DRAFT FINAL
ALLENDALE REACH SEDIMENT
PRE-DESIGN INVESTIGATION
WORK PLAN

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

June 2019

Prepared for

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ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Ecological Risk Assessment
CMRP	Centredale Manor Restoration Project
COC	Constituent of Concern
CSM	Conceptual Site Model
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FSP	Field Sampling Plan
HHRA	Human Health Risk Assessment
HI	Hazard Index
LEA	Loureiro Engineering Associates, Inc.
ng/kg	nanogram per kilogram
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
PDIWP	Pre-Design Investigation Work Plan
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RIDEM	Rhode Island Department of Environmental Management
ROD	Record of Decision
SD	Settling Defendant
SOW	Statement of Work
SVOC	Semivolatile Organic Compound
TBC	To Be Considered
TCDD	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin
TEQ	Toxicity Equivalence
TSCA	Toxic Substances Control Act
µg/kg	micrograms per kilogram

1. INTRODUCTION

This Pre-Design Investigation Work Plan (PDIWP) has been prepared by Loureiro Engineering Associates, Inc. (LEA) for the Centredale Manor Restoration Project (CMRP) Superfund Site ("the Site") located in North Providence, Rhode Island ("North Providence") on behalf of Emhart Industries, Inc. and Black & Decker Inc. (collectively, "Settling Defendants" or "SDs"). The Site is located at 2072 and 2074 Smith Street (Route 44), North Providence, Providence County, Rhode Island. The Site encompasses parts of two Rhode Island towns, North Providence and Johnston, and free-running reaches and impoundments of the Woonasquatucket River ("the River"). The Site consists of all contaminated areas within the river, its impoundments (Allendale Pond and Lyman Mill Pond [collectively, "the Ponds"]), and floodplain, as well as any other location where contamination from that area has come to be located, or from which that contamination came. The Allendale Reach includes a section of the River, from Route 44 to the end of the Source Area peninsula. The main part of the Site, known as the Source Area, and Allendale Reach are depicted on Drawing 1 of the Allendale Reach Field Sampling Plan (FSP).

1.1 Purpose and Scope

This PDIWP has been prepared to partially address the requirements of Section 3.3 of the Statement of Work (SOW) and is in support of the Remedial Design (RD)/ Remedial Action (RA). Previous investigations have been completed as part of the Site assessment, including the collection of sediment samples adjacent to and downstream of the Site and along upstream reaches of the River. The investigations have identified elevated concentrations of constituents of concern (COCs) associated with historical Site activities within Allendale Reach, adjacent to and downstream of the Source Area. The purpose of this scope of work is to evaluate the distribution of COCs in sediment in the Allendale Reach adjacent to the Source Area.

This PDIWP includes:

An evaluation and summary of existing data and description of data gaps;
Systematic planning approach using Data Quality Objectives (DQO);
Proposed sediment investigations;
Quality Assurance (QA) / Quality Control (QC) requirements set forth in the Quality Assurance Project Plan (QAPP).

1.2 Objectives

The primary objective of the Allendale Reach study is to collect additional analytical data to define the northern and vertical extent of COCs in sediment within Allendale Reach. The data will also be used to develop the remedial plan to support the remedial action objectives (RAOs).

2. SYSTEMATIC PLANNING APPROACH USING DQOS

2.1 Step 1: State the problem

Problem: RA is required for the sediment in Allendale Reach of the River to protect human health and the environment.

The RAOs for the Allendale Reach were defined in the 2012 Record of Decision (ROD). The RAOs were developed to mitigate, restore, and/or prevent existing and future potential threats to human health and the environment.

The RAOs for sediment in Allendale Reach are as follows:

> Prevent direct human exposure by incidental ingestion of, and dermal contact with, sediments containing contaminants at concentrations that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-4} to 10^{-6} or a hazard index (HI) greater than 1.
>
> Prevent human ingestion of fish and other aquatic organisms containing contaminants at concentrations that would result in a total excess lifetime cancer risk greater than the target risk range of 10^{-4} to 10^{-6} or an HI greater than 1.
>
> Prevent dermal contact and ingestion by ecological receptors to sediment containing contaminants at levels that would result in unacceptable impacts.
>
> Prevent migration of contaminants from sediment that would result in River surface water concentrations in excess of applicable or relevant and appropriate requirements (ARARs) or migration of contaminants downstream that could result in exceedance of sediment cleanup levels.[1]
>
> Reduce contaminant concentrations in fish and other aquatic organisms so that they no longer present an unacceptable human health risk (a total excess lifetime cancer risk greater than the target risk range of 10^{-4} to 10^{-6} or an HI greater than 1)[2].

The ROD has identified excavation of contaminated sediment as the appropriate RA for the Allendale Reach. Additional analytical data are needed to define the northern and vertical extent of COCs in sediment to develop the remedial plan to support the RAOs.

[1] It is assumed that the remedial action objectives for surface water will be achieved following attainment of sediment cleanup levels.

[2] This RAO was not explicitly identified prior to the ROD but is implicit as a significant outcome in supporting documents (i.e. Feasibility Study [FS] and Human Health Risk Assessment [HHRA]) for the selected remedy. It does not change any aspect of the selected remedy.

The analytical data will be used to support the development of the remedial excavation design and preparation of the Sediment Characterization Report in accordance with Section 3.3(d)(5) of the SOW. All data collected during the investigation will be evaluated to determine acceptability and usability as outlined in the QAPP.

2.1.1 Resources and CSM

2.1.1.1 Planning Team

The planning team includes SD's project coordinator, the LEA project manager, a technical specialist with a competency in statistics, other technical staff, United States Environmental Protection Agency (EPA), and stakeholders.

2.1.1.2 Conceptual Site Model

The Conceptual Site Model (CSM) is provided in Worksheet # 10 of the QAPP. The contaminant transport model included in the CSM is that floodwater washed contaminated soil from the Source Area into Allendale Reach and/or contaminants were directly or indirectly discharged into the Allendale Reach. Historically, contaminated groundwater discharging from the Site may have impacted sediment within Allendale Reach. A Time Critical Removal Action to address contaminated soil, sediment, and groundwater at the Source Area was performed in 2009-2010, which appears to have mitigated the advection of organic contaminants (above MCLs) from groundwater to the Woonasquatucket River surface water and sediment. The irregular nature of the discharges and Reach currents likely resulted in a non-uniform distribution of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and other COCs laterally across the channel and downstream.

2.1.2 Scope and Schedule

The work will be completed as part of a comprehensive Pre-Design Investigation (PDI), which will be completed in phases, as summarized in Worksheet #16 of the QAPP. As data are collected it will be validated, evaluated in respect to cleanup levels, and, if sediment concentrations exceed the cleanup levels, then the data will be evaluated to determine whether additional sampling or RA should be performed to achieve compliance with sediment RAOs. Implementation of the remedy is targeted to begin during the 2020 construction season.

2.2 **Step 2: Identify the Decision statement of the study**

2.2.1 Principal Study Question:

What is the three-dimensional extent of COCs at concentrations above clean up levels in the sediment of Allendale Reach?

2.2.2 Decision Statement:

Determine the three-dimensional extent of COCs at concentrations above clean up levels in the sediment of Allendale Reach.

2.3 **Step 3: Identify the Information Inputs**

This section outlines the sources of information needed to resolve the decision statement and applicable cleanup levels. A summary of the existing analytical data is provided in Section 2.3.2.

2.3.1 Cleanup Levels

The cleanup levels identified in the ROD were developed by identifying all contaminants detected at the Site; performing risk-based analysis to identify which contaminants individually (or when combined with other contaminants) pose an unacceptable risk and comparing risk-based values established for the most sensitive receptors/pathway. The following cleanup levels were developed to protect both human and ecological receptors.

Further evaluation of background levels for dioxins, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and metals will be performed concurrently with this investigation under the *Background Sediment PDIWP*. The objective of the background study will be to further characterize background concentrations so that EPA can revisit sediment cleanup levels and make revisions as appropriate. The cleanup levels will be revised by EPA, if needed, based on the results of the background study.

Table L-6. Allendale Pond Sediment and Sediment Associated Fish Consumption for a Resident Living Along the River.

Contaminant (carcinogenic and non-cariogenic)	Sediment Cleanup Level (mg/kg)[3]	Basis
Benzo(a)pyrene	1.4	Background[a]
Dibenz(a,h)anthracene	0.97	Background[a]
Dieldrin	0.0026	Background[a]
Chlordane	0.4	Background[b]
Aroclor 1254	0.031	Background[ac]
Aroclor 1268	0.023	Background[ac]
Arsenic	3.9	Background[a]
2,3,7,8-TCDD[4]	0.000015	Background[a]
Coplanar PCBs (Toxicity Equivalence [TEQ])[5]	0.000025	Background[a]

[3] Cleanup levels are based on an evaluation of risk-based preliminary remediation goals (PRGs) (developed for the most sensitive receptor and/or exposure pathway). requirements To Be Considered (TBCs) and Site background data. Because there are no chemical-specific ARARs for sediment, ARARs are not included in this evaluation. Additional sampling will be performed during the design phase to verify background conditions and the statistical comparisons, and verify undetected contaminants using analytical methods capable of measuring concentrations at levels below the risk-based PRGs. These data will be evaluated to assess impacts, if any, to the cleanup levels.
[4] Dioxin TEQ cleanup level for sediment is background level of 34 ng/kg. Background is used because human health risk-based PRG (combined fish diet and direct contact, 10^{-6}) is below upstream background value.
[5] Coplanar PCBs (TEQ) will be included as part of the sediment dioxin TEQ cleanup level in the future data evaluations.
a. Background is used because human health risk based PRG (10^{-6}) is below upstream background value.
b. Background is used because ecological risk-based PRG (HI=1) is below upstream background value. Human health risk-based PRG (10^{-6}) is also below upstream background value.
c. Estimated regional background values derived by excluding elevated upriver background results collected between the Smithfield Wastewater Treatment Plant and Route 44.

Table L-7. Allendale Pond Sediment Contact and Sediment Associated Prey Consumption by Ecological Receptors

Contaminant	Sediment Cleanup Level (mg/kg)[6]	Basis
2,3,7,8-TCDD[7]	0.000015	Background[a]
Aroclor 1254[8]	0.031	Background[ac]
Total Aroclors	0.060	Background[bc]
Chlordane	0.4	Background[b]
Selenium	1.1	Background[b]
Zinc	221	Background[b]

2.3.2 Summary of Existing Sediment Data

The following sections provide a summary of the specific contaminants with cleanup criteria for sediment within the Study Area and are compiled from previous documents for the CMRP Superfund Site, including the *Final Technical Memorandum* (Battelle, 2004); *Interim Final CMRP Remedial Investigation Report* (Battelle, 2005); *Interim Final Feasibility Study* (Battelle, 2010); *Addendum to Interim Final Feasibility Study* (Battelle Memorial Institute, 2011); and *Record of Decision* (EPA, 2012).

Historically, sediment samples were collected for the following analysis:

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[6] Cleanup levels are based on an evaluation of risk-based PRGs (developed for the most sensitive receptor and/or exposure pathway), TBCs and Site background data. Because there are no chemical-specific ARARs for sediment, ARARs are not included in this evaluation. Additional sampling will be performed during the design phase to verify background conditions and the statistical comparisons, and verify undetected contaminants using analytical methods capable of measuring concentrations at levels
below the risk-based PRGs. These data will be evaluated to assess impacts, if any, to the cleanup levels.

