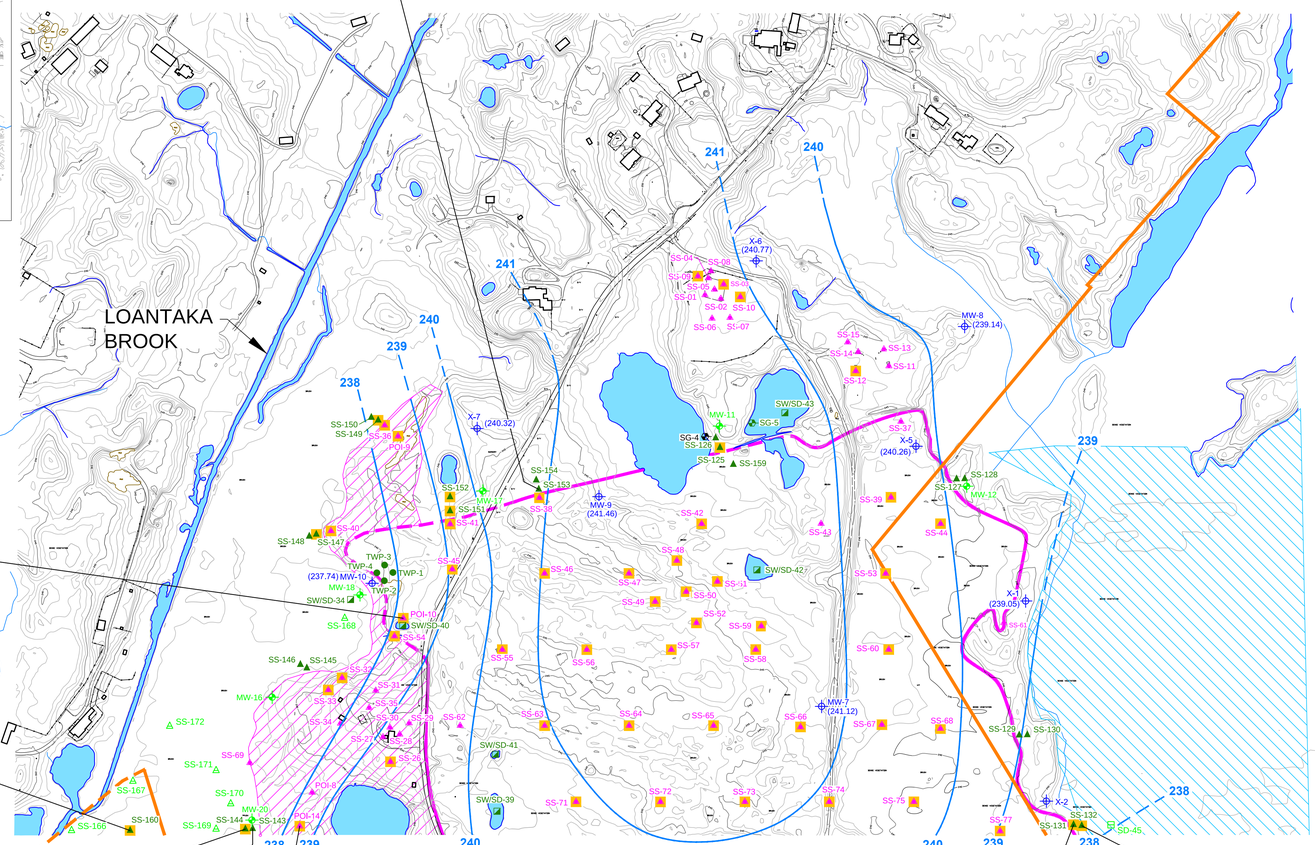
FIGURE 3b

CITY: CRANBURY-NJ DIV/GROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC:(Opt) PM: K.ROMAINE TM: L.HYATT LYR: ON=*;OFF=*REF*
C:\ENVCAD\CRANBURY\ACT\B0033203\0004\00004\DGSAP\B0033203P02.DWG LAYOUT: 3B SAVED: 4/27/2015 8:19 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/27/2015 10:11 AM BY: FATTO, TRACEY
XREFS: 33203X01 B0033203X16 B0033203X0E B0033203X17 IMAGES: PROJECTNAME: ----



