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REMEDIAL ACTION PLAN
for
LEAD IMPACTED RIVER SEDIMENTS
MILL RIVER STUDY AREAS I –V
THE FORMER EXIDE BATTERY FACILITY PROJECT
2190 BOSTON POST ROAD
FAIRFIELD, CONNECTICUT

Pertaining to:
CTDEEP CONSENT ORDER NO. SRD - 193
DATED OCTOBER 20, 2008

Prepared for:
EXIDE GROUP INCORPORATED
C/O VALE CANADA LIMITED
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Prepared by:
CCA, LLC

OCTOBER 2011
Revised April 2012

LIST OF TABLES, FIGURES AND DRAWINGS

LIST OF APPENDICES

DOCUMENT CERTIFICATION STATEMENT

"I have personally examined and am familiar with the information submitted in this document *(Remedial Action Plan for Lead Impacted River Sediments, Mill River Areas I-V, The Former Exide Battery Facility Project, Fairfield, Connecticut* dated April 2012*)* and all attachments, and certify that based on reasonable investigation, including my inquiry of those individuals immediately responsible for obtaining the information, the submitted information is true, accurate, and complete to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachments may be punishable as a criminal offense."

K L Money — 5-1-12

K. L. Money
Vice President
Exide Group Incorporated

Date

May 1, 2012

Ralph A. Klass, P.E., L.E.P.
CCA, LLC

Date

ACRONYMS & DEFINITIONS:

CCA	CCA, LLC
CET	Complete Environmental Testing
CTDEEP	Connecticut Department of Energy and Environmental Protection (formerly the Connecticut Department of Environmental Protection (CTDEP)
CTETPH	Connecticut Extractable Total Petroleum Hydrocarbons
EGI	Exide Group Incorporated
ELUR	Environmental Land Use Restriction
1992 Engineering Report	*1992 Engineering Report on Mill River – Sediment Study, Potential Pollutant Source and & Alternatives for Remediation* (YWC).
E^{x}ponent	E^{x}ponent, Inc. of Maynard, MA - E^{x}ponent and their predecessor Menzie-Cura Associates (MCA) have performed the ecological risk and sediment toxicity evaluations of Mill River sediments
GWPC	Groundwater Protection Criteria
I/C	Industrial/Commercial
L.E.P.	Licensed Environmental Professional
Pb	Lead
P.E.	Professional Engineer
PCBs	Polychlorinated Biphenyls
PHCs	Petroleum Hydrocarbons
PMC	Pollutant Mobility Criteria
PRGs	Preliminary Remediation Goals
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RA	Remediation Area
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recover Act
RCSA	Regulations of the Connecticut State Agencies
RES DEC	Residential Direct Exposure Criteria
RSRs	Remediation Standard Regulations
SedQAPP	"*Sediment Sample Collection & Quality Assurance Project Plan for Qualitative Sediment Assessment, Mill River Areas I – V, Former Exide Storage Battery Facility Project, Fairfield, Connecticut*" dated March 2008
SedRAP	Remedial Action Plan for River Sediments
Site (or the Site)	The Former Exide Battery Facility located at 2190 Boston Post Road, Fairfield, Connecticut
SOCs	Substances of Concern
SPLP	Synthetic Precipitate Leachate Procedure
SVOCs	Semi-Volatile Organic Compounds
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

I. INTRODUCTION

This Remedial Action Plan for Lead Impacted Sediments (the "SedRAP"), addresses sediments (lead impacted) located in the Mill River adjacent to and in the vicinity of the Former Exide Battery Facility (the "Site"), and has been prepared based on the findings of extensive sediment lead mapping efforts and ecological/human health risk evaluations conducted in said river since the year 2000. The investigations were performed by Exide Group Incorporated ("EGI" or the "Owner"), a subsidiary of Vale Americas Inc, to meet the requirements of Connecticut Department of Energy and Environmental Protection (the "CTDEEP", formerly the Connecticut Department of Environmental Protection or CTDEP) Administrative Order No. SRD-193 (the "Order") dated October 20, 2008. This document represents the Final SedRAP and comments received from CTDEEP since the Draft document was released in October 2011 have been duly incorporated herein.

The following pages summarize:

- information obtained through implementation of the aforementioned comprehensive studies, ancillary efforts and associated discussions/approvals with CTDEEP regarding cleanup criteria and other issues,
- current conditions of the Mill River environment as it pertains to the five Study Areas (an aerial image depicting the study areas is presented as Figure 1) covered under this SedRAP,
- remediation methodologies evaluated,
- presentation of the selected approach as well as justification of techniques to be utilized to extract, dewater, handle and dispose of the lead impacted sediments in an environmentally safe manner.

This SedRAP also addresses site controls/permitting, concurrent upland remediation to be performed along the river bank and post-remediation monitoring of river sediment.

II. OVERVIEW - REMEDIAL ACTION PLAN FOR LEAD IMPACTED SEDIMENT

As illustrated in Figure 1, due to the topographic/physical features of the Mill River area under study the study area has historically been divided into five individual reaches (Mill River Areas I - V). Each reach is delineated from an adjacent reach by a physical constriction to river flow such as a roadway/railroad crossing or tidal gate structure as described below.

The individual reach limits and their identification as historically defined and continued for the purposes of this report are as follows:

I. Upstream Area – The Mill River between I-95 and the Metro-North Railroad line.

II. Mill Pond Area – A ponded section of the Mill River (adjacent to the Exide site), located between the Metro-North Railroad Line and the Boston Post Road.

III. Downstream Area – The Mill River between the Boston Post Road and Harbor Road (tidal dam structure located here).

IV. Southport Harbor Area – An area bounded by Harbor Road and a project limit line, oriented in an east-west direction, and located approximately 225 feet south of Harbor Road.

V. Upriver – The Mill River from I-95 north to a constriction in the river 2,100 feet north of I-95 (near Mill Hollow Park).

Based on the results of the *Sediment* Sample Collection & Quality Assurance Project Plan (SedQAPP) Implementation (the 2008-2009 sediment mapping effort performed on behalf of EGI), detailed knowledge of the vertical and horizontal distribution of lead in study area sediments has been gained and is presented graphically herein. Although all available remedies to dealing with the mapped sediments were evaluated (such as capping-in-place, monitored natural recovery, etc.) it was ultimately decided that a proactive method of removal and offsite disposal of lead impacted sediments, while the most costly alternative, was in the best interest of all stakeholders, particularly the Mill River and its dependent organisms.

Given the selection of a removal approach to remediation, determining what segment of these sediments needed remediation required the determination of a cleanup criteria – which was accomplished through the multiple ecological risk studies and discussions with CTDEEP (ecological risk studies are necessary because the CT Remediation Standard Regulations do not provide specific numerical criteria for sediments as they do other environmental media). In short, the studies (described in much greater detail in Section 4.0) established that a sediment lead concentration of no greater than 400 mg/kg lead is protective of human health as well as ecological receptors. The results of the analysis indicated that a cleanup criteria of 220 mg/kg lead be followed for Areas I-IV, largely because the area of sediment dredged would be very similar to that if a 400 mg/kg lead standard were followed. A cleanup level of 400 mg/kg lead was recommended for Area V since the additional destruction of more than twice the amount of benthic community and submerged aquatic vegetation required under a 220 mg/kg lead standard outweighed the benefits of a more stringent criteria. The difference in target criteria for Area V is further justified by the value and sensitivity of the ecological habitat in Area V, the accessibility concerns and challenges, and desire to minimize disruption to the public and neighbors that border Area V. Based on evaluation of the data presented and due consideration of site specific issues EGI and CTDEEP agreed the above cleanup criteria would be protective of all human and ecological receptors.

The following table presents a summary of the calculated estimate of the volume of sediment determined to exhibit lead concentrations greater than the agreed upon cleanup criteria:

	Area I	Area II	Area III	Area IV	Area V	Total Vol.
Vol. (cu. yd.) of lead impacted sediment above the cleanup criteria	4,441	4,978	5,908	904	5,210	**<u>21,440</u>**

Note: The cleanup criteria for Areas I – IV is 220 mg/kg and Area V is 400 mg/kg lead in sediment

Selected Remediation Method

To accomplish removal of greater than 21,000 cubic yards of lead impacted sediments, EGI consulted several leading remediation firms that specialize in environmental dredging, accompanying some of them on tours of typical "case study" areas and visiting sites where they were utilizing technologies similar to those considered for implementation on this project. Based on these consultations and an exhaustive review of all available remedial options, the remedial method deemed most appropriate for this project is hydraulic cutterhead dredging. This method has been selected as the remedial option over other alternatives, largely because of the fact that lead will be removed from the river quickly and permanently. When compared to other options that could accomplish this (cofferdams and mechanical dredging), hydraulic dredging produces less potential for elevated turbidity during dredging, less habitat destruction, and easier, less destructive river access arrangements.

Selected Sediment Processing Method

Once dredged, the river sediment slurry will be pumped to the Upland staging area located at the Former Exide Battery Facility site for processing. The dredged slurry will be dewatered to increase the solids content of the material and therefore allow for cost effective transportation of the sediment cake to out-of-state permitted landfills for ultimate stabilization and/or disposal. There are several sediment processing/dewatering techniques that could be successfully utilized on this project. EGI reviewed available alternative technologies as they pertain to reliability, total cake solids potential and processing rate (capacity) of a dewatering technique to allow project completion in a reasonable time frame. Geotubes® (large bags made from a high tensile strength woven polypropylene fabric "geotextile" panels sewn to form long tubes for containment of pumped slurry (dredged material)) have been selected as the preferred dewatering method due to a variety of project specifics that make them the more viable option including:

- The ±6-acre upland parcel provides ample laydown area for the placement of Geotubes® and the construction of the associated filtrate collection and treatment facilities
- Geotube® dewatering, while requiring skilled technicians to handle the setup and filtrate collection/treatment and polymer injection, is relatively uncomplicated compared to other techniques which sometimes involve complex equipment that can breakdown and require long repair and maintenance times. The Geotubes are fed directly from the dredge line (although a manifold system of piping to facilitate conditioning and filling of several bags simultaneously will likely be used) thereby eliminating the need to construct storage basins onsite (or using in-river scows for the same purpose).
- The treatability testing of Mill River sediments yielded favorable results using Geotubes®.

SedRAP Implementation

Bid documents will be distributed to prospective Contractors within one to two months of CTDEEP approval of this document with contractor selection made within one to two months thereafter. In the interim, EGI will be submitting the required federal, state and local permit applications. It has been estimated that implementation of the RAP will require two dredging seasons when it is considered that dredging will not be possible during the winter months of December, January and February and will be partially limited due to shellfish spawning period restrictions as they pertain to Areas III & IV. A proposed SedRAP Implementation Timeline, presuming permit approvals are received by August 15, 2012, is presented as Figure 14.

1.0 INTRODUCTION

1.1 Introduction

The following sediment Remedial Action Plan (the "SedRAP") has been prepared to address lead impacted river sediments in Mill River Study Areas I –V in the vicinity of the Former Exide Battery Facility (the "Site") located at 2190 Post Road, Fairfield, Connecticut. Figure 1 depicts the general study area location. An aerial image identifying the individual Mill River study areas is presented as Figure 2. The SedRAP has been prepared based on the findings of numerous sediment mapping efforts and ecological risk evaluations, including the recently completed re-mapping of the distribution of lead in Mill River sediments as summarized in the June 2009 *Sediment Sample Collection & Quality Assurance Project Plan (QAPP) Implementation Report for Qualitative Sediment Assessment, Mill River Areas I-V, The Former Exide Battery Facility Project, Fairfield, Connecticut* prepared by CCA, LLC (CCA) and the recent toxicity study summarized in the June 2009 *Sediment Toxicity Study: Mill River, Fairfield, Connecticut* prepared by E^{x}ponent, Inc. (E^{x}ponent). Both investigations were performed on behalf of Exide Group Incorporated ("EGI" or the "Owner"), a subsidiary of Vale-Inco United States, Inc. ("Vale-Inco") and in accordance with Connecticut Department of Energy and Environmental Protection (the "CTDEEP") Consent Order No. SRD-193 (the "Order") dated October 20, 2008. As noted, this document represents the Final SedRAP and comments received from CTDEEP since the Draft document was released in October 2011 have been duly incorporated herein.

The SedRAP presents an overview of Project history and of numerous investigations completed, particularly of the ecological evaluations performed to establish the clean-up criteria for lead impacted sediments in the Mill River. The clean-up criteria will be the driver for the remedial actions undertaken, with the express purpose of implementing the remedial action in a way that will be protective of human health and the environment.