[7] Dioxin TEQ cleanup level for sediment is background level of 34 ng/kg. Background is used because human health risk-based PRG (combined fish diet and direct contact, 10^{-6}) is below upstream background value.

[8] The Baseline Ecological Risk Assessment (BERA) evaluated risks for individual and Total Aroclors if benchmarks were available for a specific endpoint species.

a. Background is used because human health risk-based PRG (10^{-6}) is below upstream background value.

b. Background is used because ecological risk-based PRG (HI=1) is below upstream background value. For technical chlordane, human health risk-based PRG (10^{-6}) is also below upstream background value.

c. Estimated regional background values derived by excluding elevated upriver background results collected between the Smithfield Wastewater Treatment Plant and Route 44.

CMS-SPMD1, CMS-SPMD2, CMS-SPMD3, CMS-SPMD4, and CMS-SPMD5 were analyzed for 2,3,7,8-TCDD.
SD-26, SD-27, SD-28, WRC-SD-2009, WRC-SD-2010, WRC-SD-2011, WRC-SD-2012, and WRC-SD-2013 were analyzed for dioxins, furans, PCBs, and pesticides.
WRC-SD-2009, WRC-SD-2010, WRC-SD-2011, WRC-SD-2012, and WRC-SD-2013 were also analyzed for SVOCs and metals.

The data below are organized by COC and include a discussion of relevant data gaps.

2.3.2.1 Dioxins and Furans

During previous investigations, 14 sediment samples were collected from 13 locations within the Study Area.

CMS- SPMD1[9], WRC-SD-2009, and SD-28 are north of existing Resource Conservation and Recovery Act (RCRA) Cap No. 4 near Brook Village
CMS-SPMD2, CMS-SPMD3, and CMS-SPMD4 are adjacent to existing RCRA Cap No. 4
WRC-SD-2010, WRC-SD-2011, WRC-SD-2012, WRC-SD-2013, SD-27, and CMS-SPMD5 are in the vicinity of Existing Cap No. 2.
SD-26 is located adjacent to Cap No. 1.

CMS-SPMD1, CMS-SPMD2, CMS-SPMD3, and CMS-SPMD4 were all collected from the 0 to 0.7 foot interval. The remaining samples were collected from the 0 to 0.5 foot interval, with the exception of WRC-SD-2011, where a sample was also collected from the 0.5 to 1.5 foot interval. Sample locations and depths are shown on Drawing 1of the FSP.

The sediment analytical data were compared to the mean concentration for the upstream sediment background reported as 15 nanograms per kilogram (ng/kg) for 2,3,7,8-TCDD and 34 ng/kg for TEQ. 2,3,7,8-TCDD and TEQ impacts were identified in all nine samples. Eleven of the 13 locations exceeded background values for 2,3,7,8-TCDD with concentrations up to 5,070 ng/kg (CMS-SPMD2). Analytical data for 2,3,7,8-TCDD in Allendale Reach Sediment are presented in Table 1.

The three sample locations (CMS-SPMD1, WRC-SD-2009, and SD-28) north of Existing RCRA Cap No 4 did not exceed background values for 2,3,7,8-TCDD or TEQ. The locations were approximately 350 to 400 feet downgradient of the Smith Street (Route 44) Bridge.

[9] Sample IDs for the locations CMS-SPMD# are CMS-SD-500#. For clarity, only the location ID is discussed.

The one location with multiple sample intervals, WRC-SD-2011, indicated lower concentrations of 2,3,7,8-TCDD in the 0 to 0.5-foot interval (210 ng/kg) than the 0.5 to 1.5-foot interval (313 ng/kg), both of which exceed background values.

No locations with concentrations exceeding background were adequately delineated vertically or horizontally as part of historical investigations to determine limits of excavation. The three northern locations CMS-SPMD1, WRC-SD-2009, and SD-28 are not sufficient to defined the northern extent of 2,3,7,8-TCDD in Allendale Reach. Additional sediment samples should be collected to confirm the results of these upgradient locations.

2.3.2.2 PCBs

Nine sediment samples collected from eight locations in the Study Area were collected and analyzed for PCB Aroclors. No sediment samples collected in the Study Area contained concentrations of PCBs exceeding the Toxic Substances Control Act (TSCA) criteria of 50 milligrams per kilogram (mg/kg). Cleanup criteria were identified in the ROD for Total Aroclors (60 micrograms per kilogram [µg/kg]), Aroclor 1254 (31 µg/kg), and Aroclor 1268 (23 µg/kg). Table 2 provides a summary of Total Aroclors and Aroclor 1254 sediment analytical data for the Study Area. Aroclor 1268 was not analyzed for in previous sediment samples within this Study Area.

Concentrations of Aroclor 1254 were detected above background concentration in eight of the nine samples[10], with a maximum concentration of 280 µg/kg detected in WRC-SD-2011. For the ninth sample (WRC-SD-2013), the detection limit for Aroclor 1254 was above the background concentration but Aroclor 1254 was not detected. Total PCBs were detected above the background criteria of 60 µg/kg in seven of the nine samples. The one location with multiple sample intervals, WRC-SD-2011, indicated higher concentrations of PCBs in the 0 to 0.5-foot interval (280 µg/kg) than in the 0.5 to 1.5-foot interval (210 µg/kg), both of which exceed background values. No locations with concentrations exceeding background were delineated vertically or horizontally as part of historical investigations. Sample locations and depths are shown on Drawing 1.

2.3.2.3 SVOCs

During previous investigations, six sediment samples were collected from five locations and analyzed for SVOCs. Cleanup criteria were identified in the ROD for benzo(a)pyrene (1,400 µg/kg) and dibenz(a,h)anthracene (970 µg/kg). Sediment samples were collected from the 0-0.5 ft interval at each of the sampling locations, one additional sediment sample was collected from

[10] Note that estimated regional background value for Aroclor 1254 was derived by excluding elevated upriver background results collected between the Smithfield Wastewater Treatment Plant and Route 44 (ROD Table L-6)

the 0.5-1.5 ft interval (WRC-SD-2011). Benzo(a)pyrene was detected at concentrations above the background level in sediment samples collected from WRC-SD-2009 (0-0.5ft), WRC-SD-2010 (0-0.5ft), and WRC-SD-2011 (0-0.5ft). The maximum concentration of benzo(a)pyrene (4,800 µg/kg) was detected in the 0 to 0.5 ft interval of sample location WRC-SD-2011. Dibenz(a,h)anthracene was detected above the background level in WRC-SD-2011 (0-0.5 ft) at concentration of 1,700 µg/kg. The detection limit of dibenz(a,h)anthracene was above the background level in two samples: WRC-SD-2010 (0-0.5 ft) and WRC-SD-2011 (0.5-1.5ft).

No locations with concentrations exceeding background were delineated vertically or horizontally as part of historical investigations. Table 3 provides a summary of benzo(a)pyrene and dibenz(a,h)anthracene sediment analytical results. Sample locations and depths are shown on Drawing 1.

2.3.2.4 Metals

During previous investigations, six sediment samples were collected from five locations and analyzed for metals. Cleanup criteria were identified in the ROD for arsenic (3.9 mg/kg), selenium (1.1 mg/kg), and zinc (221 mg/kg). Sediment samples were collected from the 0-0.5 ft interval at each of the sampling locations, one additional sediment sample was collected from the 0.5-1.5 ft interval (WRC-SD-2011).

Arsenic was detected in five of the six samples, however, the concentrations were below the site specific background. Selenium was not detected in the sediment samples. Zinc was detected in four of the six samples and was detected above the background levels in one sample WRC-SD-2012 (0-0.5) at a concentration of 553 mg/kg. Table 4 provides a summary of sediment analytical results for arsenic, selenium, and zinc. Sample locations and depths are shown on Drawing 1.

2.3.2.5 Pesticides

Eight sediment samples were collected from seven locations in Allendale Reach and analyzed for pesticides. Cleanup criteria were identified in the ROD for dieldrin (2.6 µg/kg) and chlordane (400 µg/kg). Chlordane was not analyzed for in the prior sediment samples. However, cis-chlordane and trans-chlordane were analyzed for and were not detected above criteria. Dieldrin was detected in two samples at concentrations above the site-specific background concentration of 2.6 µg/kg. The highest concentration detected was 12 µg/kg (SD-27). Dieldrin was identified as being non-detect with laboratory detection limits above background in four samples. Table 5 provides a summary of dieldrin, cis-chlordane, and trans-chlordane sediment analytical data for Allendale Reach. Sample locations and depths are shown on Drawing 1.

2.3.3 Data Gap

Based on a review of historical analytical data, the extent of COCs in the Allendale Reach sediment has not been adequately defined to design the limits of excavation.

No data are available to evaluate distributions of COCs across the channel. The available historical data indicates the concentration of 2,3,7,8-TCDD is highest near RCRA Cap No. 4 and downstream of the Cap. Additional data are needed to define the depth of COCs in the sediment, the distribution of COCs across the channel, and the overall distribution of COCs in the channel. The extent will need to be defined to design the remedy.

2.4 Step 4: Define the boundaries of the study

The Study Area is bound to the north by Route 44, to the south by the southern end of the Source Area and on the east and west by the River channel. The study area includes 1,600 feet of the river channel and extends to a depth of 4-feet in the bed of the channel[11].

2.5 Step 5: Develop the analytical approach

Below are "if-then" statements that were used to develop the analytical approach.

If COCs are detected at concentrations above the applicable cleanup criteria, then the sediment will be excavated. The excavation depth of 4-feet below top of sediment is an assumption, no data is available deeper than 1.5-feet. Additional samples will be collected from deeper intervals if needed, based on the results of initial round of sampling.

2.6 Steps 6 and 7: Specify performance and acceptance criteria and develop the detailed plan for obtaining data.

2.6.1 Performance criteria

Sediment samples will be collected and analyzed following the methodology set forth in the RD QAPP.

2.6.2 Laboratory Analytical Data

[11] The study area boundary limit of 4-feet below top of sediment is an assumption, no data is available deeper than 1.5-feet. Additional samples will be collected from deeper intervals if needed, based on the results of the initial round of sampling.

Analytical data collected as part of the PDI sediment field investigation will meet the applicable quality control acceptance criteria and will be analyzed by accredited laboratories, as applicable. The laboratory performance criteria are presented in the QAPP Worksheet #12.

Sediment samples will be collected for laboratory analysis of the following:

Dioxin/furans (TEQ)
PCB congeners (TEQ)
SVOCs
PCBs (Aroclors)
Pesticides
Arsenic
Selenium
Zinc
Grain Size

2.6.3 Sampling Plan - Systematic/Grid Based

A review of the historical sediment data and the *Guidance on Choosing a Sampling Design for Environmental Data Collection EPA QA/G-5S,* (EPA, December 2002) were used to select the systemic/grid sampling approach. The grid spacing is based on remedial design requirements.