SITE MAP

0 500' 1000'
GRAPHIC SCALE



NJDEP Soil Remediation Standards		
Constituent	Non-Residential	Residential
VOCs		
Carbon Tetrachloride	2	0.6
Chloroform	2	0.6
SVOCs		
Acetophenone	5	2
Benzo(a)anthracene	2	0.6
Benzo(a)pyrene	0.2	0.2
Benzo(b)fluoranthene	2	0.6
Benzo(k)fluoranthene	23	6
Dibenz(a,h)anthracene	0.2	0.2
Indeno(1,2,3-cd)pyrene	2	0.6
PCBs		
Aroclor-1242	1	0.2
Aroclor-1248	1	0.2
Aroclor-1254	1	0.2
Aroclor-1260	1	0.2
Aroclor-1262	1	0.2
Aroclor-1268	1	0.2
Total PCBs (Aroclors)	1	0.2
PCBs (Congeners)		
Total PCBs (Congeners)	1	0.2
Pesticides		
Aldrin	0.2	0.04
alpha-Chlordane	1	0.2
Dieldrin	0.2	0.04
gamma-Chlordane	1	0.2
Heptachlor	0.7	0.1
Heptachlor epoxide	0.3	0.07
Metals		
Antimony	450	31
Arsenic	19	19
Cadmium	78	78
Copper	45,000	3,100
Lead	800	400
Manganese	5,900	11,000
Mercury	65	23
Vanadium	1,100	78

Ecologically-Based Screening Levels for Sediment	
Constituent	Value
SVOCs	
Bis(2-ethyl hexyl) phthalate	0.182
PCBs	
Aroclor-1260	0.005
Pesticides	
4,4'-DDE	0.005
Heptachlor	0.0006
Metals	
Arsenic	6
Cadmium	0.6
Copper	16
Cyanide	0.0001
Lead	31
Mercury	0.2
Zinc	120

LEGEND:

- OPEN WATER
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (DASHED WHERE APPROXIMATE)
- WASTE AND DEBRIS OBSERVED ON GROUND SURFACE BUT NOT OBSERVED OR ANTICIPATED TO BE BELOW GROUND SURFACE
- AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY
- DATA GAP SAMPLING LOCATION
- SAMPLES COLLECTED PRIOR TO DATA GAP SAMPLING
- SOIL SAMPLING LOCATION
- SOIL SAMPLING LOCATION WITH DETECTED CONCENTRATIONS GREATER THAN NJDEP NONRESIDENTIAL SOIL REMEDIATION STANDARDS
- PROPOSED MONITORING WELL
- EXISTING MONITORING WELL
- DATA GAP TEMPORARY WELL POINT
- DATA GAP SOIL SAMPLE LOCATION
- PROPOSED SOIL SAMPLE LOCATION
- DATA GAP SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE
- PROPOSED SEDIMENT/SOIL SAMPLE (SAMPLE TYPE WILL BE BASED ON FIELD CONDITIONS OBSERVED AT THE TIME OF SAMPLE COLLECTION)
- STREAM GAUGE
- DATA GAP STREAM GAUGE LOCATION
- GROUNDWATER ELEVATION CONTOUR – DECEMBER 2014 (DASHED WHERE INFERRED)
- (236.34) GROUNDWATER ELEVATION – DECEMBER 2014 (FEET ABOVE MEAN SEA LEVEL)

DATA NOTES:

UNITS = MILLIGRAMS PER KILOGRAM

[] = DUPLICATE SAMPLE

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PCBS = POLYCHLORINATED BIPHENYLS

SVOCS = SEMIVOLATILE ORGANIC COMPOUNDS

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J = FOR ORGANICS THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