The SedRAP also discusses alternative methodologies considered for Mill River sediment remediation, processing and disposal, and presents a plan of implementation, including project scheduling, procedures for controls, confirmation sampling, and documentation.

1.2 Background - Project History Leading to Preparation of Remedial Action Plan

The following is a brief overview of project history in relation to Mill River issues. From 1951 through June 1981, Electric Storage Battery (ESB) Incorporated and its corporate successors, operated the Site, an automotive battery manufacturing facility at 2190 Post Road in Fairfield, Connecticut. In 1974, the International Nickel Company of Canada, (Inco Limited), now Vale Canada Limited, acquired ESB Incorporated. In December 1981, Inco Limited began an orderly withdrawal from the ESB battery business. In January 1983, the last part of that withdrawal was completed with Inco's sale of the automotive battery business of Exide Corporation. Under the terms of that sale, certain parts of the battery business were retained by Inco, one of which was the Fairfield, Connecticut automotive battery plant. EGI retained the site following the sale and assumed responsibility for addressing any resulting environmental issues and acquired the right to sell the Site.

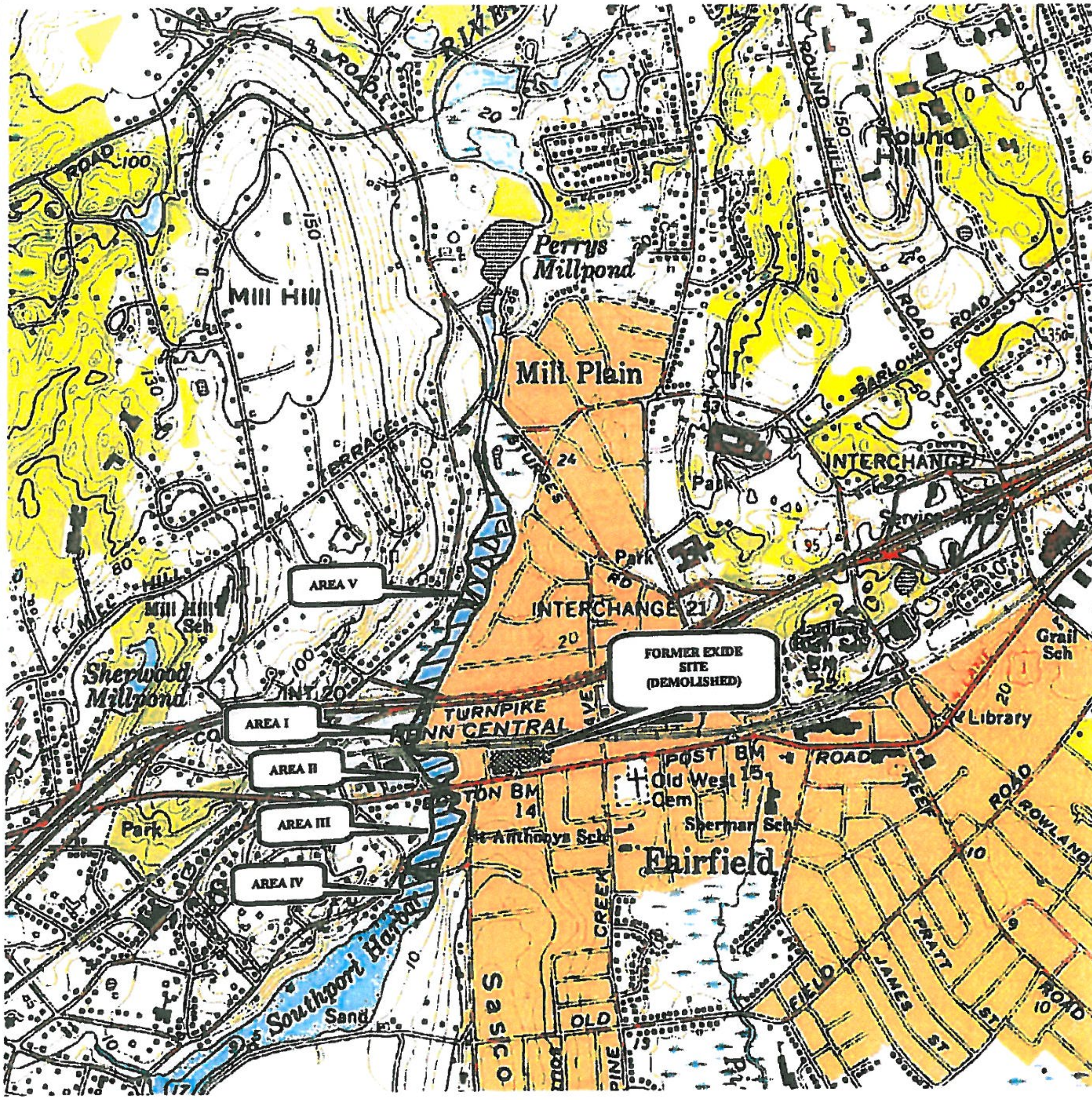
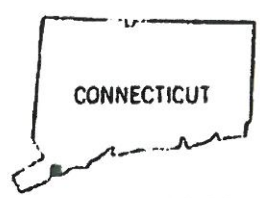


FIGURE 1
SITE LOCATION PLAN
MILL RIVER
FAIRFIELD, CONNECTICUT

Date: 3/28/08
Project Number 8014
Analyst: J.A.B
Scale: 1" =1500'



QUADRANGLE LOCATION

FIGURE TAKEN FROM THE WESTPORT, CONN U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP (PHOTO TAKEN 1971 PHOTOREVISED 1974)

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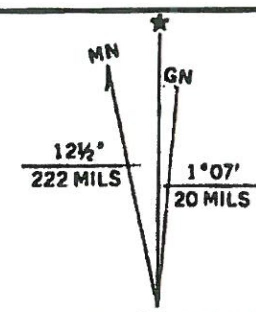

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Figure 2
MILL RIVER
SEDIMENT STUDY AREA

EXIDE GROUP INCORPORATED

FAIRFIELD, CONNECTICUT

LEGEND

★ STORM-WATER OUTFALL (AS FIELD LOCATED DURING JAN. 2009 SURVEY)

WETLANDS AREA

IMAGE SOURCE:
TOWN OF FAIRFIELD PLANNING AND ZONING COMMISSION, FAIRFIELD CT
AERIAL HIGH RESOLUTION TRUE COLOR COASTAL IMAGERY (SEPTEMBER 2004)

INCHES

Date:	5/27/09
Scale:	1" = 400' +/-
Proj. No.:	8014
File No.:	8014
Acad No.:	ACAD
Sheet:	1

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In February 1982, the CTDEEP, prior to Inco's sale of the automotive battery business, issued a Consent Order requiring Exide Corporation, the then owner of the Site, to remove 4,100 cubic yards of contaminated sediment from the Mill Pond which had allegedly emanated from the Site. Compliance with the consent order was achieved by EGI in May 1983. This effort is described in greater detail in Section 1.2.1.

Subsequent to completion of the sediment removal effort, follow-up sediment studies performed by CTDEEP and EGI indicated an increase in lead concentration in Mill River sediments. In November 1989, CTDEEP issued an Order (Administrative Order No. WC4893) dated November 29, 1989 (the "Order") to Inco United States, Inc. and Exide Group Incorporated (EGI) requiring them to determine the sources and degree of Mill Pond contamination, if any, which might be emanating from the former ESB battery production facility at 2190 Post Road, Fairfield, CT (the "Site") and to present remediation alternatives for removal of contamination from the Mill Pond. In June 1992, EGI presented the report (June 1992 Engineering report) required by the Order in compliance with the time schedule called for in the Order.

CTDEEP responded to the 1992 Engineering Report in 1998 by requiring additional investigations, primarily relating to issues pertaining to the upland factory grounds. Said investigations were performed coincident with River Sediment Human Health and Ecological Risk Assessments on behalf of EGI which resulted in a multiple submissions to and responses from CTDEEP during the period of 1998 through 2003. In 2003 CTDEEP approved 220 mg/kg as the remediation standard preliminary remediation goal (PRG) for lead in Mill River sediments.

From 2006 through 2008 CTDEEP and EGI had several correspondences regarding the sediment remediation standard, the ultimate result of which was a January 2008 letter from CTDEEP setting the sediment lead standard for Mill River at 220 mg/kg. This letter also granted EGI the opportunity to present an alternative remediation standard following an additional ecological risk based study.

In response to the January 2008 letter, EGI, 1) authorized performance of an additional ecological risk based studies (including the June 2009 *Sediment Toxicity Study* by Exponent, Inc. (Exponent)) and 2) submitted the Sediment Sample Collection & Quality Assurance Project Plan (the SedQAPP) in March 2008.

The ecological risk studies established that a sediment lead concentration of less than 400 mg/kg lead is protective of human health as well as ecological receptors. The results of the analysis indicated that a cleanup criteria of 220 mg/kg lead be followed for Areas I-IV, largely because the area of sediment dredged would be very similar to that if a 400 mg/kg lead standard were followed. A cleanup level of 400 mg/kg lead was recommended for Area V since the additional destruction of more than twice the amount of benthic community and submerged aquatic vegetation required under a 220 mg/kg lead standard outweighed the benefits of a more stringent criteria. Impacts to neighboring property owners were also considered.

On October 10, 2008 CTDEEP and EGI signed Consent Order # SRD-193 (superseding Administrative Order WC4893 and all other outstanding Consent Orders and Administrative Orders) which among other issues formalized the sediment mapping requirements. Following CTDEEP's September 26, 2008 approval of the SedQAPP, sediment mapping activities were initiated in October 2008 and completed in Spring 2009.

The findings of the sediment mapping effort approved by CTDEEP were presented in the report entitled *"Sediment Sample Collection & Quality Assurance Project Plan (QAPP) Implementation Report for Qualitative Sediment Assessment, Mill River Areas I-V, The Former Exide Battery Facility Project, Fairfield, Connecticut"* dated July 29, 2009. The document presented herein was prepared in-part based on data presented in the aforementioned implementation report. Specifically, this SedRAP presents a targeted approach to remediation of the lateral and vertical extents of sediment impacted with lead above the cleanup criteria, as mapped during implementation of the SedQAPP.

1.2.1 Summary of 1983 Remediation of Mill Pond

In 1983, a dredging program to remove lead impacted sediments from a portion of Mill Pond (Area II) was implemented on behalf of EGI. This effort, which was the culmination of a collaborative effort between EGI, the Town of Fairfield and the CTDEEP involved the dredging of 4,400 cubic yards of river sediment identified to be impacted with lead at concentration greater than 500 mg/kg from Mill Pond. Mill Pond was the only portion of Mill River identified to have been lead impacted at that time and the impacted sediments in Mill Pond were removed in accordance with CTDEEP Consent Order dated February 10, 1982.

The dredging was performed following a review of all possible alternatives regarding the Mill Pond lead contamination, including No Further Action; In Place Isolation/Stabilization; Removal, Stabilization and Replacement; and Dredge and Removal. Alternatives were ranked according to short and long term impacts, both negative and positive, to the Mill Pond area environment. Ultimately, the alternative to dredge and remove (for offsite disposal following dewatering) of 90% of the lead in the Mill Pond sediments (all sediments impacted with lead above 500 mg/kg) was selected in part because it was protective in the long term without causing severe short term damage to the Mill Pond environment. This alternative, which was supported by the public, was one of the two most expensive options considered.

Specifically, the project was implemented following a mapping of the distribution of lead in the Mill Pond bottom sediments, using a hydraulic dredge fitted with a shroud and variable speed cutter head and dredge pump. Depth of dredging was generally limited to 1-foot below the river bottom (the most contaminated sediments were identified in the surface and 1-foot intervals) although deeper dredging was performed in some areas. Dewatering of sediments was performed using a belt filter press and the ultimate disposal location of dewatered sediments was at Cecos Landfill, Niagara Falls, New York. Initially, 4,100 cubic yards of sediment was dredged and processed, in accordance with the Consent Order and Contract Documents. However, confirmation sediment sampling performed following dredging indicated that a portion of the eastern shoreline of Mill Pond still exhibited elevated lead concentrations and a follow-up dredging effort was implemented in this area which brought the total dredged volume to 4,383 cubic yards.

Laboratory analysis of Mill Pond sediments immediately following the 1983 dredging project showed a marked improvement in the reduction in lead contamination. The concentration of lead in surface sediments went from an average of 25,047 mg/kg before dredging to an average of 444 mg/kg after project implementation. Sediments in the 1-foot interval averaged 1,688 mg/kg lead in sediment before dredging and 49 mg/kg lead in sediment after dredging.