Three sediment samples will be collected every 100-feet from across the channel bottom to investigate the possibly uneven distribution of COCs within the channel and to determine the depth of the excavation. For the sediment sample transects north of RCRA Cap No. 4 (starting with locations PDI-ADR-SD-013, 014, and 015), samples will be collected from all depth intervals (0-1, 1-2, 2-3, and 3-4). Along RCRA Cap No. 4 and downstream, sediment sample transects will not include the 0-1 foot interval because at a minimum the top 1 foot of sediment will be excavated in accordance with the ROD. The sample collected from the 0-1 foot interval (or 1-2 foot interval for PDI-ADR-SD-016 through -048) will initially be analyzed for 2,3,7,8-TCDD and the remaining samples placed on hold at the laboratory. If 2,3,7,8-TCDD is detected above the cleanup criteria, the next sample down will be released for analysis of 2,3,7,8-TCDD. Additional samples will be released progressively by depth until the vertical extent of 2,3,7,8-TCDD exceeding cleanup criteria has been delineated. Once the vertical extent of 2,3,7,8-TCDD has been delineated, the sample interval that contained 2,3,7,8-TCDD and dioxin TEQ less than the cleanup criteria will be analyzed for the COCs identified in Tables L-6 and L-7. If any of these contaminants exceed cleanup levels, additional samples will be released progressively by depth until all COCs have been vertically delineated. Additional sampling may be used to refine the vertical and lateral extent of the COCs.

Based on the channel length, 16 transects (48 sample locations) are planned for the analytical parameters listed above. If needed, based on the results of the initial investigation, additional sediment samples may be collected in the channel.

2.6.4 Impacts of Decision Error

The sampling plan has been designed to limit false negatives (failing to identify contamination) based on an evaluation of risk and costs. The following section examines the consequences of making incorrect decisions based on the performance criteria selected above.

False Negative: In the bottom of the channel the risk of not identifying contamination exceeding background concentrations.

The false negative is controlled by the excavation plan, sediment will be excavated to a depth where COCs are below cleanup levels and excavated sediment will be replaced to existing grade with materials designed to minimize erosion. If contamination exceeding cleanup levels were to remain, it would not be readily exposed to the receptors.

False Positive: The risk associated with the excavation of sediment that did not contain COCs at concentrations above cleanup levels.

Uncontaminated sediment will be excavated and disposed of, which would result in increased excavation limits, more truck traffic, longer project duration and impacts to the residents, and higher project costs.

3. ALLENDALE REACH STUDY REPORT

The Pre-Design Investigation Allendale Reach Study Report will document the objectives, methods, and findings of the study. The report will include:

Introduction (background information and study objectives);
Overview of Allendale Reach Sample Selection and Sampling/Analytical Rationale
Field Program and Sampling Methodology (study scope, sampling and analytical methods, scope and method deviations, photographs documenting work, and results of the data validation and data usability assessment);
Laboratory Analytical Data QA/QC and Results (data validation and laboratory analytical results);
Summary and Conclusions; and
References

Full laboratory data packages and data validation reports will be included as appendices to the report. The qualified laboratory results for each data set will be provided in summary tables.

4. REFERENCES

Battelle. *Addendum to the Interim Final Feasibility Study, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. September 2011.

Battelle. *Final Technical Memorandum*. July 2004.

Battelle. *Interim Final Feasibility Study, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. April 2010.

Battelle. *Interim Final Remedial Investigation, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. June 2005.

EPA. *Guidance for Comparing Background and Chemical Concentrations for CERCLA Sites*. EPA 540-R-01-003 OSWER 9285.7-41. September 2002.

EPA. *Guidance for Data Quality Assessment – Practical Methods for Data Analysis, EPA QA/G-9, QA00 Update*. Office of Environmental Information, Washington, DC. EPA/600/R-96/084. 2000.

EPA. *Guidance on Choosing a Sampling Design for Environmental Data Collection, EPA QA/G-5S*. Office of Environmental Information, Washington, DC. EPA/240/R-02/005. December 2002.

EPA. *ProUCL Version 5.1 Technical Guide: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. EPA/600/R-07/041. October 2015.

EPA. *Record of Decision: Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. September 2012.

EPA. *Rules of Thumb for Superfund Remedy Selection*. Office of Emergency and Remedial Response, Washington, DC. EPA/540-R-97/003, OSWER 9285.7-41. 1997

EPA. *Soil Screening Guidance: User's Guide*. Office of Emergency and Remedial Response, Washington, DC. EPA/540-R-96/018, OSWER 9285.7-41. 1996

EPA. *Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3: Soils and Solid Media*. Office of Policy, Planning, and Evaluation, Washington DC. EPA 230-R-94-004. December 1992.

Kleinschmidt Associates. *Woonasquatucket River Riparian Buffer Restoration Project*. Prepared for RIDEM and Woonasquatucket River Watershed Council. October 2001.

LEA. *Draft Final Remedial Design Quality Assurance Project Plan, Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island.* November 2018.

RIDEM. *Woonasquatucket River Fecal Coliform Bactria and Dissolved Metals Total Maximum Daily Loads*. State of Rhode Island and Providence Plantations Department of Environmental Management, Office of Water Resources. April 2007.

RIDEM. *Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases*. State of Rhode Island and Providence Plantations Department of Environmental Management, Office of Waste Management. January 2019.

Toxic Substances Control Act, 15 U.S.C. §2601 et seq. (1976)

TABLES

TABLE 1
SUMMARY OF EXISTING DIOXIN ANALTYICAL DATA FOR ALLENDALE REACH SEDIMENT
Centredale Manor Restoration Project Superfund Site
Allendale Reach Sediment Pre-Design Investigation Work Plan

Location	Depth Range	CAS Number	Analyte	Detected	Result*	Qualifier	Units	Criteria (ng/kg)	Exceedance of Criteria
CMS-SPMD1	0-0.7 ft	1746-01-6	2,3,7,8-TCDD	t	2.58		ng/kg	15	No Exceedance
CMS-SPMD2	0-0.7 ft	1746-01-6	2,3,7,8-TCDD	t	5070		ng/kg	15	Exceedance
CMS-SPMD3	0-0.7 ft	1746-01-6	2,3,7,8-TCDD	t	1190		ng/kg	15	Exceedance
CMS-SPMD4	0-0.7 ft	1746-01-6	2,3,7,8-TCDD	t	446		ng/kg	15	Exceedance
CMS-SPMD5	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	437		ng/kg	15	Exceedance
SD-26	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	92.2	J	ng/kg	15	Exceedance
SD-27	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	1330	J	ng/kg	15	Exceedance
SD-28	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	f	2.13	UJ	ng/kg	15	No Exceedance
WRC-SD-2009	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	6.3		ng/kg	15	No Exceedance
WRC-SD-2010	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	194		ng/kg	15	Exceedance
WRC-SD-2011	0.5-1.5 ft	1746-01-6	2,3,7,8-TCDD	t	313		ng/kg	15	Exceedance
WRC-SD-2011	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	210		ng/kg	15	Exceedance
WRC-SD-2012	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	407	$	ng/kg	15	Exceedance
WRC-SD-2013	0-0.5 ft	1746-01-6	2,3,7,8-TCDD	t	58.6		ng/kg	15	Exceedance

Notes:
* - Concentrations rounded to three significant figures
ng/kg - nanogram per kilogram
ft - feet
U - Not detected
J - Estimated concentration

TABLE 2
SUMMARY OF EXISTING PCB ANALTYICAL DATA FOR ALLENDALE REACH SEDIMENT
Centredale Manor Restoration Project Superfund Site
Allendale Reach Sediment Pre-Design Investigation Work Plan

Location	Depth Range	CAS Number	Analyte	Detected	Result	Qualifier	Units	Criteria (µg/kg)	Exceedance of Criteria
SD-26	0-0.5 ft	AROCLORTOT	Total Aroclor	t	33		µg/kg	60	No Exceedance
SD-26	0-0.5 ft	11097-69-1	Aroclor 1254	t	33	J	µg/kg	31	Exceedance
SD-27	0-0.5 ft	AROCLORTOT	Total Aroclor	t	140		µg/kg	60	Exceedance
SD-27	0-0.5 ft	11097-69-1	Aroclor 1254	t	140		µg/kg	31	Exceedance
SD-28	0-0.5 ft	AROCLORTOT	Total Aroclor	t	48		µg/kg	60	No Exceedance
SD-28	0-0.5 ft	11097-69-1	Aroclor 1254	t	48	J	µg/kg	31	Exceedance
WRC-SD-2009	0-0.5 ft	AROCLORTOT	Total Aroclor	t	190		µg/kg	60	Exceedance
WRC-SD-2009	0-0.5 ft	11097-69-1	Aroclor 1254	t	190		µg/kg	31	Exceedance
WRC-SD-2010	0-0.5 ft	AROCLORTOT	Total Aroclor	t	444		µg/kg	60	Exceedance
WRC-SD-2010	0-0.5 ft	11097-69-1	Aroclor 1254	t	110	J	µg/kg	31	Exceedance
WRC-SD-2011	0.5-1.5 ft	AROCLORTOT	Total Aroclor	t	236		µg/kg	60	Exceedance
WRC-SD-2011	0.5-1.5 ft	11097-69-1	Aroclor 1254	t	210		µg/kg	31	Exceedance
WRC-SD-2011	0-0.5 ft	AROCLORTOT	Total Aroclor	t	400		µg/kg	60	Exceedance
WRC-SD-2011	0-0.5 ft	11097-69-1	Aroclor 1254	t	280		µg/kg	31	Exceedance
WRC-SD-2012	0-0.5 ft	AROCLORTOT	Total Aroclor	t	196		µg/kg	60	Exceedance
WRC-SD-2012	0-0.5 ft	11097-69-1	Aroclor 1254	t	180	J	µg/kg	31	Exceedance
WRC-SD-2013	0-0.5 ft	AROCLORTOT	Total Aroclor	f	99	U	µg/kg	60	Detection Limit Exceeds Criteria
WRC-SD-2013	0-0.5 ft	11097-69-1	Aroclor 1254	f	49	U	µg/kg	31	Detection Limit Exceeds Criteria

Notes:
µg/kg - microgram per kilogram
ft - feet
U - Not detected
J - Estimated concentration

TABLE 3
SUMMARY OF EXISTING SVOC ANALTYICAL DATA FOR ALLENDALE REACH SEDIMENT
Centredale Manor Restoration Project Superfund Site
Allendale Reach Sediment Pre-Design Investigation Work Plan