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0 200' 400'
GRAPHIC SCALE

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

PROPOSED SAMPLING LOCATIONS - NORTH

ARCADIS

FIGURE
3c

CITY: GRANBURY-NJ DIV/GROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC(Opt): PM: K.ROMANIE TM: L.HYATT LYR: ON=*;OFF=*REF*
C:\ENVCAD\GRANBURY\ACT\B0033203\0004\00004\DCS\APB0033203P03.DWG LAYOUT: 3C SAVED: 4/27/2015 8:21 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/27/2015 10:13 AM BY: FATTO, TRACEY
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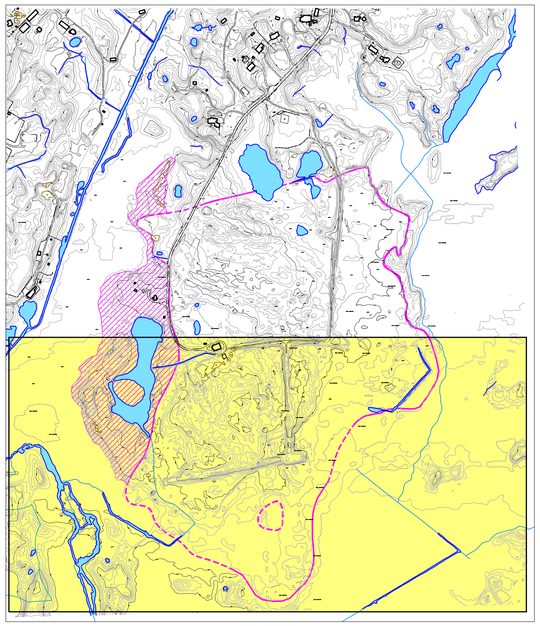

SITE MAP

0 500' 1000'
GRAPHIC SCALE

LEGEND:

- OPEN WATER
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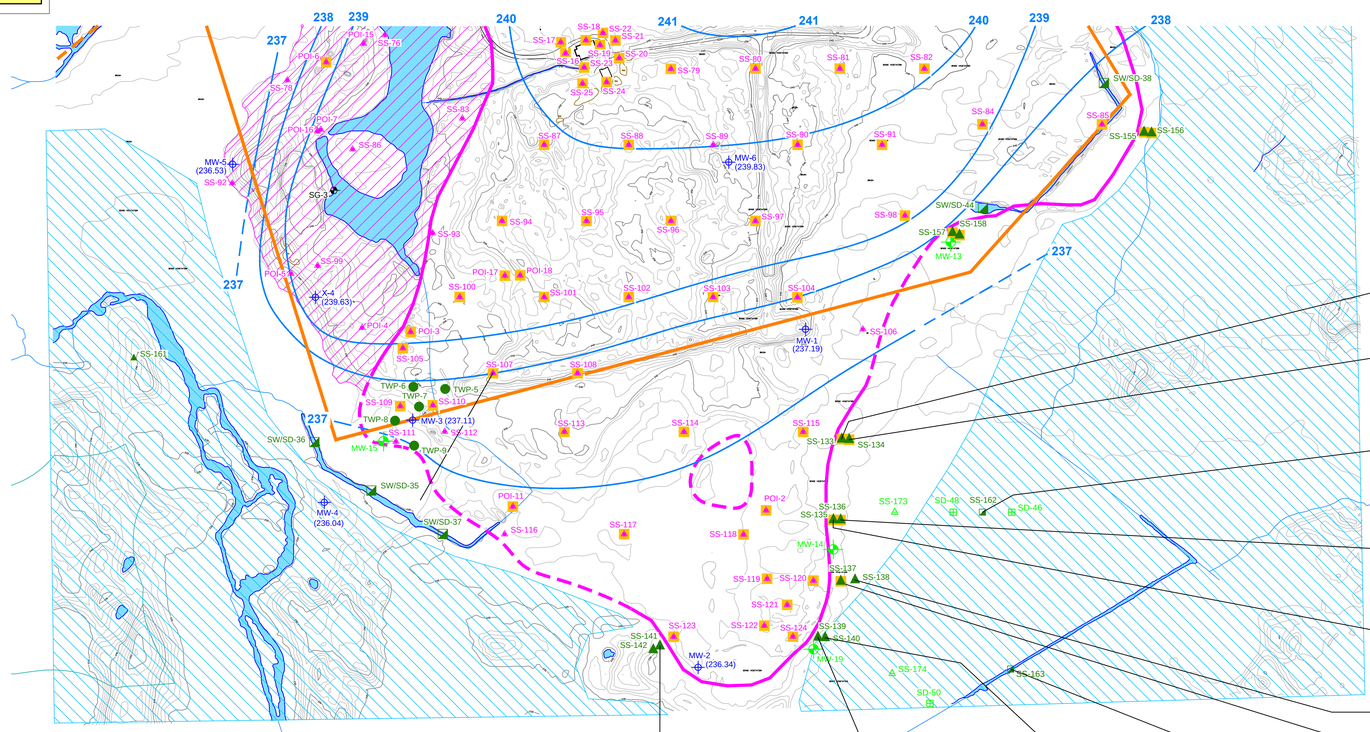