2.0 REMEDIAL ACTION PLAN (RAP) OVERVIEW

2.1 Overview/Purpose

The SedRAP presented herein has been prepared for two reasons, 1) to achieve compliance with CTDEEP Consent Order SRD-193 and 2) to reduce the concentration/bioavailability of lead in sediments in the Mill River study areas to levels that are protective of human health and the environment. In the following Sections, several alternatives to achieve these objectives will be presented along with the positive and negative aspects to each alternative. Finally, a recommended course of action will be presented along with justification that the selected action will most effectively accomplish the objectives.

2.2 Desired Effects

Whichever course of action is selected to achieve the project objectives there will be both short term and long term effects on the Mill River environment. In spite of the elevated sediment lead concentrations in some areas, Mill River currently exhibits a vibrant array of dependent flora and fauna. It is desirable that whatever remedial alternative is selected, consideration be given to minimizing the negative short term disturbance to these organisms and maximizing the long term benefits of reducing lead in the environment in which they live.

2.2.1 Short Term

In the short term, positive effects of SedRAP implementation are expected to include the elimination of lead in river sediments at concentrations where incidental human contact/ingestion poses a human health risk. This benefit would be expected to be immediate and should allow for the current ban on wading and swimming in the river to be repealed. Negative short term effects (including the destruction of flora that supports a currently productive ecosystem) are highly dependent on what alternative is selected. For example, a proactive remediation approach such as dredging would have significantly higher short term negative effects than other available alternatives. Section 5.0 will detail the potential negative short term effects associated with each of the remediation alternative.

2.2.2 Long Term

There are several intended long term benefits of the proposed project. First, the overall reduction in the lead concentration in river sediments should aid in the improvement of overall health and diversity of benthic organisms in the study areas. With significant concentrations of lead no longer being available to benthic organisms and to vegetation growing in and around the river, gradually, a reduction in the bioaccumulation of lead in higher organisms should be observed.

After a short term disturbance to the ecosystem of the river associated with any remedial action (other than the "No Further Action" option), it is anticipated that the quality and quantity of plant and animal life in the study area will rebound/flourish and exceed that which is currently observed.

2.3 Cleanup Criteria

The Regulations of Connecticut State Agencies Remediation Standard Regulations (RSRs) do not provide numerical clean-up criteria for river sediments in regard to lead or other constituents. The RSRs do, however, provide for the self-determination (by responsible parties) of ecological risk-based standards. To this end, E^{x}ponent Inc. (E^{x}ponent – formerly Menzie-Cura Associates (MCA)) performed several studies over a number of years on behalf of EGI to determine an ecological risk based standard for lead in sediment that is protective of human health and the environment. The ecological risk studies, beginning with the April 14, 2000 "*Mill River Human Health and Ecological Risk Assessment (MR HHERA) Planning and Problem Formulation*" (MCA), have gone through several revisions and supplemental studies following submittals and input from CTDEEP and the Town of Fairfield. The complete history of these studies, along with a discussion of an environmental benefit analysis is provided in Section 4.0 of this report.

In Consent Order SRD-193 dated October 20, 2008 CTDEEP formally approved of 220 mg/kg lead in sediment as the ecological risk based standard/preliminary remediation goal (PRG) for Mill River sediments. The Order also provided the opportunity for an additional ecological risk study to be performed on behalf of EGI, where an alternative risk based standard may be proposed. Under authorization from EGI, E^{x}ponent initiated this final study in March 2008 and reported findings in the summer of 2009. After several subsequent technical meetings, the CTDEEP and E^{x}ponent agreed on an ecological risk based cleanup criteria of 220 mg/kg lead in sediment for Study Areas I, II, III & IV and a cleanup criteria of 400 mg/kg lead in sediment for Area V. The human health and ecological risk assessment is discussed in greater detail in Section 4.0.

The remedial actions presented herein will address sediments determined to exhibit lead concentrations in excess of the Study Area specific cleanup criteria presented above. Post-remediation confirmation sampling (assuming a pro-active remedial alternative is employed) will need to confirm that the calculated 95% upper confidence interval total lead concentration in each river reach does not exceed the applicable cleanup criteria and that no individual sediment sample exhibits a lead concentration more than double this value

Any sample location exhibiting a concentration more than double the cleanup criteria, during post remediation confirmation sampling will need to be addressed in a supplemental effort, pending an environmental net benefit analysis of the merits of any supplemental efforts.

3.0 MILL RIVER – CURRENT CONDITIONS

Due to the topographic/physical features of the Mill River area under study (see Figure 1 and Figure 2) the study area has historically been divided into five individual reaches (Mill River Areas I - V). Each reach is delineated from an adjacent reach by a physical constriction to river flow such as a roadway/railroad crossing or tidal gate structure as described below.

The individual reach limits and their identification as historically defined and continued for the purposes of this report are as follows:

I. Upstream Area – The Mill River between I-95 and the Metro-North Railroad line.

II. Mill Pond Area – A ponded section of the Mill River (adjacent to the Exide site), located between the Metro-North Railroad Line and the Boston Post Road.

III. Downstream Area – The Mill River between the Boston Post Road and Harbor Road (tidal dam structure located here).

IV. Southport Harbor Area – An area bounded by Harbor Road, and a project limit line, oriented in an east-west direction, and located approximately 225 feet south of Harbor Road.

V. Upriver – The Mill River from I-95 north to a constriction in the river 2,100 feet north of I-95 (near Mill Hollow Park).

The study area is located within the Mill River drainage basin which includes approximately 31.8 square miles. The river within the drainage basin flows southerly through the Easton Reservoir and the Samp Mortar Reservoir. Land use within the drainage basin can be classified as mostly residential north of the Connecticut Turnpike and industrial/commercial between the Turnpike and the tidal dam where the river and Southport harbor meet. The harbor is mostly residential on both sides with associated recreational/commercial water front activities.

The tidal dam structure (associated with a circa 1700s grist mill) is located on Harbor Road and has a permanent concrete spillway on the west side and three tidal (flap) gates on the east side. The flap gates are normally located on the upstream side of the structure with the effect that water heights in the river upstream of the tide gate range from a low elevation set by the spillway and on tidal heights (high tide) in the harbor. The tidal dam structure effectively prevents the Mill River from draining into the harbor during periods of low tide, which creates a quiescent ponded upper river (Areas I, II, III & V) with low salinity and very low to non-existent current velocity. Based on historical salinity sampling, almost the entire length of the study area is tidally influenced however.

Salinity measurements have detected a layer (wedge) of brackish water which is thickest at the tide gate structure and diminishes until a point just downstream of the Sturges Road Bridge. The relatively dense brackish water wedge was detected at the lower water depths while fresh water from the upstream was present above the wedge.

During the 2008/2009 SedQAPP implementation, a variety of field observations such as water depth, bottom type and flow characteristics were made at each of the individual river reaches. The river boundaries, bottom contours and other physical features, including outfalls, are illustrated in Drawings 1 & 2, attached. Drawings 3 & 4 illustrate water column thickness at observed (during implementation of the sampling program) low water elevations. The field observations are summarized as follows:

Area I - Upstream

The river bottom observed in this area Area I can best be described as two sections. The first is a shallow, confined channel which flows from under I-95 south to the Metro-North railroad overpass relatively unencumbered and unchanged. The second section is a broad, silty pond-like area to the west separated from the channel by a peninsula of marsh. A small stream enters this section from the west and likely contributes sediment to this area. The river bottom drops off some in the southern end of both sections as water velocity picks-up near the Metro-North railroad overpass.

Sampler refusal in this area was limited to the scoured area just south of the I-95 bridge.

Water column depths recorded during sampling ranged from 0.30 – 5.7 feet. In the eastern (channelized) section of this river reach shallow depth sediments generally consisted of coarse black sand with some gravel. Intermediate depth sediments consisted of brown medium sand through silt with roots. Deeper sediments were similar to the intermediate sediments.

In the western section of this reach, shallow depth sediments generally consisted of brown/black mucky silt with organic matter (primarily leaves and twigs). Intermediate depth sediments did not differ significantly from the shallow sediments but were more solid. Deeper sediments did not differ appreciably from the intermediate sediments other than exhibiting a slightly larger grain size (fine sand) on average.

Area II – Mill Pond

The river bottom observed in this area can be described as a hard, scoured river bottom with a relatively steep topographic relief along the western edge of this area (where the primary channel flow takes place) in contrast with the majority of this reach (within the relatively quiescent ponded eastern portion) which can be characterized as shallow with a generally flat, soft bottom. The wide eastward ponded portion of this reach, away from the main channel, provides a quiescent zone enabling settlement of finer sediments resulting in the soft bottomed shallows observed during sampling and as notable from the water. Sampler refusals in this area were limited to adjacent to the Metro-North railroad and Route 1 bridges and along the northwest side of the reach where the river bank/shoreline is relatively steep and appears to be reinforced with rip rap.

Water column depths recorded during sampling ranged from 0.50 – 8.51 feet. Shallow depth sediments in this area generally consisted of mucky brown/black silt and organic matter (generally straw-like rootlets). Intermediate depth sediments did not differ significantly from the shallow sediments but were more tightly packed/cohesive. Deeper sediments did not differ appreciably from the intermediate sediments in general.

Area III – Downstream

The river bottom in this area can be described as exhibiting limited topographic relief with two exceptions. In the northeast portion of this reach an obvious scour area of relatively sharp relief exists just south of the Route 1 bridge. A deep depression also exists just north of the tide gates, where increased water velocity during the falling tide likely scours sediments from this area. The majority of the sampler refusals noted in Area III were in these two areas where finer sediments were scoured leaving only a hard cobbled river bottom.

Water column depths recorded during sampling ranged from 1.08 – 14.60 feet. Shallow depth sediments in this area generally consisted of loose brown/black muck. Intermediate sediments generally consisted of homogenous brown fine and silt, sometimes with varying organic matter (straw-like roots, twigs, leaves). In general, deeper sediments did not differ appreciably from the intermediate sediments.

Area IV – Southport Harbor

Unlike the other reaches of the study area, this area is subject to full tidal effects, which were noted to be approximately six to seven feet. Sample collection was performed at varying tide stages. At low tide a significant portion of the river (harbor) in this study area is exposed. Immediate sampler refusal was encountered in several grid points located along the tide gate outfall, around the tide mill dam and tidal dam spillway where rocks line the harbor bottom. Once away from these structures, sampling was generally unencumbered.

Two significant depressions ("scour holes") were noted in the harbor bottom south of the tide gate outfall and south of the tidal dam spillway. These depressions are likely a result of scouring from discharges exiting these structures. Water column depths recorded during sampling ranged from 0.70 – 10.90 feet. Shallow depth sediments in this area generally consisted of a combination of odorous black sand, silt and muck, sometimes containing bivalve shell fragments. Intermediate depth sediments where generally lighter in color (grey or brown) and frequently comprised of fine sand and silt. Deeper sediments were similar to the intermediate sediments although sometimes coarser and more likely to contain shell fragments.

Area V - Upriver

The river bottom elevations recorded in this area are illustrated on Drawing 6). Area V, the largest segment (reach) of the study area, begins adjacent to Mill Hollow Park, where the Mill River is a narrow, rocky bottomed shallow stream void of the tidal influence affecting the rest of the study area. Immediately downriver of the "stream" the river fans out to its widest point. This wide section of river is also the deepest.

It has been reported that this area of the river was mined for gravel during construction of the Connecticut Turnpike (Interstate route 95) resulting in an approximately 20-foot deep hole. In the mined area is an apparent zone of deposition for organic materials (leaves and other debris) carried by the Mill River from wooded areas north of the study area. The bottom in the mined area exhibited an extremely soft, mayonnaise like consistency. This sub-area of Area V spans a distance of approximately three hundred feet from the boat launch located near the intersection of Unquowa Road and Somerset Avenue then south along the middle of the river.

South of the area described above the river narrows and becomes significantly shallower from this point to the I -95 overpass (the southern limit of Area V). The width of this portion of Area V is more comparable to the other study areas. The only significant feature observed in this stretch of Area V is a marshy, somewhat protected cove at the southern (west) end of the reach that is ringed by cattails and is shallow and soft bottomed.

Sampler refusal in Area V was generally limited to the rocky bottom stream area described above, in addition to occasional refusal along shoreline areas where river bank fortification/stabilization near residences may extend below the water line.