Location	Depth Range	CAS Number	Analyte	Detected	Result	Qualifier	Units	Criteria (µg/kg)	Exceedance of Criteria
WRC-SD-2009	0-0.5 ft	50-32-8	BzAPyrene	t	1600	J	µg/kg	1400	Exceedance
WRC-SD-2010	0-0.5 ft	50-32-8	BzAPyrene	t	1400	J	µg/kg	1400	Exceedance
WRC-SD-2011	0.5-1.5 ft	50-32-8	BzAPyrene	t	1200	J	µg/kg	1400	No Exceedance
WRC-SD-2011	0-0.5 ft	50-32-8	BzAPyrene	t	4800		µg/kg	1400	Exceedance
WRC-SD-2012	0-0.5 ft	50-32-8	BzAPyrene	t	600		µg/kg	1400	No Exceedance
WRC-SD-2013	0-0.5 ft	50-32-8	BzAPyrene	t	84	J	µg/kg	1400	No Exceedance
WRC-SD-2009	0-0.5 ft	53-70-3	DiBzAhAnthracene	t	800	J	µg/kg	970	No Exceedance
WRC-SD-2010	0-0.5 ft	53-70-3	DiBzAhAnthracene	f	4600	U	µg/kg	970	Detection Limit Exceeds Criteria
WRC-SD-2011	0.5-1.5 ft	53-70-3	DiBzAhAnthracene	f	4200	U	µg/kg	970	Detection Limit Exceeds Criteria
WRC-SD-2011	0-0.5 ft	53-70-3	DiBzAhAnthracene	t	1700	J	µg/kg	970	Exceedance
WRC-SD-2012	0-0.5 ft	53-70-3	DiBzAhAnthracene	t	130	J	µg/kg	970	No Exceedance
WRC-SD-2013	0-0.5 ft	53-70-3	DiBzAhAnthracene	f	480	U	µg/kg	970	No Exceedance

Notes:
µg/kg - microgram per kilogram
ft - feet
U - Not detected
J - Estimated concentration

TABLE 4
SUMMARY OF EXISTING METAL ANALTYICAL DATA FOR ALLENDALE REACH SEDIMENT
Centredale Manor Restoration Project Superfund Site
Allendale Reach Sediment Pre-Design Investigation Work Plan

Location	Depth Range	CAS Number	Analyte	Detected	Result	Qualifier	Units	Criteria (mg/kg)	Exceedance of Criteria
WRC-SD-2009	0-0.5 ft	7440-38-2	Arsenic	t	1.1	J	mg/kg	3.9	No Exceedance
WRC-SD-2010	0-0.5 ft	7440-38-2	Arsenic	t	2.5		mg/kg	3.9	No Exceedance
WRC-SD-2011	0.5-1.5 ft	7440-38-2	Arsenic	t	1.4		mg/kg	3.9	No Exceedance
WRC-SD-2011	0-0.5 ft	7440-38-2	Arsenic	t	1.1	J	mg/kg	3.9	No Exceedance
WRC-SD-2012	0-0.5 ft	7440-38-2	Arsenic	t	1.7	J	mg/kg	3.9	No Exceedance
WRC-SD-2013	0-0.5 ft	7440-38-2	Arsenic	f	0.83	U	mg/kg	3.9	No Exceedance
WRC-SD-2009	0-0.5 ft	7782-49-2	Selenium	f	0.7	U	mg/kg	1.1	No Exceedance
WRC-SD-2010	0-0.5 ft	7782-49-2	Selenium	f	0.86	U	mg/kg	1.1	No Exceedance
WRC-SD-2011	0.5-1.5 ft	7782-49-2	Selenium	f	0.59	U	mg/kg	1.1	No Exceedance
WRC-SD-2011	0-0.5 ft	7782-49-2	Selenium	f	0.7	U	mg/kg	1.1	No Exceedance
WRC-SD-2012	0-0.5 ft	7782-49-2	Selenium	f	1.1	U	mg/kg	1.1	No Exceedance
WRC-SD-2013	0-0.5 ft	7782-49-2	Selenium	f	0.73	U	mg/kg	1.1	No Exceedance
WRC-SD-2009	0-0.5 ft	7440-66-6	Zinc	t	100		mg/kg	221	No Exceedance
WRC-SD-2010	0-0.5 ft	7440-66-6	Zinc	t	86.5		mg/kg	221	No Exceedance
WRC-SD-2011	0.5-1.5 ft	7440-66-6	Zinc	f	36	U	mg/kg	221	No Exceedance
WRC-SD-2011	0-0.5 ft	7440-66-6	Zinc	f	43.1	U	mg/kg	221	No Exceedance
WRC-SD-2012	0-0.5 ft	7440-66-6	Zinc	t	533		mg/kg	221	Exceedance
WRC-SD-2013	0-0.5 ft	7440-66-6	Zinc	t	61.2		mg/kg	221	No Exceedance

Notes:
mg/kg - milligram per kilogram
ft - feet
U - Not detected
J - Estimated concentration

TABLE 5
SUMMARY OF EXISTING PESTICIDES ANALTYICAL DATA FOR ALLENDALE REACH SEDIMENT
Centredale Manor Restoration Project Superfund Site
Allendale Reach Sediment Pre-Design Investigation Work Plan

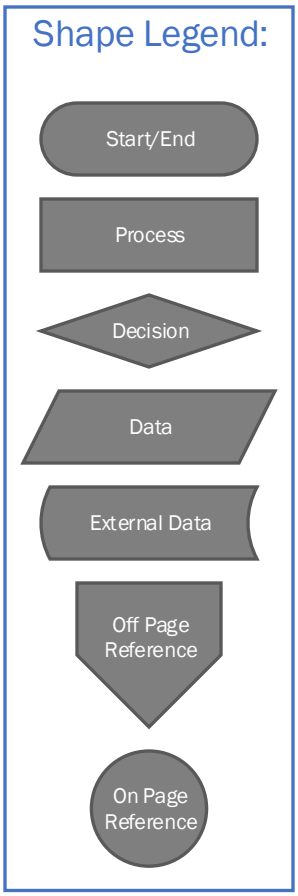
Location	Depth Range	CAS Number	Analyte	Detected	Result	Qualifier	Units	Criteria (µg/kg)	Exceedance of Criteria
SD-26	0-0.5 ft	60-57-1	Dieldrin	f	4.1	U	µg/kg	2.6	Detection Limit Exceeds Criteria
SD-26	0-0.5 ft	5103-71-9	cisChlordane	f	2.1	U	µg/kg	400	No Exceedance
SD-27	0-0.5 ft	60-57-1	Dieldrin	t	12	EB	µg/kg	2.6	Exceedance
SD-27	0-0.5 ft	5103-71-9	cisChlordane	t	1.2	J	µg/kg	400	No Exceedance
SD-28	0-0.5 ft	60-57-1	Dieldrin	f	4.1	U	µg/kg	2.6	Detection Limit Exceeds Criteria
SD-28	0-0.5 ft	5103-71-9	cisChlordane	f	2.1	U	µg/kg	400	No Exceedance
SD-28	0-0.5 ft	5103-74-2	transChlordane	f	2.1	U	µg/kg	400	No Exceedance
WRC-SD-2009	0-0.5 ft	60-57-1	Dieldrin	f	4.7	U	µg/kg	2.6	Detection Limit Exceeds Criteria
WRC-SD-2009	0-0.5 ft	5103-71-9	cisChlordane	t	3.9		µg/kg	400	No Exceedance
WRC-SD-2009	0-0.5 ft	5103-74-2	transChlordane	t	4.8		µg/kg	400	No Exceedance
WRC-SD-2010	0-0.5 ft	60-57-1	Dieldrin	t	4.6	J	µg/kg	2.6	Exceedance
WRC-SD-2010	0-0.5 ft	5103-71-9	cisChlordane	t	2.4	J	µg/kg	400	No Exceedance
WRC-SD-2010	0-0.5 ft	5103-74-2	transChlordane	t	2.4	J	µg/kg	400	No Exceedance
WRC-SD-2011	0.5-1.5 ft	60-57-1	Dieldrin	f	4.1	U	µg/kg	2.6	Detection Limit Exceeds Criteria
WRC-SD-2011	0.5-1.5 ft	5103-71-9	cisChlordane	f	2.1	U	µg/kg	400	No Exceedance
WRC-SD-2011	0.5-1.5 ft	5103-74-2	transChlordane	t	2.7		µg/kg	400	No Exceedance
WRC-SD-2011	0-0.5 ft	60-57-1	Dieldrin	f	4.7	U	µg/kg	2.6	Detection Limit Exceeds Criteria
WRC-SD-2011	0-0.5 ft	5103-71-9	cisChlordane	f	2.4	U	µg/kg	400	No Exceedance
WRC-SD-2011	0-0.5 ft	5103-74-2	transChlordane	t	3.5		µg/kg	400	No Exceedance
WRC-SD-2013	0-0.5 ft	60-57-1	Dieldrin	f	4.9	U	µg/kg	2.6	Detection Limit Exceeds Criteria
WRC-SD-2013	0-0.5 ft	5103-71-9	cisChlordane	f	2.5	U	µg/kg	400	No Exceedance
WRC-SD-2013	0-0.5 ft	5103-74-2	transChlordane	f	2.5	U	µg/kg	400	No Exceedance

Notes:
µg/kg - microgram per kilogram
ft - feet
U - Not detected
J - Estimated concentration