SS-133	
Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.21 J P

SS-134	
Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Total PCBs (Aroclors)	0.27 J P

SS-162	
Date	1/9/2015
SVOCs	
Bis(2-ethyl hexyl) phthalate	0.61 J B [0.52 J B]
PCBs (Aroclors)	
Aroclor-1260	0.018 J
Metals	
Arsenic	8.2
Cadmium	1.2
Copper	49.7
Cyanide	0.13 J
Lead	73.6
Mercury	0.65

SS-136	
Depth(Feet)	(0 – 1)
Date	12/17/2014
SVOCs SIM	
Benzo(a)anthracene	0.65
Benzo(a)pyrene	0.6
PCBs (Aroclors)	
Aroclor-1254	0.46 P
Total PCBs (Aroclors)	0.62 J P
Metals	
Arsenic	28.5

SS-135	
Depth(Feet)	(0 – 1)
Date	12/17/2014
PCBs (Aroclors)	
Aroclor-1254	0.32
Total PCBs (Aroclors)	0.41 J P

SS-138	
Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Congeners)	
Total PCBs (Congeners)	0.224

SS-137	
Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Aroclors)	
Aroclor-1254	0.31 P [0.22 J P]
Total PCBs (Aroclors)	0.55 P [0.387 J P]
PCBs (Congeners)	
Total PCBs (Congeners)	1.178 q [1.184 q]

SS-140	
Depth(Feet)	(0 – 1)
Date	1/2/2015
--	No Exceedances
PCBs (Congeners)	
--	Data Not Yet Received

SS-163	
Date	1/9/2015
SVOCs	
Bis(2-ethyl hexyl) phthalate	0.66 J B
Metals	
Arsenic	14.5
Cadmium	1.4
Copper	36.2
Lead	81.1
Mercury	0.53
Zinc	156

SS-141	
Depth(Feet)	(0 – 1)
Date	12/17/2014
--	No Exceedances

SS-139	
Depth(Feet)	(0 – 1)
Date	1/2/2015
PCBs (Congeners)	
Total PCBs (Congeners)	0.230

SS-164	
Date	1/9/2015
SVOCs	
Bis(2-ethyl hexyl) phthalate	0.57 J B [0.54 J B]
PCBs (Aroclors)	
Aroclor-1260	0.025 J
Pesticides	
4,4'-DDE	0.0057 J
Heptachlor	0.00079 J B
Metals	
Arsenic	8.6
Cadmium	1.3
Copper	35.7
Cyanide	0.076 J
Lead	101
Mercury	0.55

Ecologically-Based Screening Levels for Sediment	
Constituent	Value
SVOCs	
Bis(2-ethyl hexyl) phthalate	0.182
PCBs	
Aroclor-1260	0.005
Pesticides	
4,4'-DDE	0.005
Heptachlor	0.0006
Metals	
Arsenic	6
Cadmium	0.6
Copper	16
Cyanide	0.0001
Lead	31
Mercury	0.2
Zinc	120

NJDEP Soil Remediation Standards		
Constituent	Non-Residential	Residential
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Chloroform	2	0.6
SVOCs		
Acetophenone	5	2
Benzo(a)anthracene	2	0.6
Benzo(a)pyrene	0.2	0.2
Benzo(b)fluoranthene	2	0.6
Benzo(k)fluoranthene	23	6
Dibenz(a,h)anthracene	0.2	0.2
Indeno(1,2,3-cd)pyrene	2	0.6
PCBs		
Aroclor-1242	1	0.2
Aroclor-1248	1	0.2
Aroclor-1254	1	0.2
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Total PCBs (Aroclors)	1	0.2
PCBs (Congeners)		
Total PCBs (Congeners)	1	0.2
Pesticides		
Aldrin	0.2	0.04
alpha-Chlordane	1	0.2
Dieldrin	0.2	0.04
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Heptachlor	0.7	0.1
Heptachlor epoxide	0.3	0.07
Metals		
Antimony	450	31
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Cadmium	78	78
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0 200' 400'
GRAPHIC SCALE