Water column depths recorded during sampling ranged from 0.2 – 20.6 feet. Shallow depth sediments in Area V ranged from silt and organics (leafy detritus) with the consistency of pudding, to sand of various classifications in some of the down river areas. Intermediate depth sediments consisted of brown medium sand through silt. Deeper sediments did not differ appreciably from the intermediate sediments in general. Given the large area that Area V comprises, the above sediment classifications should be considered very general, sample specific sediment observations are provided for all reaches of the river in the attached tables.

3.1 River Survey (including local features)

As detailed in the SedQAPP Implementation report, a GPS survey of the waters edge of the entire Mill River study area was performed in February 2009 when sediment sampling was suspended due to the formation of ice on the river. The high watermark survey was performed in all reaches of the study area except Southport Harbor (Area IV) where sea walls restrict the horizontal movement of water in the area and the proposed grid points were noted to be accurately located in relation to the shoreline during sample collection in that area. Thus, the edge of water depicted for Area IV is based on aerial survey. The 2009 survey resulted in the updated waters edge (versus the waters edge as defined by Town of Fairfield tax maps which had been historically used), as depicted on Drawings 1 through 16 (attached). Drawings 1 & 2 illustrate the location of all pipes discharging to Mill River study areas, as observed during the January 2009 survey. Pipe inverts, materials of construction, diameter and apparent function (as well as comparable measurements from nearest upstream catch basin, as appropriate) were also recorded and are summarized in Figure 3 below.

FIGURE 3
INVENTORY OF OUTFALLS
REMEDIAL ACTION PLAN FOR LEAD IMPACTED SEDIMENTS
MILL RIVER AREAS I –V, FAIRFIELD, CONNECTICUT

Study Area	Outfall No.	Type	Const.	Diameter (inches)	Invert (ft. above MSL)	Notes
AREA I	1	Storm	RCP	30	2.39	Discharge from headwall associated with intermittent stream and/or I-95 on-ramp. Empties into small intermittent stream
	2	Storm	RCP	15	4.58	Discharge from I-95 catch basin to earthen swale above river
	3	Storm	CMP	48	2.27	Large outfall for I-95 storm drainage
	4	Storm	RCP	24	3.19	Drainage from Linwood Ave. and/or Metro-North
AREA II	5	Storm	Clay pipe	12	7.38	Outfall along steep river bank tied to catch basin in Superior Plating Co. loading dock area
	6	Storm	RCP	18	4.01	Drainage from Route 1
	7	Storm	RCP	18	1.37	"RR outfall" – piping under Metro-North, discharges drainage from Pine Creek Road vicinity
	8/SS-27	Storm	Tile	15	2.81	Former Exide plant storm drain now used to discharge storm drainage from Route 1 due to cross connection made by CTDOT
	9/SS-28	Storm	Tile	15	2.51	Clogged CTDOT drain from Route 1, apparently the reason for cross connection (above)
	10/SS-29	Storm	RCP	15	3.08	Catch basin outfall from Route 1

FIGURE 3 (Cont.)
INVENTORY OF OUTFALLS
REMEDIAL ACTION PLAN FOR LEAD IMPACTED SEDIMENTS
MILL RIVER AREAS I –V, FAIRFIELD, CONNECTICUT

AREA III	11	Storm	RCP	18	13.10	Catch basin outfall from Route 1. Discharges high-up on river bank to rip rap swale
	12	Storm	RCP	18	3.04	Catch basin outfall from Route 1
	13	Storm	RCP	15	3.80	Headwall discharge likely of drainage from River Street area commercial parking lots
	14	Storm	RCP	18	3.20	Drainage from River Street catch basins
	15	Storm	RCP	15	3.02	Drainage from River Street catch basins
AREA IV	16*	River water	RCP	±24	- 2.86	Tide gate (1 of 3) located north side of Harbor Rd.
	17*	River water	RCP	±24	- 3.06	Tide gate (2 of 3) located north side of Harbor Rd.
	18*	River water	RCP	±24	- 2.88	Tide gate (3 of 3) located north side of Harbor Rd.
	19	River water	Concrete	NA	2.17	Concrete spillway located above tide gate pipes, east side of Harbor Rd.
	20	River water	Concrete	NA	2.25	Large concrete spillway located on the west side of Harbor Road. The elev. given is an average
	21 & 22	River water	Unk	Unk	Unknown but lower than the 2.25 spillway elevation	Intake, protected by a debris grate, for former mill located on north side of Harbor Road. The outtake is located, at a lower elevation in the harbor south of the road

FIGURE 3 (Cont.)
INVENTORY OF OUTFALLS
REMEDIAL ACTION PLAN FOR LEAD IMPACTED SEDIMENTS
MILL RIVER AREAS I –V, FAIRFIELD, CONNECTICUT

AREA V	23	Storm	RCP	15	3.49	Outfall from I-95 off-ramp drainage
	24	Storm	RCP	15	2.78	Outfall from I-95 off-ramp drainage
	25	Storm	RCP	15	3.00	Outfall from I-95 off-ramp drainage
	26	Storm	RCP	18	3.36	Drainage from Bronson Rd. catch basin
	27	Storm	RCP	18	2.35	Drainage from Bronson Rd. catch basin
	28	Storm	CMP	15	3.41	Drainage from Unquowa Rd. catch basin
	29	Storm	RCP	18	2.34	Drainage from Unquowa Rd. catch basin
	30	Storm	Clay	4	2.71	Yard drain (presumably) discharge from residence
	31	Storm	Clay	4	2.61	Yard drain (presumably) discharge from residence
	32	Storm	Clay	4	2.44	Yard drain (presumably) discharge from residence
	33	Storm	PVC	4	2.35	Yard drain (presumably) discharge from residence
	34	Storm	RCP	12	6.22	Drainage from Henderson Rd.

Note: RCP = reinforced concrete pipe; CMP = corrugated metal pipe; PVC = polyvinyl chloride
* = all three Harbor Road tide gates are currently in the closed position and have been since circa 2003

During remediation of Mill River Sediments, it will be the contractors responsibility to 1) protect all outfalls to the river from damage which could be caused by heavy equipment that may be working in or near the river and 2) address the flow from these outfalls when performing remedial actions in their vicinity as said flow may cause higher turbidity (to due increased river flow around the outfall during storm events) and redistribute impacted sediments. Mitigating measures, dependent on the remedial methods employed, will have to be taken when working around these outfalls. In addition to the outfalls summarized above, there is also an **active sanitary sewer crossing** under the river bottom in Area V approximately 360-feet north of Interstate 95 which needs to be protected from damage. This crossing is illustrated in Drawing 2. EGI is unaware of any additional piping discharging to, or located in the study areas.

3.2 Sediment Lead Distribution

The primary purpose of the 2008/2009 SedQAPP implementation was to map the horizontal and vertical distribution of lead in Mill River sediments. Said distribution is depicted in Drawings 5 through 9. In short, the mapping effort involved the collection of 411 sediment cores (to a depth of three feet below the river bottom) distributed across the individual river reaches as summarized below:

	Area I Upstream	Area II Mill Pond	Area III Downstream	Area IV Southport Harbor	Area V Upriver
Anticipated Individual Core Locations[1]	30	50	60	37	234

1.Four sediment sample points, outside of the above described grid, were located in the Southport Harbor Mud Flats sub-area and were placed to replicate samples collected there during the 1992 Engineering Report.

From the collected cores, greater than two thousand (>2,000) individual sediment samples were catalogued and submitted for laboratory analysis. The referenced drawings illustrate, at depth, the portions of the study areas which were determined, during the aforementioned effort, to exhibit total lead concentrations above the cleanup criteria and therefore require remediation. These drawings (and others) will be the basis on which contractors prepare their remedial action proposals and volume estimates.

Figure 4 presents a tabulation of the volume of sediment, at depth in each study area, which is lead impacted above the cleanup criteria and therefore requires remediation.

In addition to the drawings, the 2008/2009 SedQAPP Implementation Report provided a narrative description of the distribution of lead in the study area sediments. Portions of that narrative are provided below.

A review of the summary data indicates that, as anticipated, the highest average sediment lead concentrations are present in Area II (Mill Pond) where the highest average sediment lead concentration was found in the 12-18" interval. The next highest average sediment lead concentrations were found in the river reaches neighboring Area II, namely Area I &

FIGURE 4
VOLUME SUMMARY OF INSITU SEDIMENT IMPACTED ABOVE THE CLEANUP CRITERIA

REMEDIAL ACTION PLAN FOR LEAD IMPACTED RIVER SEDIMENT
MILL RIVER AREAS I -V
THE FORMER EXIDE BATTERY FACILITY PROJECT
2190 BOSTON POST ROAD, FAIRFIELD, CONNECTICUT

DEPTH	AREA I - 220 mg/kg volume (cu. yd)	AREA II - 220 mg/kg volume (cu. yd)	AREA III - 220 mg/kg volume (cu. yd)	AREA IV - 220 mg/kg volume (cu. yd)	AREA V - 400 mg/kg volume (cu. yd)	Volume Summary at Depth (cu.yd)
0-6"	1086	1717	2118	0	1643	6564
6 -12"	1127	1835	1929	109	1715	6715
12-18"	768	763	1345	252	1477	4605
18-24"	633	377	399	252	344	2003
24-30"	485	243	70	109	30	937
30-36"	342	43	48	183	0	615
	TOT. VOL (CU. YD)	TOT. VOL (CU. YD)	TOT. VOL (CU. YD)	TOT. VOL (CU. YD.)	TOT. VOL (CU. YD)	
	4441	4978	5908	904	5210	21440

III where average lead concentrations were generally found to be an order of magnitude lower than in Area II. The highest average sediment lead concentration in these two reaches was found to exist in the 24-30" interval in Area I and in the 6-12" interval in Area III. The 12-24" interval exhibited the highest sediment lead concentration in Area IV. In Area V, the 0-6" interval exhibited the highest average sediment lead concentration.

Deeper sediments (from 30-36" below the river bottom) exhibited the lowest lead concentrations in all river reaches. Beyond this, average sediment lead concentrations in given sediment core intervals vary somewhat between river reaches. Areas II & III exhibited some similarities in average sediment lead concentration. In both Areas, the highest averages were in the 0-6", 6-12" & 12-18' intervals (in differing order however) and the lowest averages were 18-24", 24-30" & 30-36" (in that exact order in both Areas).

In Area I, the shallowest (0-6") and deepest (30-36") sediments on average were the least lead impacted while the intermediate intervals were the most impacted (24-30" exhibited the highest average lead concentration). As noted earlier, Area IV sample cores were divided into four rather than six segments. The 12-24" segment exhibited the highest sediment lead concentration and the 24-36" exhibited the lowest lead concentration. In Area V average lead concentrations decreased with depth throughout the six intervals without exception, therefore the 30-36" interval exhibited the lowest average lead concentration.

Drawings 5 & 6 depict the areal surface areas and associated depth (thickness of dredge cut) of lead impacted sediment to be removed during implementation of the remedial action plan. Drawings 7, 8 & 9 present dredge prisms which will be used by Contractors in their dredging programs. Drawing 10 represents typical cross sections generated using the dredge prisms. The Contract Documents will include similar drawings for the entire length of the river where impacted sediment is to be removed.

3.3 Physical Characteristics of Study Area Sediments

The physical characteristics of the sediment selected to undergo remediation is of concern primarily due the impact these characteristics are likely to have on the design of the appropriate remediation, and, if necessary, dewatering methodologies. Turbidity controls are also dependent on the type of material being handled.

During the 2008/2009 SedQAPP implementation, physical characteristics testing was performed on the entire sediment profile (four vertical components in Area IV, six vertical components in all other study Areas) at every tenth grid point. Physical characteristics samples were submitted for the following analyses: pH, specific gravity and grain size distribution. Tables 1-1 through 1-5 provide the physical characteristics results of analyses performed on the forty-four physical characteristics sample locations representing each of the major sampling areas encompassed by the sampling program (physical characteristics locations were distributed as follows: Area I – 3 locations, Area II – 5 locations, Area III – 7 locations, Area IV – 5 locations and Area V – 24 locations).

The sample data indicates that river sediments generally exhibit a specific gravity near 2.5 (meaning that the sediment is 2.5 times denser than water). The pH was noted to vary from the high 6 to low 8 s.u. (standard units) range meaning that the river sediments are generally neutral (not particularly acidic nor basic). Review of the sieve data would, in general, indicate that on a by-weight basis, approximately eighty percent of the sample material from any single sample segment would be characterized as fine sand or finer.