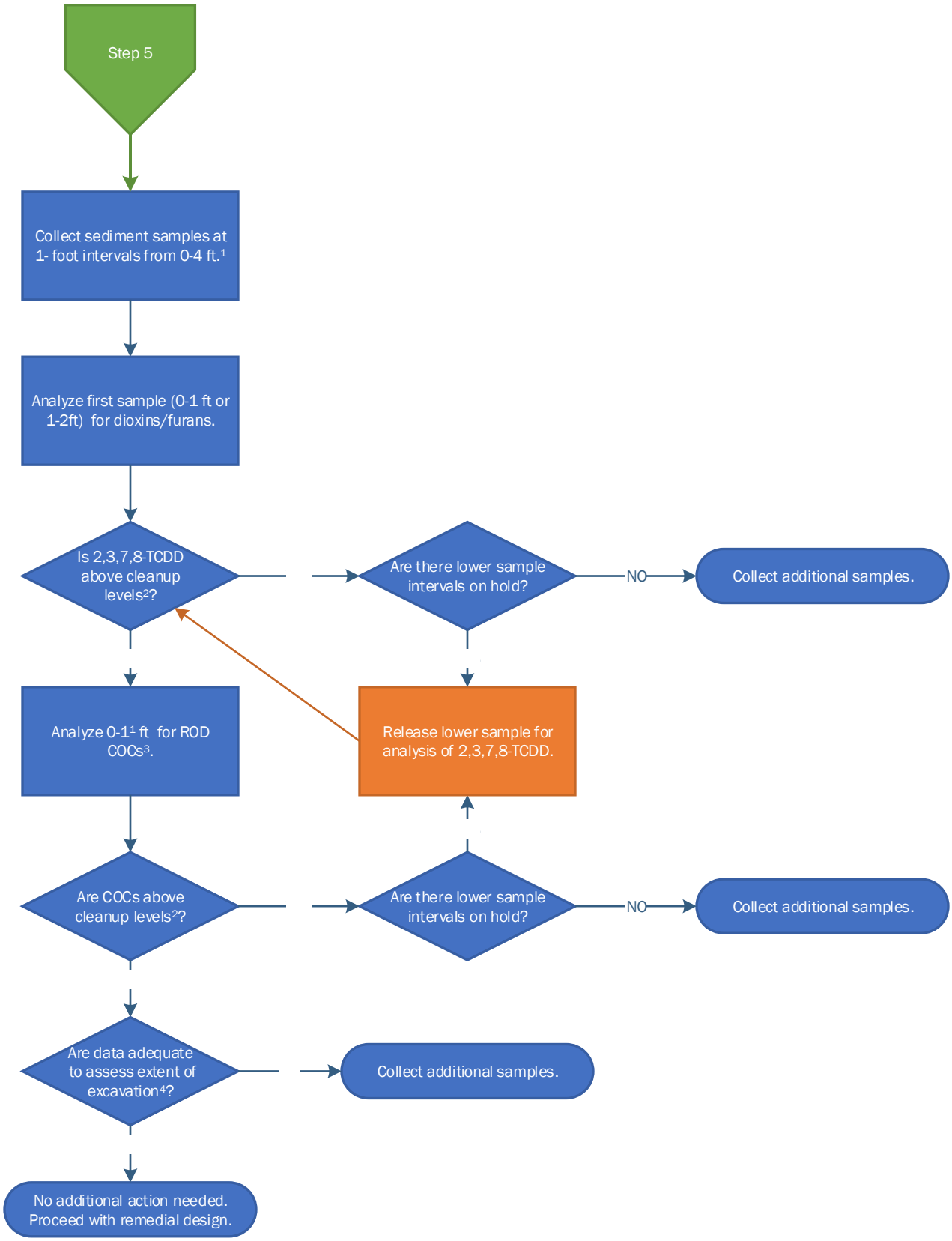
FIGURES

Figure 1: Data Quality Objective - Allendale Reach Sediment

	Step Description	Step Flow Chart
Step 1	Problem Statement	COCs in Allendale Reach pose a risk to human health and ecological resources
Step 2	Goal	Collect the additional data needed to design excavation to protect human health and the environment
Step 3	Identify Information Inputs	Data collected during previous investigations Additional analytical sediment data that defines the extent of COCs[1]
Step 4	Define the Boundaries of the Site	Allendale Reach – upper 4 feet of sediment
Step 5	Develop the Analytical Approach	Step 5
Step 6	Specify Performance or Acceptance Criteria	Exceedances of background levels
Step 7	Develop the Plan for Obtaining Data	Sampling plan provided in Allendale Reach Work Plan
Notes	[1] COCs found in tables L 6 and L 7 of the ROD: benzo(a)pyrene; dibenz(a,h)anthracene; dieldrin; chlordane; arochlor 1254; aroclor 1268; arsenic; 2,3,7,8 tetrachlorodibenzo p dioxin; dioxin TEQ; coplanar PCBs (TEQ); total aroclors; selenium; and zinc.	



Step 5



Notes

[1] Sediment samples downstream of RCRA Cap #4 will only be collected from 1 2 ft, 2 3 ft, and 3 4 ft. Excavation of upper foot is assumed.
[2] Cleanup levels were identified in Tables L 6 and L 7 of the ROD and may be modified based on the results of the planned background study.
[3] COCs are identified in Tables L 6 and L 7 of the ROD.
[4] The decision for additional borings to design the remedial action (excavation) will be made after a review of the data throughout the area and will be based on the nature and extent of contamination and the relative cost effectiveness or practicability of the remedial action.

ATTACHMENT A

Allendale Reach Sediment
Pre-Design Investigation Field Sampling Plan

DRAFT FINAL
ATTACHMENT A
ALLENDALE REACH SEDIMENT
PRE-DESIGN INVESTIGATION
FIELD SAMPLING PLAN

Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island

June 2019

Prepared for

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DRAWINGS

APPENDIX

ACRONYMS

COC	Constituent of Concern
CMRP	Centredale Manor Restoration Project
EDD	Electronic Data Deliverable
ELLE	Eurofins Lancaster Laboratories Environmental
EPA	United States Environmental Protection Agency
EQuIS	Environmental Quality Information System
FSP	Field Sampling Plan
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
LEA	Loureiro Engineering Associates, Inc.
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAD83	North American Datum 1983
NAVD88	North American Vertical Datum 1988
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
PDIWP	Pre-Design Investigation Work Plan
PE	Performance Evaluation
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RIDEM	Rhode Island Department of Environmental Management
ROD	Record of Decision
RTN	Real Time Network
SOP	Standard Operating Procedure
SOW	Statement of Work
SVOC	Semivolatile Organic Compound
TCDD	Tetrachlorodibenzo-p-dioxin

VOC	Volatile Organic Compound

1. INTRODUCTION

This Field Sampling Plan (FSP) has been prepared by Loureiro Engineering Associates, Inc. (LEA) for the Centredale Manor Restoration Project (CMRP) Superfund Site ("the Site") located in North Providence, Rhode Island ("North Providence") on behalf of Emhart Industries, Inc. and Black & Decker Inc. (collectively, "Settling Defendants"). This FSP is being submitted to the United States Environmental Protection Agency (EPA) and the Rhode Island Department of Environmental Management (RIDEM) (together referred to as the "Agencies") for review and approval prior to commencing the Remedial Design (RD)/Remedial Action (RA) activities at the Site. This FSP specifically pertains to collecting additional analytical data to define the northern and vertical extent of constituents of concern (COCs) in Allendale Reach sediment to the develop a remedial plan to support the remedial action objectives (RAOs). The Allendale Reach includes a section of the Woonasquatucket River ("the River"), from Route 44 to the end of the Source Area peninsula. This FSP outlines the sampling objectives and provides guidance for field activities to be conducted as part of the Pre-Design Investigation Work Plan (PDIWP).

This plan is to be used in conjunction with the Quality Assurance Project Plan (QAPP) (LEA, 2018) and its applicable addendums: Addendum 001, Addendum 002, and Addendum 003. The QAPP provides a plan with procedures needed to establish and maintain effective quality controls during the analysis of the sediment and floodplain soil samples. Standard Operating Procedures (SOPs) referenced in this FSP are also included in the QAPP to be followed while conducting the field sampling activities.

1.1 Background

The Site is located at 2072 and 2074 Smith Street (Route 44), North Providence, Providence County, Rhode Island. The Site encompasses parts of two Rhode Island towns, North Providence and Johnston, and free-running reaches and impoundments of the Woonasquatucket River. The Woonasquatucket River flows from North Smithfield for 19 miles south and east to downtown Providence, where it joins the Moshassuck River to form the Providence River, which in turn flows into Narragansett Bay. The Site consists of all contaminated areas within the Source Area, Woonasquatucket River, the impoundments (Allendale Pond and Lyman Mill Pond [collectively, "the Ponds"]), and floodplain, as well as any other location where contamination from that area has come to be located, or from which that contamination came.

The Allendale Reach includes a section of the Woonasquatucket River ("the River"), from Route 44 to the end of the Source Area peninsula.

1.2 FSP Organization

The following is a general description of the contents of each section presented in this FSP:

Section 2 provides the organization and responsibilities of all parties involved in the project team;

Section 3 provides a description of the sampling objectives and scope of work for field sampling activities to be performed upstream of the Site;

Section 4 provides a detailed description of the field procedures to be followed during the Pre-Design Investigation (PDI) for the characterization of sediment in Allendale Reach;

Section 5 provides a description of the procedures to be followed regarding investigation derived waste;

Section 6 provides a list of references.

2. ORGANIZATION AND RESPONSIBILITIES

A list of project staff, their roles and responsibilities, and an Organizational Chart for the project team is provided in Worksheet #5 and Worksheet #6 of the QAPP. LEA will be self-performing the sediment collection and sampling, as reflected in the organizational chart.

3. OBJECTIVES AND SCOPE

This section identifies the objectives and scope of the Allendale Reach PDI FSP.

3.1 Project Objectives

The primary objective of the Allendale Reach study is to collect additional analytical data to define the northern and vertical extent of COCs in sediment to develop the remedial plan to support the RAOs.

This FSP includes the following field activities:

> Sediment sampling to be performed within the Woonasquatucket River[1] from the Route 44 intersection to the end of the Source Area peninsula.

The following sections detail the scope of work proposed to meet the objectives of the project.

3.2 Scope of Work

As part of the PDI, sediment samples will be collected from the Allendale Reach. The sediment samples will be used to define the northern and vertical extent of COCs in sediment and develop the remedial plan to support the RAOs. The sampling approach is detailed in the Allendale Reach PDIWP and work will be completed in accordance with the QAPP.

Three sediment samples will be collected every 100-feet from across the channel bottom to investigate the possibly uneven distribution of COCs within the channel. The sediment data will be used to determine the depth of the excavation. For the sediment sample transects north of Resource Conservation and Recovery Act (RCRA) Cap No. 4 (starting with locations PDI-ADR-SD-013, 014, and 015), samples will be collected from all depth intervals (0-1, 1-2, 2-3, and 3-4). Along RCRA Cap No. 4 and downstream, sediment sample transects will not include the 0-1 foot interval because at a minimum the top 1 foot of sediment will be excavated in accordance with the Record of Decision (ROD). The sample collected from the 0-1 foot interval (or 1-2 foot interval for PDI-ADR-SD-016 through -048) will initially be analyzed for dioxins/furans and the remaining samples placed on hold at the laboratory. If tetrachlorodibenzo-p-dioxin (TCDD) is detected above the cleanup criteria, the next sample down will be released for analysis of dioxins/furans. Additional samples will be released progressively by depth until the vertical extent of TCDD exceeding cleanup criteria has been delineated. Once the vertical extent of

[1] The Woonasquatucket River sediment, for the purposes of the study, will be sediment in the river channel with, at a minimum, 6-inches of water flowing over it.

TCDD has been delineated, the sample interval that contained TCDD less than the cleanup criteria will be analyzed for the COCs[2] identified in Tables L-6 and L-7. If any of these contaminants exceed cleanup levels, additional samples will be released progressively by depth until all COCs have been vertically delineated.

Based on the channel length, 16 transects (48 sample locations) are planned for the analytical parameters listed below. If needed, based on the results of the initial investigation, additional sediment samples may be collected in the channel.

Analytical data collected as part of the PDI sediment field investigation will meet the applicable quality control acceptance criteria as defined in QAPP Worksheets #12 and #28 and will be analyzed by accredited laboratories, as applicable. The laboratory reporting limits and Project Reporting Goals are presented in the QAPP Worksheet #15.

Sediment samples will be collected for laboratory analysis of the following:

Dioxin/furans
Polychlorinated biphenyl (PCB) congeners
Semi-volatile organic compounds (SVOCs)
PCBs (Total Aroclors)
Pesticides
Arsenic
Selenium
Zinc
Grain Size

The proposed sample locations are depicted on Drawing 1. Table 3-1 outlines the sample locations, their unique location identification numbers, and rationale.

[2] COCs include: Dioxins/Furans, PCB Congeners, Benzo(a)pyrene, Dibenz(a,h)anthracene, Aroclor 1254, Aroclor 1268, Total PCB Aroclors, Dieldrin, Technical Chlordane (reported as Chlordane), Arsenic, Selenium, Zinc, PCB Congener TEQ, and Dioxin TEQs. These parameters will be calculated and compared to the appropriate cleanup levels.

4. FIELD PROCEDURES

The sections below detail the procedures and methodologies to be utilized in the field in the collection of sediment samples.

4.1 Field Equipment Calibration

A photoionization detector (PID) will be used for the detection of volatile organic compounds (VOCs) as a preliminary analyzer and as a health and safety protocol. The PID will be calibrated at the beginning of each day in accordance with manufacturer specifications as described in Worksheet #22 included in the QAPP. In addition, a pocket scale will be used with sampling of sediments in accordance with the LEA SOP 10006 *Soil Sampling* and Worksheet #22 in the QAPP. Instrument numbers, calibration procedures, and instrument performance data will be recorded on a Daily Field Report Calibration Record.