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

PROPOSED SAMPLING LOCATIONS - SOUTH

ARCADIS

FIGURE
3d

CITY: CRANBURY-NJ DIVGROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC(DB): PM: K.ROMAINE TM: L.HYATT LYR: ON=*;OFF=*REF*
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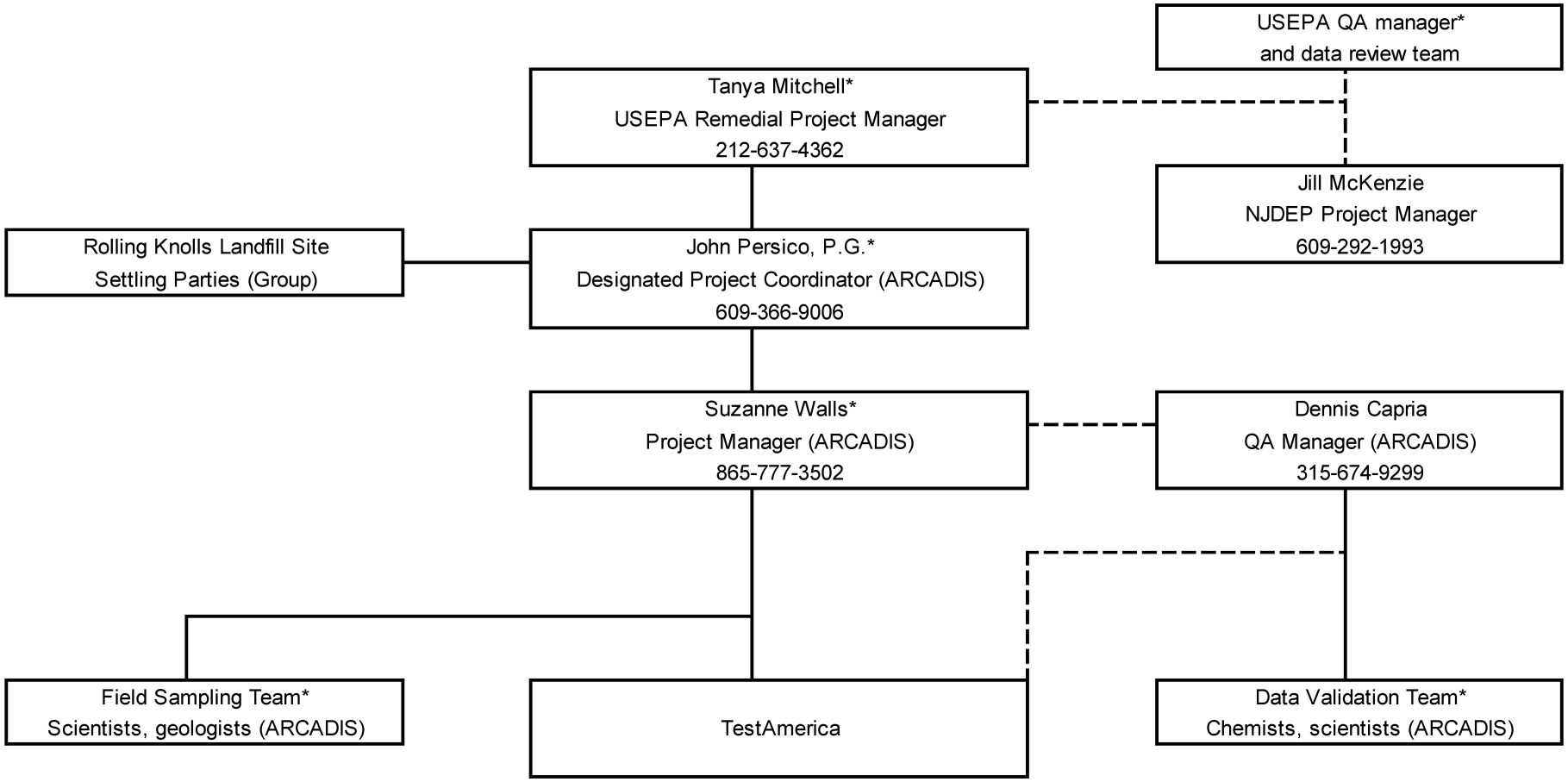

* - QAPP recipient

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY
DATA GAPS SAMPLING AND ANALYSIS PLAN ADDENDUM 1

PROJECT ORGANIZATIONAL CHART

ARCADIS

FIGURE
4