Percent solids data gathered from the collected grab samples would indicate that the percent solids of in situ sediments in the study areas, while varying with depth and location, averages approximately 45 – 50%.

3.4 Hazardous Waste Characteristics of Study Area Sediments

During the 2008/2009 SedQAPP implementation, nine composite samples (each composite broken into the six (or four for Area IV) depth intervals), representing each of the five study areas (five composite samples for Area V and one composite for each of the other four reach) encompassed by the sampling program were collected and submitted for RCRA Hazardous Waste Characteristics analysis. The analytical results indicated that composites samples for all reaches of the study area did not exhibit hazardous characteristics of ignitability, corrosivity or cyanide reactivity. Petroleum hydrocarbons (via CTETPH test) were not detected in any of the samples.

Results of analysis performed on composite material obtained from Area II indicate that the sample (12-18") was sulfide-reactive at levels above the historically used general numerical guideline of 250 mg/kg which indicates that the sediment may be hazardous and require pre-treatment and/or special handling/disposal. It should be noted that the EPA has discontinued use of reactivity as a method and the determination that the above listed sediments might be sulfide reactive may not alone qualify them as hazardous waste.

Results of chemical analysis performed for determination of total PCBs indicate that PCBs were detected in sediment composites from 0-18" in the Mill Pond Area (Area II). Several of the thirteen (13) priority pollutant metals were detected in the composite samples, namely lead, chromium, copper, nickel, zinc and aluminum. TCLP analysis for the RCRA 8 metals resulted in detection of cadmium, barium and lead only. While TCLP cadmium and barium were detected below levels stated by 40 CFR 261.24 as characteristically toxic (and therefore hazardous), lead was detected above this level in the 0-6", 6-12" & 12-18" composite samples collected from Area II (the regulatory criteria is 5.0 mg/L, lead was detected in the Area II composites as concentrations of 8.2, 9.0 & 12.0 mg/L respectively). Mercury was not detected in any of the composite samples via total nor TCLP analysis.

While the results presented above indicate that a large portion of remediated sediments may be handled and disposed of as non-hazardous waste, it is likely that sediment remediation in the Mill River study area may involve removal of some materials which may require disposal at a hazardous waste facility. This determination is based on the reactive sulfide results (the EPA no longer considers this a method for hazardous waste determination but disposal facilities may impose their own acceptance guidelines for sulfide reactive materials) for sediments collected in Area II in collaboration with a review of TCLP lead concentrations detected in Area II which do meet the EPA definition of hazardous waste. Characterization of dredged, de-watered materials awaiting disposal will be the final factor in identifying appropriately permitted landfills (disposal facilities). Appropriate measures (such as stabilization) will be employed, as necessary, pending this analysis.

3.5 Limited Overbank Surficial Soil Investigation

As noted in Section 1.1 of the SedQAPP, an evaluation of the need to study the potential for deposition of lead impacted sediments in normally "out-of-water" areas was performed. This evaluation included visual inspection of low lying shore areas, particularly following a significant flooding event which occurred during the course of the sediment mapping project (heavy rain/snow melt event from December 11 thru December 12, 2008). No readily visible sediment deposition in "out-of-water" areas was noted following this flooding event or at any other time during the more than three month duration of the sediment core sampling effort.

In a letter dated January 14, 2009, the Town of Fairfield Conservation Commission provided EGI with data sources which provide, among other things, historic high tides for Southport Harbor as measured by the Fairfield Engineering Department. Using this data, it was determined that the maximum likely water level elevation for the Mill River (in the project study area) during a flooding event, coincident with an above normal high tide, would be 5.0 feet above MSL. A line demarcating this elevation has been added to Drawings 3 through 16 attached.

A limited out-of-water study was undertaken in October 2009 to evaluate a portion of the soils located between the normal waters edge and this line to determine if further study of these soils is warranted. Samples were collected at twenty-two (22) locations from Study Areas I, II, III & V. Study Area IV (Southport Harbor) was excluded from this evaluation because it is confined by seawalls and very little lead impacted sediments have been mapped there. Samples were collected in locations determined to meet the project goal of mapping the most likely areas where lead impacted sediment deposition might occur, specifically samples were collected at locations where low-lying shoreline areas abutted in-water locations where elevated sediment lead concentrations had been mapped.

In a report (dated May 2010) submitted to CTDEEP, CCA presented the findings of this investigation. In general, the report concluded that the relatively low levels of lead detected in the samples were in the range of background for Fairfield, possibility attributable to historical usage of leaded gasoline along Boston Post Road and Interstate 95 (both of which transect the study areas) and further study was not recommended. This determination is supported by years worth of field observations made during various field efforts during which CCA staff has been in the river during and after storm events and witnessed no significant sediment deposition in low lying areas or elsewhere.

3.6 Federal Wetlands Delineation

Anticipating the Army Corps of Engineers (ACOE) requirement to do so, EGI contracted a soil science firm to identify and flag both State and Federal wetlands in the Mill River Study Area corridor. Environmental Planning Services (EPS) of West Hartford, CT performed the mapping in March 2009 and the flags were immediately field located by CCA surveyors. Both wetland delineation reports (EPS) are presented in Appendix V. The CCA survey of the wetlands flagging is presented in Drawings 11 & 12.

3.7 Natural Diversity Database (NDDB) Research

Per Title 26, Chapter 495, Secs. 26-303 to 26-316 of the Connecticut General Statutes (CGS), the "*General Assembly declares it is a policy of the state to conserve, protect, restore and enhance any endangered or threatened species and essential habitat.*" Natural Diversity Database (NDDB) maps have been developed by the CTDEEP which delineate approximate locations of Endangered, Threatened and Special Concern Species. The CT DEP defines these as:

"**Endangered Species**" means any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an "endangered species" pursuant to the federal Endangered Species Act.

"**Threatened Species**" means any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the state and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the federal Endangered Species Act, except for such species determined to be endangered by the Commissioner in accordance with section 4 of this act.

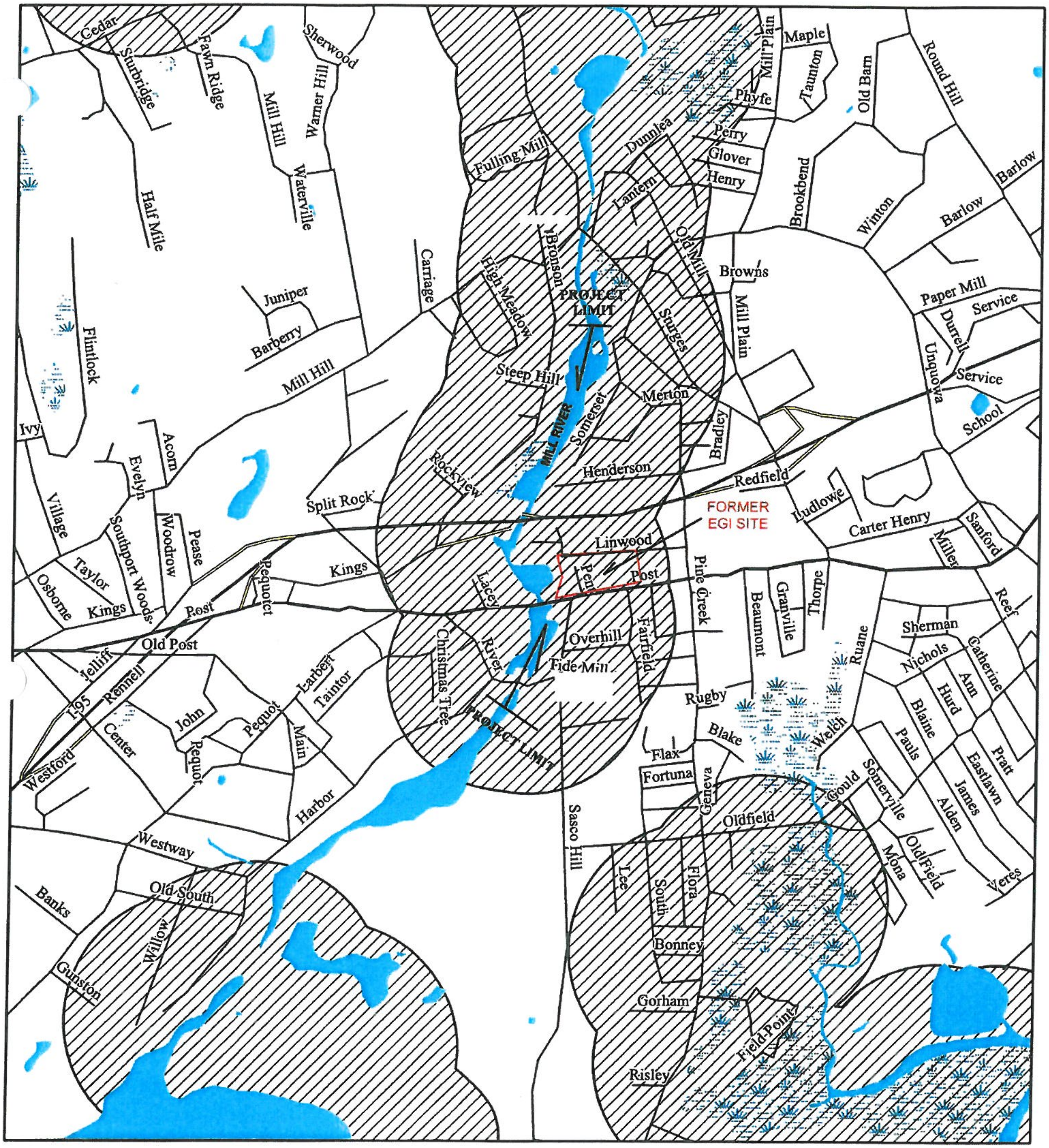
"**Species of Special Concern**" means any native plant species or any native non-harvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that its unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

Permit applications associated with this project require a review of the CTDEEP NDDB maps for the project area. If any part of the project is within a shaded area, overlaps a water body that has any shading, or is less than ½ mile upstream or downstream from a shaded area, there is a potential impact on endangered or threatened species or significant natural communities. Upon review of the NDDB maps (see Figure 5 for an illustration of the NDDB mapping in the study area), it was determined that shaded areas are depicted over the Mill River study area. Accordingly, a Connecticut Natural Diversity Data Base Review Request Form was submitted to the CTDEEP for a more detailed review of the project impact on Endangered, Threatened and Special Concern Species. On September 22, 2009 CCA received a response from Nancy M. Murray, NDDB Program Coordinator, which stated that "According to our information, there are no known extant populations of Federal or State Endangered, Threatened, or Special Concern Species that occur at the site in question."

An additional NDDB Review Request Form was submitted in August 2011 and in a letter dated August 18, 2011 CTDEEP staff stated "I have determined that the proposed activities will not impact any extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur in the vicinity of this property.

Appendix III includes the Connecticut Natural Diversity Data Base Review Request Forms and the corresponding CT DEP response letters.

It should be noted that NDDB information maintained at the CTDEEP is continuously updated, and future changes to the database may impact site activities. A follow-up review of the GIS maps will be performed during permit application preparation and prior to project start-up to confirm that no changes to the database within the study area have occurred.



0 0.125 0.25 0.5 0.75 1 Miles

N

FIGURE 5
NATURAL DIVERSITY DATABASE AREAS
IN PROJECT VICINITY
REMEDIAL ACTION PLAN
FOR LEAD IMPACTED RIVER SEDIMENTS
MILL RIVER AREAS I-V
THE FORMER EXIDE BATTERY FACILITY PROJECT
FAIRFIELD, CONNECTICUT

Legend

Natural Diversity Area

ENVIRONMENTAL CIVIL ENGINEERING SURVEYING CCA LLC

4.0 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

4.1 Introduction

Since the State of Connecticut Remediation Standard Regulations (RSRs) do not provide numerical criteria for the remediation of contaminated sediments, Human Health and Ecological Risk Assessments (HHERAs) are necessary to develop project-specific remediation goals. A HHERA is a structured scientific evaluation of the potential for harm to occur to humans and ecological receptors as a result of exposure to some stressor, often a chemical contaminant (in this case, lead). The results of the evaluation are used to develop recommended Preliminary Remediation Goals (PRGs), which will be basis for selection of project specific cleanup criteria (in terms of concentrations of a contaminant) that a Remedial Action Plan (RAP) is designed to be protective of both human health and ecological receptors.