4.2 Decontamination Procedures for Field Equipment

Decontamination procedures prevent cross-contamination between samples. General decontamination procedures are described in LEA SOP 10065 *Decontamination of Sampling Equipment* (provided in the QAPP). This section provides a summary of the provisions of LEA SOP 10065 as it relates to the proposed sampling. Personnel decontamination procedures are discussed in the Loureiro Health and Safety Plan (HASP) (July, 2018).

All non-disposable sampling equipment including pistons, hand augers, shovels (as needed), spatulas, spoons, bowls, and trowels will be decontaminated between samples to prevent cross-contamination. Polycarbonate sleeves and core catchers from a piston core device or pneumatic vibratory sampling device will be changed after each sample collected, and will be placed in large, heavy-duty garbage bags and transported to the Staging Area for transfer into an open top 55-gallon steel drum or roll-off. Decontamination fluids will be temporarily containerized in 5-gallon buckets with lids prior to transport to the Staging Area for transfer into a closed top 55-gallon steel drum.

The effectiveness of decontamination procedures will be assessed by the collection of equipment blanks and submitted to the off-site analytical laboratory for analysis. The frequency of equipment blanks is described in Worksheet #20 of the QAPP.

4.3 Allendale Reach Sediment Sample Collection Procedures

Sediment samples will be collected from 48 locations in Allendale Reach. Sampling locations are identified on Drawing 1. The sampling procedures for sediment sampling will follow LEA SOP 10009, entitled *Sediment Sampling in Shallow Rivers and Ponds* and LEA SOP 10066 *Sediment Sampling Using Vibratory Corer*. Sampling equipment shall be decontaminated as detailed in Section 4.2.

4.3.1 Property Access

Each sample location will be reviewed to determine property ownership and level of required access. The property owner will be sent a letter describing the scope of work and access agreement via certified letter. At least one week prior to the beginning of work, the property owner will be contacted in the form of the property owner's choosing (e.g. call, text, or email) to discuss the scope of work and the timing of the sampling event, as well as identify potential access issues and considerations (e.g. fences, animals, debris). Communication with the property owner during the planning and execution of the field work will include: setting a sampling date, reminder/notification a week prior to sampling, and notification of additional access needs or notable occurrences during work. The private property owners for the Allendale Reach of the river include the Narragansett Electric Company, Brook Village Senior Housing LLC, and Centredale Manor Associates. An access agreement has been secured for each of these property owners. Following the review of the analytical results by EPA, the results will be provided to the property owners.

4.3.2 Sediment Sample Collection

Sediment samples from Allendale Reach will be collected moving in a northerly direction (downstream towards upstream) starting at the end of the Source Area peninsula. This process will be followed in order to minimize disturbance and contaminant migration towards other sediment sample locations. Sample locations will always be approached from downstream.

Sediment samples will primarily be collected via the use of a piston core device. If there is inadequate recovery, or difficulty penetrating to the target depth, a pneumatic vibratory sampling device system (such as a "Vibracore") will be used. In the instance where the pneumatic vibratory device does not recover a sample (e.g. in coarse deposits), a hand auger or other sampling device will be used as the alternative sample collection method. Sample advancement and collection will be performed in accordance with LEA SOP 10009 *Sediment Sampling in Shallow Rivers and Ponds* or LEA SOP 10066, *Sediment Sampling Using Vibratory Corer* (LEA SOP 10066 is provided in Appendix A).

In the instance where a sampling location is not accessible on foot due to depth of water, a floating vessel may be required to obtain the samples. If a vessel is utilized, sample advancement and collection will be performed with a piston core or pneumatic vibratory device from the deck of the vessel. LEA SOP 10066 covers the procedures for collecting sediment samples from a vessel. Samples will be transferred to the shore for collection of laboratory analytical samples by Loureiro personnel.

A generalized description of work activities for the collection of sediment sampling is below:

Mobilize to the pre-surveyed proposed sampling location using the differential Global Positioning System (GPS) receiver. The coordinates for sample locations are provided in Table 3-1. The minimum GPS accuracy will be +/- 0.10 feet for vertical and +/- 0.05 for horizontal measurements. Document the conditions of the sample location using photographs (per 3.3(b)(7) of the Statement of Work (SOW).

Set up work space on the shore for sample collection and a decontamination area.

Using the preferred method, advance the collection device and collect the sample, then transfer to the shore for processing. Samples will be collected within a 5-foot radius of the coordinates provided in Table 3-1. If samples are collected outside of that radius, the new location will be surveyed. Samples will then be described in accordance with LEA SOP 10015 *Geologic Logging of Unconsolidated Sedimentary Deposits* and photographed. Then material from each target interval will be removed from the core and placed in a bowl to be homogenized until uniform in color and texture, and then sub-sampled into the appropriate sample containers according to LEA SOP 10006 *Soil Sampling*.

Decontaminate reusable equipment and contain and store decontamination fluids in appropriate containers. Dispose of single-use equipment into heavy duty garbage bags to be transferred to the Staging Area.

4.4 Laboratory Analytical Testing Program

The laboratory analytical testing program for sediment is presented in Table 3-1. Allendale Reach sediment samples collected during the Allendale Reach PDI will be analyzed by a certified laboratory using analytical methods as listed in the QAPP (Analytical Laboratory Accreditations are available in Appendix B of the QAPP). Worksheet #12 in the QAPP denotes the project-specific performance criteria for analytical methods. Excavated sediment will be disposed of in a landfill, which requires 1 particle size test per 1000 tons of alternative daily

cover. Based on these requirements, it is estimated that 16 samples will be submitted for grain size analysis. Grain size samples will be a composite from the recovered intervals at each selected location. This will provide enough samples to satisfy landfill requirements for excavation of up to 3 feet of sediment in the Study Area.

4.5 Location and Sample Designation

In order to ensure accuracy and clarity of sampling locations throughout the scope of this work, locations and samples will have their own unique identification procedure and nomenclature. The following sections detail the location and sample identification processes.

4.5.1 Location Identification

The first three characters of the sample location will be "PDI" indicating the phase of work the associated sample was a part of, followed by a hyphen. The next two characters are used to identify the general location of the sample, and for this FSP will be "ADR", which stands for Allendale Reach, followed by a hyphen. The next two characters will be used to identify the specific sample media, and will be "SD" for sediment, followed by a hyphen. Following "SD" will be four numbers corresponding to a sequential order of sample collection. For example, the third sediment sampling location in the Allendale Reach would be noted and identified as, "PDI-ADR-SD-0003".

For any quality assurance (QA)/quality control (QC) samples collected during the sampling, the sample location identification will be as follows:

Trip Blank	PDI-ADR-BKT
Performance Evaluation (PE)	PDI-ADR-PE

Equipment blanks will also include a two letter designation indicating the type of sampling equipment:

Hand Auger Equipment Blank	PDI-ADR-BKE-HA
Vibracore Equipment Blank	PDI-ADR-BKE-VC
Piston Core Equipment Blank	PDI-ADR-BKE-PC

Field QA/QC sampling procedures are discussed in greater detail in Section 4.8.4 of this FSP.

4.5.2 Sample Identification

Each individual sample collected, including any QA/QC samples, shall be assigned a unique seven digit tracking number assigned by the LEA Information Management System database

which will be linked with sample collection location. Any other pertinent information regarding the sampling location and field measurements shall be recorded in the field notes by on-site sampling personnel. The seven digit tracking number will also be used for data storage in LEA's Environmental Quality Information System (EQuIS) database upon receipt of electronic data deliverables (EDDs) from the laboratories.

4.6 Sample Containers and Preservation

The specifications for sample collection processes, sample containers, and preservatives used to store samples prior to analysis were determined based on requirements in the published analytical methods or EPA Region I data validation guidelines. Required sample volumes, containers, and preservation requirements for each method and matrix are presented in Worksheet #19 in the QAPP.

4.7 Sample Chain of Custody and Shipping

The sample custody process to be implemented for the investigation is detailed in the QAPP, and LEA SOP 10067, *Handling, Packaging, and Shipping of Analytical Samples* included in the QAPP. These procedures are established to document the custody of samples, and to ensure the integrity of the samples that will be collected during the investigation. The table below outlines the performing laboratory for each testing parameter, to which the field sampling crew will send the samples.

Testing Parameter	Performing Laboratory
Dioxin/furans (TEQ)	Eurofins Lancaster Laboratories Environmental (ELLE)
PCB Congeners (TEQ)	ELLE
SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene)	ELLE
PCBs (Aroclors)	Alpha
Dieldrin and chlordane	ELLE
Arsenic, Selenium, Zinc	ELLE
Grain Size	GeoTesting Express (GTX)

4.8 Field Sampling Quality Control Procedures

In implementing this FSP, information and data will be obtained upstream from the Site. The information and data will include field observations and recorded measurements that are obtained using the QA/QC procedures provided in LEA SOP 10005 entitled *Quality Assurance/Quality Control Measures for Field Activities,* included in the QAPP. The associated laboratory analyses will be conducted in accordance with the QAPP. The following sub-sections discuss the various QA/QC measures to be managed and performed during field sampling activities.

4.8.1 Quality Control Organization and Personnel

The quality control organization for the project will consist of personnel in the field and in the offices of LEA. The roles and responsibilities of team members involved with the quality control and quality assurance of the project are detailed in Worksheet #7 of the QAPP. On-site QC inspections will be provided by the LEA Project Quality Assurance Manager or by a competent person under the supervision of the Project Quality Assurance Manager. The on-site personnel will be responsible for performing each phase of QC identified in the QAPP. Office personnel will be responsible for the final review and approval of submittals, maintaining the proper QC documentation, and providing support in the event that any deficiencies or inconsistencies are identified that may require action.

4.8.2 Deficiencies and Corrective Actions

In the event that a deficiency is identified, or work is not performed in accordance with this FSP or with the QAPP, the Project Manager will be notified immediately. The Project Manager will discuss the deficiencies with the team performing the work, and will immediately identify corrective actions that will be taken to correct the deficient work. The field operations lead will confirm that the work has been corrected prior to allowing additional tasks that are affected by the non-conforming work to be performed. Quality assurance documentation of deficiencies and corrective actions are further discussed in Worksheet #28 included in the QAPP.

4.8.3 Documentation

LEA shall document and record all QC measures that are implemented in the field in accordance with LEA SOP 10038 *Documentation and Integrity of Field Sampling Activities.* The field operations lead will verify all required QC activities documented by the Field Sampling Team prior to transfer of field paperwork to the LEA office. The field staff will be responsible for documenting and recording all QC measures taken on field paperwork. Any deviations from the

QC measures outlined in this FSP will be recorded on these forms and discussed with the Project Manager and Project Quality Assurance Manager. Worksheet #29 in the QAPP details the documentation of QA/QC activities.

4.8.4 QA/QC Sampling and Analysis

The QC samples that will be collected or generated during the sediment and floodplain soil sampling activities are described below. A detailed discussion of the objectives, procedures, and collection frequency for each type of QC sample is provided in Worksheet #12, Worksheet #20, and Worksheet #28 of the QAPP.

Equipment Blanks: Equipment blanks will be collected at the rate of one per day of samples submitted to the laboratory for analysis, for the full list of analyses sampled per that day[3] of sampling. One equipment blank will be collected for each sample collection process used during a specific day. For example if a hand auger and a piston core device are both used on a particular day, then two equipment blanks will be collected.

Field Duplicates: Field duplicates will be collected at a rate of one per every twenty samples collected per media. This includes any samples submitted to the laboratory on hold. Field duplicates will be submitted for analysis for the full list of analyses of their representative duplicate pair. Field duplicates will be a second aliquot collected from the same homogenized sample as the primary sample.

Matrix Spike (MS)/Matrix Spike Duplicates (MSD): MS/MSDs will be collected at the rate of one for every twenty samples collected. This includes any samples submitted to the laboratory on hold. MS/MSDs will be submitted to the laboratory for analysis for the full list of analyses sampled per that day of sampling. MS/MSD samples will be collected from the same homogenized sample as the primary sample.

PE Samples: PE samples will be sent to the off-site laboratory for the full list of analyses provided in Table 3-1 of this FSP at a rate of one for every twenty samples per analysis.

Each individual QA/QC sample collected shall be assigned a unique seven digit tracking number assigned by the LEA Information Management System database. Any other pertinent information regarding the sampling location and field measurements shall be recorded in the field notes by on-site sampling personnel. The seven digit tracking number will also be used for data storage in LEA's EQuIS database upon receipt of EDDs from the laboratories.

[3] The equipment blanks will be collected on the same day the equipment is used.

4.9 Sample Location Survey

Each sample location will be identified using GPS techniques. If the sample location is revised during field sampling activities from those Northing and Easting locations identified in Table 3-1, the revised location (including GPS coordinates) and the reason for the revision will be documented in the field notes on the soil boring log. The horizontal datum will be measured and recorded in North American Datum 1983 (NAD83) and the vertical datum will be recorded in North American Vertical Datum 1988 (NAVD88). The minimum GPS accuracy will be +/- 0.10 feet for vertical and +/- 0.05 for horizontal measurements. The sample location procedures to be implemented for the investigation is detailed in LEA SOP 10050, *Real Time Network (RTN) Global Positioning System (GPS) for Field Survey Technicians and Robotic Total Station* included in the QAPP.

5. INVESTIGATION DERIVED WASTE

During the course of the field sampling activities performed during the investigation, excess sediment, decontamination fluids, and personal protective equipment (PPE) will be generated. Efforts will be taken to minimize the waste generated wherever possible during all sampling activities. Waste management activities at the Site shall be conducted in accordance with LEA SOP 10059 *Management of Investigation-Derived Waste.* The following sections detail the management and disposal procedures of this FSP.

5.1 Container Labeling

As discussed in LEA SOP 10059, waste containers will be provided with a unique designation that consists of four letters and three numbers. The first two letters are the Site Identifier. In this case, the letters "CM" will be used in reference to the Site name of "Centredale Manor".

The following two letters are the container-type identifier. The investigation derived waste (IDW) generated as part of this FSP will yield the following possible container types:

OT – Open top drum
CT – Closed top drum

The final three characters of the container identification number will be numbers in chronological order (ex. 001). These numbers will increase chronologically as new containers are generated. For example, the second container generated for soil and sediment would be noted and identified as, "CM-OT-002".

The container number will be printed on an adhesive label and adhered to the side of the container. The sticker will also include the site information, contents, and accumulation start date.

5.2 Transportation and Disposal

A licensed hazardous waste transportation and disposal subcontractor will be required to transport and dispose of all waste streams generated during the investigation. LEA field staff will only transport waste from the sample location area to the Staging Area.

5.3 Documentation

Documentation of IDW generated is discussed in Section 6 of LEA SOP 10059. On a daily basis, the site superintendent or designee will document the generation of IDW during the investigative activities to ensure that the IDW is properly containerized and stored at the Staging

Area. Information will be recorded on a "Waste Container Inventory Sheet". Daily records of contents stored in drums will include the following information:

Container No. (Unique Identification Number)
Date first accumulated
Source of material
Volume of material
Sample ID# (consistent with sample ID numbers described in Section 4.5)

6. REFERENCES

LEA. *Health and Safety Plan (HASP), Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. July 2018.

LEA, 2018. *Quality Assurance Project Plan (QAPP), Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island*. November 2018

TABLES

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-001	331528.90	282566.50	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-002*	331540.90	282568.10	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-003	331552.98	282569.66	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-004	331545.14	282468.70	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-005*	331558.59	282470.45	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-006	331572.17	282472.22	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-007	331550.63	282369.03	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-008*	331567.09	282369.03	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-009	331567.09	282372.64	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-010	331583.56	282372.64	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-011*	331562.97	282273.28	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-012	331588.61	282273.16	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-013	331560.55	282172.07	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-014*	331570.34	282171.98	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-015	331580.13	282171.89	0 - 1	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			1 - 2		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-016	331559.33	282072.32	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-017*	331569.98	282072.22	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-018	331561.47	281971.78	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
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TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-019*	331572.61	281972.04	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-020	331567.84	281871.26	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-021*	331578.54	281872.09	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

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Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-022	331575.29	281770.71	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-023*	331588.32	281772.43	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-024	331588.95	281670.96	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

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Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-025*	331603.00	281673.58	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-026	331613.05	281573.26	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-027*	331624.33	281576.00	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-028	331638.53	281476.08	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-029*	331649.05	281479.23	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-030	331659.57	281482.39	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-031	331665.49	281379.93	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-032*	331678.02	281383.88	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-033	331690.56	281387.83	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-034	331708.52	281287.45	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-035*	331720.88	281294.30	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-036	331733.23	281301.15	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-037	331764.27	281201.22	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-038*	331774.26	281210.47	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-039	331784.26	281219.73	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-040	331826.66	281122.23	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-041*	331843.04	281137.87	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-042	331858.53	281152.64	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-043	331580.65	282072.10	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-044	331583.76	281972.30	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-045	331589.25	281872.91	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Acronyms and footnotes provided at end of table.

TABLE 3-1
PROPOSED ALLENDALE REACH SEDIMENT SAMPLING LOCATIONS
Centredale Manor Restoration Project Superfund Site
Preliminary Design Investigation Field Sampling Plan

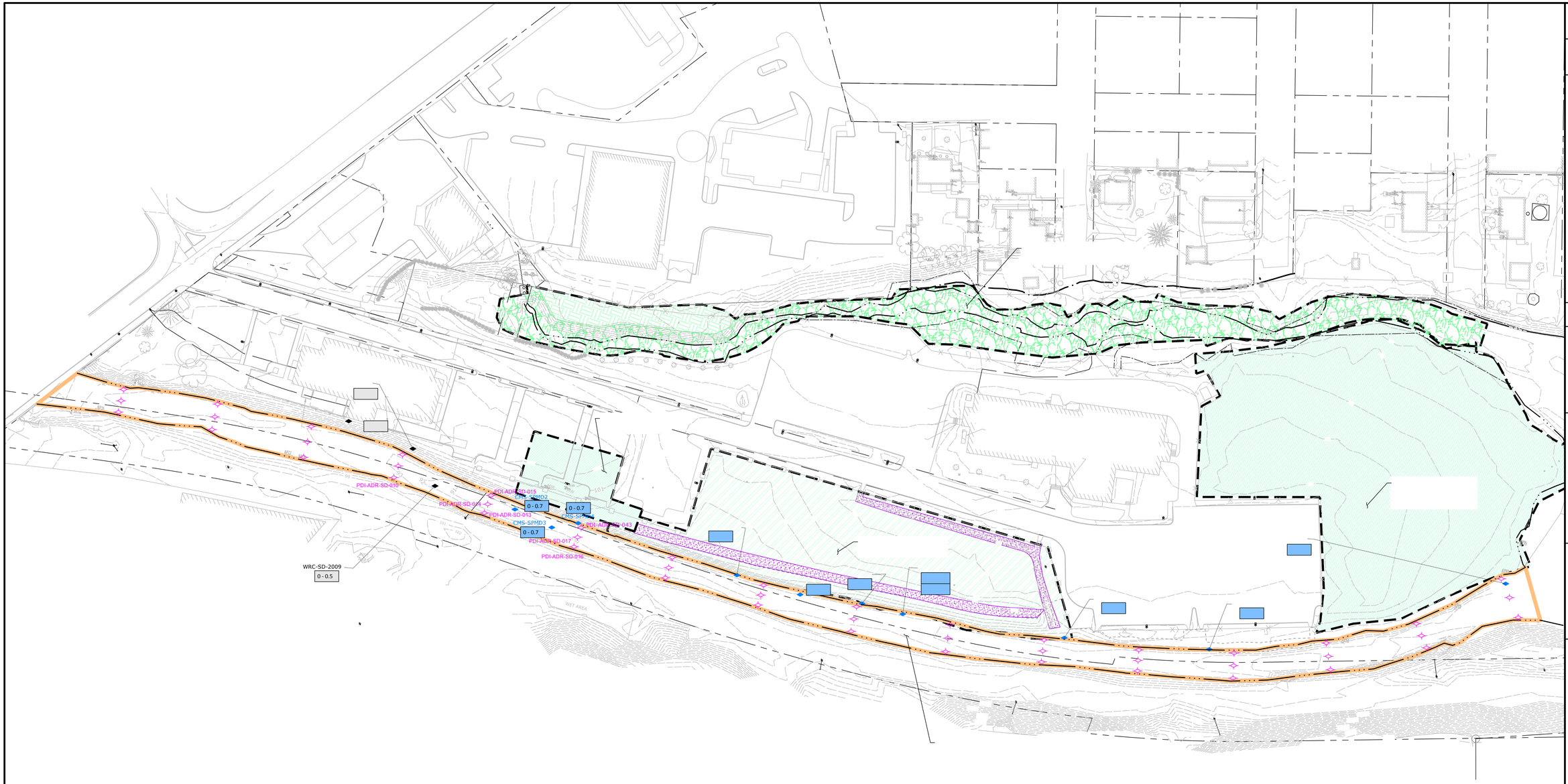
Proposed Sediment Sample ID	Easting	Northing	Sample Depths (ft.)	Laboratory Analyses Required for PDI		Sampling Rationale	Waste
				Submit for Analysis	Submit on Hold		
PDI-ADR-SD-046	331601.35	281774.14	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-047	331617.06	281676.20	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
PDI-ADR-SD-048	331635.61	281578.74	0 - 1	Do Not Sample	Do Not Sample	No sample or analysis required. 0 - 1 foot interval will be excavated in accordance with the ROD.	
			1 - 2	Dioxins, Furans	PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Investigate uneven distribution of COCs within the channel and determine depth of excavation for remedial design.	
			2 - 3		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	
			3 - 4		Dioxins, Furans, PCB Congeners, SVOCs (Benzo(a)pyrene and Dibenz(a,h)anthracene), PCBs (Aroclors), Dieldrin, Chlordane, Arsenic, Selenium, Zinc	Contingency sample to investigate uneven distribution of COCs within the channel, and determine depth of excavation for remedial design.	

Notes:
Along RCRA Cap No. 4 and downstream, sediment sample transects will not include the 0-1 ft interval because, at a minimum, the top 1 foot of sediment will be excavated in accordance with the Record of Decision (ROD).
*Grain size sample from this location will be submitted for analysis. The grain size sample will be a composite sample of the 0-4 foot interval.