4.2 Human Health Risk Assessment

Humans may be exposed to lead in the Mill River in one of two basic ways; incidental ingestion of impacted sediment, or indirect exposure from consuming contaminated shellfish and fish. To assess the human (and ecological) risks involved in a remediation project, a Mill River Human Health and Ecological Risk Assessment (MRHHERA) was undertaken by Menzie-Cura Associates (MCA, now E^{x}ponent), which was completed in March 2001. The MRHHERA is voluminous and therefore not appended to this report, however the full document is available in the public files at the CTDEEP offices in Hartford. A brief summary of the MRHHERA development and conclusions follows.

Historical uses of the Mill River Study Area have included recreational fishing, clamming and crabbing (blue crab) as well as general recreational use (swimming, kayaking, e.g.). Since aquatic organisms higher in the food chain (e.g. white perch, blue crabs) tend to bioaccumulate indigestible pollutants, particularly metals such as lead, consideration must be given to the fact that though average sediment concentrations where an organism lives are below the level safe for human consumption, levels in fish, crabs, or clams theoretically could be higher (though this was not found to be the case in the MRHHERA). Even so, development of a cleanup criteria protective of the most at-risk humans (young children and pregnant wives of subsistence fishermen) needs to be put in place to prevent over-exposure to lead by this vulnerable section of the population (young children are also most likely to incidentally ingest lead-contaminated sediments).

Five sediment lead cleanup criteria were calculated for each of the sensitive exposure groups (young children and pregnant women); one assuming exposure to lead only by incidental ingestion of sediment (recreational user); two assuming exposure only by consumption of blue crabs (recreational user and subsistence fisherman) and two assuming exposure by incidental ingestion of sediment and consumption of blue crabs (recreational user and subsistence fisherman). Subsequently the lowest human health cleanup criteria calculated in the MRHHERA (400 mg lead/kg sediment) was the cleanup criteria for the young child (or pregnant wife) of a subsistence fisherman, which in turn was the cleanup criteria used for overall human health risk.

4.3 Ecological Risk Assessment

The MRHHERA also analyzed the risk to several receptors, including foraging water birds (e.g. the mute swan), piscivorous (fish-eating) birds (e.g. the great blue heron, osprey), foraging mammals (e.g. the muskrat), piscivorous mammals (e.g. the raccoon), forage fish (e.g. killifish), semi-piscivorous fish (e.g. the white perch), recreationally important macroinvertebrates (e.g. oysters, blue crabs) and the benthic invertebrate community from target analytes (RCRA 8 metals). While the results of the study concluded that a cleanup criteria of 580 mg/kg lead in sediment was protective of benthic organisms (the lowest calculated cleanup criteria for thee ecological receptors studied, the proposed overall cleanup criteria of 400 mg/kg for lead in sediment was deemed to be protective of all the receptors mentioned (including humans).

There was some uncertainty from CTDEEP about the interpretation of sediment toxicity tests and benthic community structure data. A letter from CTDEEP dated November 12, 2003 presented an alternative cleanup criteria for lead in sediments of less than or equal to 220 mg/kg. A Supplemental Sediment Investigation (SSI) was subsequently conducted by MCA in 2004, which indicated that the taxa (i.e. various species) in Mill River sediment samples with lead concentrations of 530 mg/kg or greater was significantly reduced in comparison to reference sites; therefore a cleanup criteria of 530 mg lead/kg sediment was set for the benthic community. However, CTDEEP again took issue with the study, citing poor performance of a laboratory control sample. CTDEEP in a memorandum dated December 26, 2007 proposed an alternate criterion of $\leq$220 mg/kg for the mean lead concentration in the top 2 ft. of sediment. In subsequent discussions CTDEEP also agreed that additional data needed to be collected in order to address uncertainties in potential impacts to the benthic community; therefore another round of study (Sediment Toxicity Study: Mill River, Fairfield, Connecticut – see Appendix II) was conducted in 2009 by E^{x}ponent. This study, as well as the original MRHHERA and SSI, indicated that the previously established cleanup criteria for human health (400 mg/kg lead in sediment) was unlikely to result in adverse effects to the Mill River Benthic community.

The selection of project specific cleanup criteria is further discussed in Section 4.5.

4.4 Overall Benefits Analysis

Since socio-economic issues are usually less easily quantifiable or even unquantifiable, and are expressed in different units (i.e. dollars) than environmental issues (i.e. mg/kg), an overall analysis is necessary to assess all the competing factors at a given project. An overall benefits analysis, applied to river sediment remediation and development of cleaned criteria, is used to compare losses and benefits to the ecosystem, which in turn drives the process of considering advantages and disadvantages of different remedial options. The ultimate goal is the selection of methodologies which, when implemented, will result in the lowest overall negative environmental and socio-economic impacts, while accomplishing remedial and socio-economic goals. The over-arching goal of an overall benefits analysis, however, is maximal benefit to the environment.

In performing this analysis, consideration must first be given to the fact that as the cleanup criteria is lowered, more sediment area will be remediated (assuming a proactive approach is taken). In such a case an increase in the disruption to vegetation (flora) and bottom dwelling organisms (fauna) will result as well as a higher potential for re-suspension of sediment. This risk must then be balanced against the current bioavailability of lead to river plants and organisms (including humans), or the bioavailability which will result if the cleanup criteria is lowered.

4.4.1 Socio-Economic Issues

A significant socio-economic issue to consider in assessing overall benefits is the anticipated impact to recreational fishing and shellfish harvesting during and after remedial activities. The analysis concludes that risk to humans through consumption of fish/shellfish or ingestion of lead-contaminated sediment is substantially elevated in Area II, and elevated in Area I, with no substantial risks in Areas III, IV & V. The present risks must be weighed against the disturbance of these activities both during and after remediation. During remedial activities fishing/shellfish harvesting will not be physically possible in the immediate area of work and the destruction of substrates (i.e. submerged aquatic vegetation (SAV) and the benthic community) on which fish and shellfish are dependent may temporarily decrease fish and shellfish populations. According to E^{x}ponent, recovery of SAV and the benthic community from dredging activities is expected to take 1-3 years. These factors must be weighed against the overall remedial goal, which is complete removal of human risk from consuming lead-contaminated fish or shellfish.

Another socio-economic issue related to risk assessment is access to the river for water activities such as swimming. The risk of incidental ingestion of lead-contaminated sediments from these activities under current conditions is deemed to be substantially elevated in Area II, and elevated in Areas I & III, with no substantial risk in Areas IV & V. Since these activities are currently prohibited in Mill River Study Areas I, II, III, and V, only a net benefit would be gained by dredging the river. Real estate value would be expected to generally increase with dropped restrictions on these activities, and aesthetic qualities would be added, particularly since the river is easily visible to commuters via the railway and major through roads (US-1 and I-95).

4.4.2 Short Term/Long Term Impact

A proactive sediment remediation alternative (e.g. dredging) is expected to increase short-term risk factors due to physical disturbance of organisms and potential sediment resuspension thus possibly increasing (in the short term) bioavailability to river flora and fauna. More stringent cleanup criteria would therefore necessarily mean more dredging, using the proactive approach, thereby increasing short-term risk. However, long term impacts are expected to outweigh short term considerations if a less stringent cleanup criteria is selected (for example one which would not be protective to humans most at risk (young children and pregnant women)). As discussed further in Section 5, since sediment lead concentrations are not expected to naturally attenuate in a reasonable time frame, proactive dredging has been chosen. As mentioned, the over-arching goal is to maximize benefits to the environment.

4.5 Development of River Sediment Clean-up Criteria

As discussed in Section 4, the MRHHERA performed by MCA established that a sediment lead concentration of less than 400 mg/kg is protective of human health as well as ecological receptors. To further evaluate the appropriateness of this conclusion, an analysis was performed. The results of the analysis indicated that a cleanup criteria of 220 mg/kg be followed for Areas I-IV, largely because the area of sediment dredged would be very similar to that if a 400 mg/kg standard were followed. A cleanup level of 400 mg/kg was recommended for Area V since the additional destruction of more than twice the amount of benthic community and submerged aquatic vegetation required under a 220 mg/kg standard outweighed the benefits of a more stringent criteria. The difference in target criteria for Area V is further justified by the value and sensitivity of the ecological habitat in Area V, the accessibility concerns and challenges, and desire to minimize disruption to the public and neighbors that border Area V. Based on evaluation of the data presented and due consideration of site specific issues EGI and CTDEEP agreed the above cleanup criteria would be protective of all human and ecological receptors. The above cleanup criteria and a proactive remediation methodology (i.e. dredging) targeted to remove sediments in areas where sampling data indicates a total lead concentration in excess of the cleanup criteria are deemed to be the most protective of human health and ecological receptors, and the most beneficial to the Mill River Study Area environment.

5.0 REMEDIATION METHODOLOGY

5.1 Introduction

As mentioned in Section 4.4 an overall benefits analysis takes into account all the competing ecological and socio-economic factors in a given project, and drives the selection of a remedial option. The ultimate over-arching goal is to select the solution, which maximizes the overall benefit to the environment. During development of this SedRAP, a comprehensive review of federal and state guidance documents, case studies, project summaries etc. both in-house and on-line was undertaken so that options/alternatives for remediation of lead impacted sediments in the Mill River could be identified, developed "in-concept", and evaluated for applicability for implementation on this project. Each remedial option identified for evaluation was considered on merit and a final list of promising prospective options (presented below), consisting of methodologies considered potentially suitable for this project was created. Alternatives considered, along with a discussion of associated pros and cons in both the short and long term, are presented below. A matrix summarizing the alternative remedial options and their respective benefits/disadvantages is presented as Figure 6.

5.2 No Further Action

This alternative is presented to serve as a baseline against which to evaluate other concepts. Under this alternative there would be no effort made to remove sediments containing lead above the cleanup criteria from the Mill River study area. The existing environment would remain unchanged and the potentially adverse impacts associated with elevated lead concentrations in the Mill River would be left unmitigated.

As noted, the no action alternative has been included for purposes of comparison only, and is not considered an appropriate course of action. This is in part based on an observations (by E^{x}ponent and CCA) that it is unlikely that the natural processes of groundwater migration through the contaminated sediments and the normal flow of river water will dissolve sufficient lead to significantly improve the quality of the river sediments in a reasonable period of time.

The potential risk to human health and the environment would remain unchanged from existing conditions. Lead levels in sediment tend to be relatively constant because lead does not degrade or volatilize, and lead usually does not migrate extensively through sediment. The amount of time for natural recovery can be estimated only if an extensive data collection program appropriate for a verifiable fate and transport model to be executed and such a model implemented. Fate and transport models are used by risk assessors to estimate the transport and chemical alteration of contaminants as they move through environmental media (e.g. sediment).

Figure 6
Remedial Options
Remedial Action Plan for Lead Impacted River Sediments, Mill River Areas I - V
The Former Exide Battery Facility Project, 2190 Boston Post Road, Fairfield, Connecticut

Method	Description	Short Term Risk	Long Term Risk	Advantages	Disadvantages	Time Until Compliance	Cost
Dredging & Offsite Disposal of Sediments	Contaminated sediment is removed from the river in slurry form via suction pipe, then dredged slurry is dewatered on the EGI site and transported offsite for disposal	High	Low	-Reduces risk quickly and permanently -Produces less uncertainty about long-term effectiveness -Long-term monitoring costs lower than MNR or capping -Provides flexibility regarding use of the water -Allows for treatment, reuse of sediment	-Destruction of present benthic community -Odor and noise, increased traffic -Potential for residual contamination -Potential for resuspension of sediments	Immediate	High
Excavation In-the-Dry (Cofferdams) & Upland Disposal of Sediments	Temporary water-tight enclosures are built in the water and pumped dry to expose the bottom so that excavation can be undertaken. Excavated sediments are then dewatered and transported for offsite disposal	High	Low	-Reduces risk quickly and permanently -Produces less uncertainty about long-term effectiveness -Long-term monitoring costs lower than MNR or capping -River bottom visible for inspection -Low residual contaminated sediment	-Destruction of benthic community -Odor and noise; increased traffic; requires more access to river by land -Potential for resuspension of sediments -Construction of dams may not be possible in soft sediment, bedrock, or high velocity current	Immediate	High
Capping-In-Place (in-situ capping)	Placement of clean cover material over the contaminated sediments to effectively isolate the contaminants	High	Moderate	-Generally shortest time to achieve protection -Relatively little odor or noise -Relatively little increase in traffic -Relatively easy to repair localized erosion -No disposal issues	-Lead is still in the river -May not be feasible in all sections of river -Possible erosion of cap -Not efficient if contaminated area is not contiguous -Difficult to implement sediment removal if cap is not effective -Long-term monitoring required	Immediate (monitoring is necessary to ensure compliance)	Moderate
Monitored Natural Recovery (MNR)	No remediation is done, but a monitoring program is put in place to monitor water, sediment, and wildlife	High	Unknown	-Low cost -Minimal disturbance -No odor or noise -No traffic/lighting increase -No construction required	-Long time required for remediation/biota recovery -Human health/ecological risks & contaminated sediments remain -Long-term monitoring required	Unknown	Low
No Further Action	No remediation *or* monitoring done	High	Unknown	-Low cost -Minimal disturbance -No odor or noise -No traffic/lighting increase -No construction required -No monitoring cost	-Long time required for remediation/biota recovery -Health risks /contaminated sediments remain	Unknown	None

The main costs associated with this alternative are the costs of maintaining warning signs to advise the public that fishing, wading, and swimming are not permitted. Risks depend upon public compliance with posted warnings. Due to human health risks and damage to river fauna already sustained this is not an alternative which has been otherwise given consideration by EGI. Notwithstanding, this is for obvious reasons the most cost-effective approach to remediation.

5.3 Monitored Natural Recovery

This approach would be the same as that outlined above but with a program of sediment, water, and wildlife monitoring which would be implemented indefinitely until remediation goals are achieved. As noted above, a realistic time frame cannot be determined without an extensive data collection program appropriate for a confirmable fate and transport model to be implemented. Due to the unlikelihood of timely remediation and the reasons mentioned above in Section 5.2, this also is not considered a viable option.

5.4 Capping-In-Place

Capping-in-place (or in situ capping) involves placement of clean cover material over the contaminated sediments to effectively isolate the contaminants. The cover material can be clean sediments, sand, gravel, soil, or clay. Additives such as bentonite or cement can be added, if necessary, to reduce the hydraulic permeability and/or increase the stability of the cap. The cover material can be deposited mechanically or hydraulically, and silt curtains are used during placement of the cap to minimize turbidity in the river.

The benefit of capping-in-place would be the effective isolation of lead-containing sediments from the environment, thereby eliminating the biological uptake of lead. This method produces the quickest risk-reduction. Other benefits include less noise and odor when compared to dredging or excavating, and no need for disposal of sediments. The process of installation of the cap also requires significantly less time than dredging or excavating.

The adverse effects include the destruction of the present benthic community and the high degree of resuspension of sediments in the water column during installation, which could mobilize lead impacted sediments. Implementation of this option would not result in the actual removal of any lead from Mill River.

The possibility of erosion of the cap over time is also a concern, particularly during major storms. The thickness of the cap itself (approximately 18 inches) would make certain portions of the river shallower, thus possibly changing river flow patterns and increasing water velocity above the cap, thereby increasing erosion. Thus, a program of periodic monitoring and maintenance of the cap would be necessary, particularly in areas of high water velocity or high water turbulence.

Another disadvantage is that if the cap is not effective and dredging or excavation is required, removal of the cap to expose sediments is very difficult.

Lastly, capping is more effective for a contiguous contaminated area, which is not the case for the present project.

5.5 Dredging

Dredging involves the mechanical or hydraulic removal of sediments from beneath bodies of water. Various forms of dredging using mechanical means have been used for centuries and have generally been used to improve draft (i.e. maintenance dredging) in harbors and bays. Such dredging was and is more focused on volume removal and less concerned which re-distribution of sediments during the process. In modern times, techniques and machines have been developed to deal with the removal of contaminated sediments from sensitive water bodies.

Dredging techniques that are currently available/commonly used in the environmental (sediment remediation/removal) industry were researched and evaluated in regard to their suitability for this project. In addition to the narrative discussion of alternative sediment removal technologies presented on the following pages, the findings of this research are summarized in the matrix presented as Figure 7.

5.5.1 Hydraulic Dredging

Hydraulic dredging is the process by which a centrifugal pump provides the suction for removal of lead-contaminated sediments through a dredge "head" mounted on a barge or scow. The "head" is connected to a pipe through which the sediment/water "slurry" is pumped to another barge or an upland location. The following is a narrative of different hydraulic dredging methods, which are summarized in Figure 7.

5.5.1.1 Hydraulic Cutterhead

This approach utilizes a hydraulic dredge consisting of a large suction pipe which is mounted on a barge and supported and manipulated about by a boom (also mounted on the barge). A mechanical agitator or cutter head mounted on the end of the pipe loosens the sediment allowing it to be picked up by the suction generated by the centrifugal pump mounted on the barge. The sediments are pumped to an on-shore sediment processing area.

With proper operation this technique (through operator balancing of cutterhead speed and intake flow rate/velocity e.g. pump flow rate) results in minimal resuspension/migration of sediments. Floating silt (turbidity) screens would be employed as a further control measure to minimize the potential migration of sediments to adjacent sections of the river during dredging activities. The cutterhead also reduces the risk of clogging the suction pipe.

Figure 7
Dredging Options
Remedial Action Plan for Lead Impacted River Sediments, Mill River Areas I - V
The Former Exide Battery Facility Project, 2190 Boston Post Road, Fairfield, Connecticut

Method	Description	Resuspension Risk[1]	Maneuver-ability[2]	Minimize Residual[3]	Hardpan/ Rock Bottom[4]	Debris Handling[5]	Flexibiltiy[6]	Additional Advantages	Additional Disadvantages
Hydraulic Cutterhead	Consists of a large suction pipe which is mounted on a hull and supported and moved about by a boom, a mechanical agitator or cutter head which churns up earth in front of the pipe, and centrifugal pumps mounted on a dredge which sucks up water and loose solids.	Medium	Medium/Low	Medium	Medium/Low	Medium/Low	High	-Cutterhead grinds debris to minimize clogging -Ability to remove thin layers without over-dredging.	-"Ladder" supporting suction pipe creates extra turbidity
Hydraulic Horizontal Auger	Same as above, but sediments are loosened by a rotating auger, which moves the loosened sediments to the intake of the suction pipe	Medium	Low	Medium	Low	Medium/Low	Medium	-Auger grinds debris to minimize clogging -Ability to remove thin layers without over-dredging. -Can dredge wide, level swaths	-"Ladder" supporting suction pipe creates extra turbidity
Hydraulic Suction	Same as above, without the cutterhead or auger	Low	Medium/Low	Medium/High	Medium/High	Low	Low	-Ability to remove thin layers without over-dredging.	-Susceptible to clogging -"Ladder" supporting suction pipe creates extra turbidity
Diver-Assisted Hydraulic Suction	Same as hydraulic suction, but with trained diver operating intake	Low/Very Low	High	High	High	Low	Low	-Ability to remove thin layers without over-dredging -Firsthand observation of dredging by diver	-Susceptible to clogging -Diver takes place of "ladder", less turbidity
Tornado Motion Technology	Uses the patented Eddy Pump to create a downward "tornado" which forces sediments up the sides of a volute and into a pipe.	Very Low	High	High	High	High	Med/HIgh.	-Ability to remove thin layers without over-dredging	-"Ladder" supporting suction pipe creates extra turbidity
(Environmental) Mechanical Dredging	Barge mounted crane using a sealed bucket. A hydraulic excavator can also be used.	Low	High	Medium	Low	High	High	-No susceptibility to clogging	-Sediment must be "slurried" for piping -Cannot remover thin layers without over-dredging

Table based on table found in USEPA document "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites"
[1] =degree of risk of sediment resuspension
[2] = ability of dredge type to operate effectively around obstructions
[3] = ability of a dredge type to removing material without leaving a residual
[4] = ability of a dredge type to remove a sediment layer overlying hardpan or rock bottom without leaving excessive residual sediment
[5] = ability of a dredge type to handle rocks/vegetation/debris without clogging
[6] = flexibility of a given dredge type in adapting to different sediment conditions, and the ability to take variable cut thicknesses.

5.5.1.2 Hydraulic Horizontal Auger

Horizontal auger dredges are generally smaller than cutterhead dredges and consist of a dredge pump mounted on a barge or directly on the suction pipe and a small crane or hydraulic system to raise and lower the suction pipe and auger-type cutterhead. The sediments are loosened by the rotating auger, which moves the loosened sediments to the intake of the suction pipe. Sediments are pumped to shore for processing.

An advantage to the horizontal auger, as compared to other dredging methods are that it is capable of making the widest cut (6-8ft), up to 18 inches deep. A disadvantage is that it is designed for a set maximum cut thickness; therefore attempts to remove thick cuts may result in "plowing" actions with excessive resuspension and residuals A silt screen would be used to contain any resuspended sediments.

5.5.1.3 Hydraulic Suction

This approach involves the removal of sediments by suctioning though a submerged pipe (essentially removing the cutterhead). A special pump and intake fitting can be added, if necessary, for maximum effectiveness. The resulting sediment slurry would then be pumped to an on-shore processing area. Hydraulic suction cleaning can also be performed using on-shore vacuum trucks or heavy-duty slurry pumps in conjunction with special hoses or long-reaching boom-type suction lines extending into the river.

Suction dredging results in the least resuspension of sediments of the dredging techniques. However, the applicability at this site is expected to be limited, since in most cases a cutterhead is needed to break materials that could plug the dredge slurry transfer line into smaller pieces. As with the cutterhead auger methods, a silt screen would be used to contain any resuspended sediments.

An option for the hydraulic suction method is diver-assisted hydraulic suction, which is essentially the same process described above with trained diver operating a hand-held suction line underwater. Flow and slurry density information are communicated to the diver via two-way radio, and modifications to the dredging procedure are made accordingly. Large cobbles and debris are manually moved by the diver to allow the intake access to all sediments.

This approach is suited to smaller projects where the bottom to be dredged is easily discernable. Thus an advantage is that removal of sediments is visually observed. Another advantage is that resuspension of sediments is even lower than hydraulic suction alone.

5.5.1.4 Tornado Motion Technology

Tornado Motion Technology® (TMT) is a recently developed proprietary dredging technique which uses a patented eddy pump at the head of the suction pipe which creates the hydraulic pumping force. Essentially the eddy pump contains a shaft-driven rotor which forces a downward water "tornado" into the sediment, which in turn forces sediment up. The swirling column of fluid creates a peripheral "eddy" effect, which causes the agitated material to travel by reverse flow, up along the sides of an intake chamber, into a volute. Here the material, under pressure from below, is forced into the discharge pipe.

The eddy pump design apparently allows for the pumping of highly viscous materials, and sediment slurries in higher concentrations than conventional pumps. A higher than average percent solids by weight is also apparently achieved because the pump is constantly supplied with material.

According to the manufacturer, the combination of the eddy pump and TMT equipment results in very low to non-existent levels of turbidity, so that silt screens are not necessary.

One disadvantage of this technique is that there are a limited number of dredging contractors that have made the capital investment in this technology.

5.5.2 Mechanical Dredging

Mechanical dredging is generally accomplished with a barge-mounted crane using a "clamshell" bucket or dragline bucket. A hydraulic excavator can also be used. For environmental dredging, a special sealed clamshell or excavator bucket are used to prevent excess spillage of sediment when the bucket is swung over the water to be emptied. The dredged material is then placed in a barge for transport to the processing area. On inland lakes and rivers, the barge is generally moved to the shore and the "mud" is unloaded with a crane using a clam bucket; however the dredged material can also be "slurried" on a separate barge and pumped to an upland location. Accuracy of cut and spillage/leakage from clamshell buckets that don't fully seal when closed are problems that plague mechanical dredging operations.

5.5.3 Summary Comparison of Hydraulic and Mechanical Dredging.

Advantages to the hydraulic dredging method when compared to mechanical dredging include the ability to remove thin layers without over-dredging; as well as the ability to remove a sediment layer overlying hardpan or rock bottom efficiently without leaving residual sediment. Though advances have been made in mechanical dredging (i.e. environmental sealed buckets), case studies show that hydraulic dredging is still superior when attempting to dredge fine, loose sediments. Hayes and Wu (2001) reported percentage solids loss as low as 0.013% using a hydraulic dredge. Data from the most comprehensive studies show resuspension rates for cutterhead dredges are generally less than 0.5 percent and less than 1 percent for bucket (mechanical) dredges (Hayes and Wu 2001).

Disadvantages to hydraulic dredging methods when compared to mechanical dredging include lower maneuverability around "tight spots" (with the exception of diver-assisted hydraulic suction), and the susceptibility of hydraulic dredging to clogging due to rocks and debris.[1]

Low clearance under study area bridges will be an impediment to both mechanical and hydraulic dredging equipment on this project, however hydraulic dredging equipment is generally more compact and would be easier to maneuver using cranes, if necessary.