Acronyms:

PCB	Polychlorinated Biphenyls
PDI	Preliminary Design Investigation
SVOC	Semivolatile Organic Compound

DRAWINGS



2,3,7,8 TCDD CONCENTRATION RANGE

- BELOW BACKGROUND
- ABOVE BACKGROUND & <8,000 ng/kg
- >8,000 ng/kg & <10,000 ng/kg
- LDR EXCEEDANCE >10,000 ng/kg

ACRONYM

LDR LAND DISPOSAL RESTRICTIONS

NOTES:
1. SYMBOL COLOR IS BASED ON THE MAXIMUM CONCENTRATION OF 2,3,7,8 TCDD IDENTIFIED AT EACH LOCATION.
2. BACKGROUND CONCENTRATIONS FOR 2,3,7,8 TCDD IS 15 ng/kg.

SAMPLE REFERENCE:
ALL HISTORICAL SAMPLE LOCATIONS SHOWN WERE OBTAINED ELECTRONICALLY FROM THE EPA DATABASE FOR THE CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE AND WERE NOT LOCATED BY LOUREIRO ENGINEERING ASSOCIATES, INC.

MAP REFERENCE:
1. PROPERTY SURVEY AND EXISTING CONDITIONS, PROPERTIES OF BROOKSIDE VILLAGE SENIOR HOUSING LLC, 2072 SMITH STREET (ROUTE44) AND CENTREDALE MANOR ASSOCIATES, 21074 SMITH STREET (ROUTE 44), NORTH PROVIDENCE & JOHNSTON, RHODE ISLAND, BY LOUREIRO ENGINEERING ASSOCIATES, INC. APRIL 2019. DATUMS ARE RHODE ISLAND STATE PLANE NAD83 AND NAVD88.
2. ADDITIONAL UTILITY INFORMATION PER "CORBUILT UTILITY LOCATION WORKSHEET" PROVIDED BY CORBUILT, LLC .
3. JOHNSTON, RHODE ISLAND PARCELS WERE PROVIDED BY APPLIED GEOGRAPHICS INC. LAST UPDATED ON 12/08/17.
4. NORTH PROVIDENCE, RHODE ISLAND PARCELS WERE PROVIDED BY THE TOWN OF NORTH PROVIDENCE GIS DEPARTMENT.
5. FEMA FLOOD ZONES FROM < https://www.floodmaps.fema.gov/NFHL/status.shtml >, DATED 10/2/2015, REVISED 3/15/2018.

APPENDIX A

Loureiro Standard Operation Procedures

Loureiro Engineering Associates, Inc.
Standard Operating Procedure
for
Sediment Sampling Using Vibratory Corer

SOP ID: 10066
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REVISION RECORD

Rev #	Date	Additions/Deletions/Modifications
Initial Issue	07/23/18	
001	03/04/19	Revised to include both Mechanical and Pneumatic Vibratory samplers.

Loureiro Engineering Associates, Inc.
Standard Operating Procedure
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1. Purpose and Scope

This document discusses procedures for collection of vibratory cores for sediment sample collection and analysis. Methods for collection and quality assurance/quality control (QA/QC) requirements are covered under separate standard operating procedures (SOPs).

2. Related Standard Operating Procedures

- 10005 – QA/QA Measures for Field Sampling Activities
- 10009 – Sediment Sampling in Shallow Rivers and Ponds
- 10015 – Geologic Logging of Unconsolidated Sedimentary Deposits
- 10038 – Documentation and Integrity of Field Sampling Activities
- 10057 – Collecting and Preserving Soil and Sediment Samples for Laboratory Determination of Volatile Organic Compounds
- 10059 – Management of Investigation Derived Waste
- 10065 – Decontamination of Field Sampling Equipment
- 10067 – Handling, Packaging, and Shipping of Analytical Samples

In addition to the above-noted SOPs, project and client-specific requirements may be applicable to individual projects and should be discussed with the Project Manager and incorporated into the project-specific work plan (Work Plan) or Field Sampling Plan (FSP) for adherence during the execution of the project.

3. Definitions

- Sediment: Particulate organic and inorganic matter that accumulates in a loose, unconsolidated form on the bottom of a body of water.

- Mechanical or Pneumatic Vibratory Core Collector (aka Vibracore): A sediment sampling technology that utilizes a high frequency, low amplitude vibration to penetrate into sediment for retrieving continuous, undisturbed cores.

4. Equipment

The following equipment and supplies shall be used during vibracoring activities, as required:

- Health and safety equipment (as required by the site-specific Health and Safety Plan [HASP])
- Polyethylene or stainless steel spatula (spoon, scoop, trowel, Terra Core™, En Core®, etc.) for transfer of sediment from sample collection device to sample container
- Mechanical or Pneumatic Vibratory sampler (ex: Vibracore®)
- Rigid polycarbonate collection tubing for sediment core collection
- Core catching attachments (as required)
- Stainless steel core barrel to drive collection tube into sediment
- Weighted measuring tape with 0.1-foot increments
- Camera
- Global positioning system (GPS) unit
- Watch
- Vinyl collection tube caps
- Teflon® tape
- Paper towels
- Marker
- Double bagged ice
- Lab containers
- Table or flat surface
- Nitrile gloves
- Stainless steel knife
- Hand saw
- Regular tape measure
- Vertical cooler
- Boat (if needed based on water depth) and float plan

5. Procedures

5.1. Utilities Clearance

Underground utilities clearance will be conducted in accordance with the Loureiro Engineering Associates, Inc. (LEA) groundbreaking procedure.

5.2. Site Preparation

Review and follow the health and safety procedures or requirements specified in the site-specific HASP. All personal protective equipment (PPE) will be donned as specified in the site-specific HASP during all sampling procedures.

When sampling from a boat, follow Occupational Safety and Health Administration (OSHA) regulations 1926.106: *Working over or near water*. Ensure that the boat registration and boating certifications are up to date with State and Federal entities.

A designated sampling receiving area should be set up on shore.

Refer to the Work Plan and FSP to determine sampling locations, naming convention, order of collection, core intervals, analytical testing, and other relevant sampling information.

5.3. Equipment Decontamination and Cleaning

All equipment will be decontaminated prior to starting and in between collection of samples in accordance with SOP 10065 *Decontamination of Field Sampling Equipment* or as otherwise specified in the site-specific Work Plan or FSP.

5.4. Core Collection and Retrieval Procedures

5.4.1. Navigate to and anchor the boat at the sampling location specified in the Work Plan or FSP using a GPS.

5.4.2. Measure water height above the surface of the sediment using a weighted tape and record the water height on sediment core log, along with the exact time of measurement. If sample locations are in a tidal area, use the mean low tide as the water height.

5.4.3. Cut a four or eight-foot core of polycarbonate tube, insert the piston, and feed the tube into the core assembly. If utilizing a core catcher device, include in the assembly and document use and type on the field paperwork.

5.4.4. Lower the assembly using a winch to the 6” above the bottom (mudline) and secure the piston wire.

5.4.5. Using the Vibracore sampler, advance core to the appropriate depth, record depth of penetration on the sediment core log. Keep core vertical during sample collection.

5.4.6. Retrieve the core assembly and remove the core tube.

5.4.7. Decant water by pouring it off from the top of the core tube if present after the sample has settled.

5.4.8. Using a tape measure with 0.1-foot increments, measure and record the total length of the retrieved sediment core.

5.4.9. Calculate percent recovery, defined as the length of sediment retrieved divided by the length of the core penetration and record in field notes. The criteria for core acceptance is a percent recovery of at least 75%. If recovery is less than 75%, the core will be rejected and another core attempted. A maximum of three cores will be attempted at any one location unless otherwise stated in the Work Plan or FSP.

5.4.10. Cap both ends with vinyl caps and tape with Teflon® tape, decontaminate and dry the exterior of the core tube with a paper towel, then label the core tube with the Location ID and top/bottom with an indelible marker.

5.4.11. Record coordinates and elevation for the core location from the GPS onto the sediment core log.

5.4.12. Mark the depth from sediment surface corresponding with sample interval on the polycarbonate tubes with an indelible marker.

5.4.13. Immediately after sampling, sediment cores will be placed in a vertical cooler on the sampling vessel for preservation. If cores need to be cut on the vessel to accommodate size restrictions, the core should be cut in 4-foot intervals, measured from the bottom of the core. For example, a 9 ft core would be cut into intervals from 5-9 ft, 1-5 ft, and 1-0 ft. Samples will then be brought to the designated sampling area on the shore.

5.4.14. Once sediment cores are at the designated sampling area, cut the polycarbonate tube and sediment core lengthwise using a decontaminated stainless steel knife.

5.4.15. Record a description of sediment core by depth interval on sediment core log, and take a digital photograph(s), with scale, core location ID and up direction noted in the photograph. Complete all sample collection documentation including logging

of soil/sediment utilizing SOP 10015 *Geologic Logging of Unconsolidated Sedimentary Deposits*.

5.4.16. Separate sample intervals and collect samples according to SOP 10006 *Soil Sampling.*

5.5. Post Sampling Procedures

Follow sample handling procedures detailed in SOP 10067 *Handling, Packaging, and Shipping of Analytical Samples.*

5.6. Waste Management

Investigation derived wastes (IDW), including sediment cuttings, decontamination liquids, and disposable materials (PPE, plastic sheeting, etc.) will be placed in clearly labeled, appropriate containers in accordance with SOP 10059 *Management of Investigation Derived Waste*, or managed as otherwise specified in the site-specific Work Plan.

5.7. Documentation

Documentation of field activities will be completed in accordance with SOP 10038 *Documentation of Field Sampling Activities*. In addition, the LEA SOP 10015 *Geologic Logging of Unconsolidated Sedimentary Deposits* and any quality assurance samples (LEA SOP 10005) will be completed using the applicable forms. In general, the following field forms are required for collection of sediment samples:

- Daily Field Report
- Daily Field Report "Supplemental Sheet"
- Daily Field Report "Calibration Record" (if PID or Balance were used)
- Field Sampling Record "Miscellaneous Samples"
- Field Sediment Coring Log
- Chain of Custody

5.8. The following general information will be recorded on the appropriate field forms:

- Name of recorder
- Identification of borings
- Collection method
- Date and time of collection
- Types of sample containers used, sample identification numbers and QA/QC

sample identification
- Preservative(s) used
- Parameters requested for analysis
- Field analysis method(s)
- Field observations on sampling event
- Water depth
- Core penetration
- GPS accuracy
- Sample elevation
- Core recovery
- Name of collector
- Climatic conditions, including air temperature
- IDW
- Field Sketch of sample location and color/type of flagging (as needed)
- Number of core lengths generated per coring
- Number of attempts
- Sampling vessel

6. References

EPA. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846). Accessed 7/13/2018.

Terra Corne ™ *Terra Core ™ Sampling Kit. ALS Global.* Accessed 2/19/2018.

En Novative Technologies *EnCore® Sampler. En Novative Technologies, Inc., 2013.* Accessed 2/19/2018

OSHA. *Occupational Safety and Health Administration. (1970). Regulations* (Standard No. 1926.106). Accessed 6/7/2018.

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