The above comparisons are summarized in Figure 7.

5.6 Excavation (in-the-dry)

Excavation in-the-dry would require the construction of cofferdam cells, which are temporary water-tight enclosures built in the water and pumped dry to expose the bottom so that excavation can be undertaken. Sediments would be removed using conventional construction (excavation) equipment, and then slurried with river water, and pumped to the upland processing area.

The advantages and disadvantages of such an approach are almost identical to those listed for dredging, with the added advantage that the remediated areas would be easier to inspect, since the bottom of the dewatered enclosure would be visible. This could possibly result in lower residual contamination than dredging.

However, there are major disadvantages to this approach:

- It is a land-based approach, and providing access to each work area for construction equipment and workers presents a problem because the properties immediately adjacent to the river are largely residential in nature

- The ability to create stable cofferdam structures is questionable, due to the soft sediment and underlying bedrock in some areas

- The driving and subsequent removal of sheet piling used to construct the cofferdams is likely to disturb river sediments appreciably

- Once installed, the cofferdams would divert river flow around the structures resulting in localized increases in current velocity and, potentially, scouring and re-distribution of fine sediments (lead impacted or otherwise)

[1] TMT claims their unit does not clog.

5.7 Selected Remediation Method

To summarize the advantages of the dredging approach when compared to other remedial approaches, dredging:

- Removes lead from the river
- Results in the least uncertainty about long-term effectiveness
- Provides flexibility regarding future use of the river
- Reduces risk quickly via the immediate removal off bio-available lead from the river environment

Summarized disadvantages of dredging when compared to other remedial approaches:

- More complex and costly
- Potential for resuspension of contaminants during removal if careful adherences to engineered controls and best management procedures aren't followed
- Disruption of aquatic habitats
- Disruption of the residential community (i.e. odor, noise, traffic)

Based on an exhaustive review of all available remedial options, including consultation with remediation contractors experienced in similar projects, the remedial method deemed most appropriate for this project is hydraulic cutterhead dredging. This method has been selected as the remedial option over other alternatives, largely because of the fact that lead will be removed from the river quickly and permanently. When compared to other options that could accomplish this (cofferdams and mechanical dredging), hydraulic dredging produces less risk of turbidity, less habitat destruction, and easier, less destructive river access arrangements.

It is likely that diver-assisted hydraulic suction would be used in conjunction with cutterhead dredging given the shallow water in some work areas and the fact that divers could remove small boulders, tree limbs and other objects that are likely to clog the intake of the suction line. Prospective contractors will be given the option of hydraulic suction with or without diver assistance and they may wish to alternate between the two methods depending on the characteristics of a particular work area.

6.0 SEDIMENT PROCESSING OPTIONS

6.1 Dewatering

As, mentioned in the discussions of various dredging methods, the dredged sediments (slurry) are to be pumped to an onshore processing facility via a self-contained (dual wall) floating slurry pipeline. The slurry be is screened on-shore to remove stones and debris, and then dewatered using one of the alternative dewatering technologies discussed below and summarized in Figure 8. The goal of the slurry dewatering is to produce a "dry" material that can be transported by truck to an upland, offsite disposal facility with appropriate operating permits. The dewatering alternatives described below will be evaluated for technical feasibility and cost effectiveness for specifically this project.

6.1.1 Plate and Frame Presses

Plate and frame filter presses are dewatering machines which utilize pressure (60-80 psi, typically) to remove the liquid from a liquid-solid slurry. They are particularly suited for low solids (<2% solids), or solids composed of fines (-200 mesh), however they will essentially dewater many combinations of particle size distribution and percent solid slurries. The chemically preconditioned slurry enters the press at the bottom of the plate, using a pump suitable for pumping up to 80-90 psi. The feed then travels the path of least resistance (up between the filter plates), which has filter media inserted between the plates, and the void between the plates is filled with slurry, "clear" liquid passes through the filter media, and travels up to the outlet port at the top of the plate. This liquid is referred to as the "filtrate", and is discharged from the press. The "dewatered" solids are retained in the void between the plates, until the plates are separated discharging the filtered solids, or "cake".

Typical design capacities for a plate and frame filter will depend upon the solids being dewatered, however, they will typically range around 1 gallon per minute of slurry per square foot of surface area on the plates. Laboratory studies have yielded an average sediment cake percent solid content of 50-60%. Solids dumped from a filter press typically fall into a hopper or directly onto a conveyor belt for further transportation to the next stage of the operation.

6.1.2 Belt Filter Presses

A belt filter press is a dewatering device that applies mechanical pressure to chemically conditioned slurry which is sandwiched between two tensioned belts, by passing those belts through a serpentine of decreasing diameter rolls. The machine can be divided into three zones: the gravity zone, where free draining water is drained by gravity through a porous belt; the wedge

Figure 8
Dewatering Options
Remedial Action Plan for Lead Impacted River Sediments, Mill River Areas I - V
The Former Exide Battery Facility Project, 2190 Boston Post Road, Fairfield, Connecticut

Method	Description	% Solids Achieved	Solids Loading Rate	Cycle Time	Transport Weight	Advantages	Disadvantages
Plate and Frame Press	Slurry essentially passes between two plates, and the liquid (filtrate) passes through a filter medium and discharged from the press. The solids remain in the void between the plates, until the plates discharge the filtered solids, or "cake".	50-60%	Med[1]	Med[4]	Low	-Highest percent solids yield -Well suited for high percent solid slurries -Well suited for solids with high fines percentage -Basins/water return system not needed	-Certain amount of skill/manpower required -High equipment/replacement filter cost -Can be noisy
Belt Filter Press	Applies mechanical pressure to chemically conditioned slurry, which is sandwiched between two tensioned belts by passing those belts through a serpentine of decreasing diameter rolls.	35-50%	Med/High[2]	Med/Low	Med./Low	-Continuous production -Low maintenance -Throughput easily estimated -Basins/water return system not needed	-Certain amount of skill/manpower required -Generally high moisture content -Best suited to process waste sludge -Can be odorous
Centrifuge	Uses the force from rapid rotation of a cylindrical bowl to separate solids from liquids.	±25%	Med/High	Low	Med/High	-Continuous production -Bulking agent not needed -High speed - Basins/water return system not needed	-Certain amount of skill/manpower required -High initial cost of centrifuge -Lower percent solids -Requires most electricity -Best suited for low solids (2%) slurry
Geotubes®	Excess water drains through the fine pores of the Geotube®, which is a high tensile strength polypropylene bag into which the slurry is deposited.	45-50%	High[3]	High[5]	Med	-Low skill/manpower required (Basic, low-tech operation) - Bulking agent not needed -High flow rate	-Takes us large area - Can be odorous -Long cycle time -Requires engineered water return system

[1]= approximately 4 dry tons. per 15 hour day per sq. ft of press
[2] = approximately 8 dry tons. per 15 hour day per meter belt
[3] = approximately 750 dry tons. per 15 hour day
[4] = 1.25-1.5 hrs (excluding cake discharge)
[5] = approximately 10 days

Figure 8a
Filter Cake Processing Options
Remedial Action Plan for Lead Impacted River Sediments, Mill River Areas I - V
The Former Exide Battery Facility Project, 2190 Boston Post Road, Fairfield, Connecticut

Method	Description	% Solids Achieved	Speed	Transport Weight	Advantages	Disadvantages
Dewatering and Drying	Incorporates one of the above sediment dewatering systems, and in addition provides a (thermal) drying facility for dewatered sediments	Approx. 90%	Med. (Dependent on dewatering method used)	Low	-Highest percent solids yield	-Certain amount of skill/manpower required
Hydraulic Classification and Dewatering	Combined with one of the above dewatering techniques, hydraulic classification techniques are intended to produce a clean sand fraction of greater than 150 mesh and a fines fraction (minus 150 mesh) with a relatively high concentration of lead.	(Dependent on dewatering method used)	Med/High (Dependent on dewatering method used)	Low	-Reduces the amount of RCRA-hazardous waste product and yields a relatively clean side stream which may be disposed of at a secure (contaminated soil) landfill or as fill or cover material.	-Time consuming -Workers with scientific background required
Hydraulic Classification, Dewatering and Drying	Same as above, but dewatered sediment is passed though a thermal dryer.	Approx. 90%	High	Very Low	-Same as above, with less weight, highest percent solids yield	-Time consuming -Workers with scientific background required

zone, where the solids are prepared for pressure application; and the pressure zone, where medium, then high pressure is applied to the conditioned solids. Typically, a belt filter press produces a final product of 35-50 % cake solids. Performance depends on the nature of the solids being processed.

6.1.3 Centrifuge

Centrifugal dewatering is a high speed process which uses the force from rapid rotation of a cylindrical bowl to separate solids from liquids. Disadvantages include high initial cost for the centrifuge, though cost of operation is relatively low. Percent cake solids for centrifuge technology is not expected to exceed 25%.

6.1.4 Geotube®

Geotubes® are simply large bags made from a high tensile strength woven polypropylene fabric "geotextile" panels sewn to form long tubes for containment of pumped slurry (dredged material). The typical Geotube® length for applications similar to this project is 120-feet long by 90-feet (40'w by 6' h) circumference, though they can vary in size.

Dewatering is a three-step process. In the *confinement* stage, the high strength bags are filled using pumps. Depending on the scale of the project, banks of bags and sophisticated pipe manifolds can be set up. In the *dewatering* phase, excess water simply drains through the fine pores of the Geotube®. Depending on the nature of the contained material the decanted (drained) water may be of a quality where it can be reused or returned to waterways without additional treatment. If not, the bags can be set up in lined basins that allow the water to be treated before release or re-use. As the water drains from the Geotubes®, the contained volume decreases and it is possible to refill them several times until they remain full. In the final phase (*consolidation*), the solids continue to densify due to desiccation as residual water vapor escapes through the fabric (volume reduction can be as high as 65 per cent). The Geotube® can then be cut open and the solids recovered and hauled off for disposal. The geotextile material is generally disposed of with the solids material.

The advantages of the Geotube® dewatering process include:

- minimal supervision/labor required
- potential reuse of resulting solid-filled bags

The disadvantages of Geotubes® include:

- Depending on the amount of material to be de-watered, Geotubes® may required a lay down area much larger than the footprint required by other de-watering technologies

- bags laying on-site for extended periods of time may pose an odor problem

6.2 Dewatering and Drying

This alternative incorporates one of the above sediment dewatering systems, and in addition provides a thermal drying facility for dewatered sediments to provide a solids content of approximately 90%. Drying reduces transportation and disposal costs by reducing the gross weight of waste. Dried materials would also not require stabilization agents such as fly ash or cement to comply with transportation requirements, thus further lowering the cost. The cost of fuel required to dry the sediments must be considered a major factor when evaluating this alternative.

6.3 Hydraulic Classification and Dewatering

This alternative is primarily intended for sediments determined to contain relatively high lead content (>700mg/kg) that are likely to be classified as RCRA-hazardous based on the TCLP leachate (lead) test. Hydraulic classification techniques are intended to produce a clean sand fraction of greater than 150 mesh and a fines fraction (minus 150 mesh) with a relatively high concentration of lead. The objective is to reduce the amount of RCRA-hazardous waste product and yield a relatively clean side stream which may be disposed of at a secure (contaminated soil) landfill or as fill or cover material.

River sediments would be pumped to the processing facility as slurry. The slurry would then pass through a coarse screen and be sent to holding tanks. The slurry is then pumped to a sediment-washing unit. The clean sand and contaminated fines fractions from the sediment washing unit are then pumped to separate filter presses for dewatering and sent to appropriate disposal sites. Filtrate from the filter presses as well as decanted water from the holding tanks are passed through a polishing filter and returned to the river.

Essentially the process is additional to that of dewatering in that separate, dedicated filter press and polishing filter (media filter) trains are provided for the RCRA-hazardous and non-hazardous fractions from the hydraulic classification system.

6.4 Hydraulic Classification, Dewatering and Drying

This alternative is identical to the procedure described above in section 6.3, except that dewatered sediment from the hydraulic classification system is passed through a thermal dryer, which, as noted, reduces the gross weight of waste. Costs of transportation and off-site disposal are therefore also reduced.

6.5 Treatability Testing

The key factor in selecting of the appropriate sediment processing/dewatering methodology is the nature of the material to be handled. Grain size, total solids, organic matter content and other physical properties are considered when evaluating how amenable sediment (or slurry, once dredged) will be to the various dewatering techniques commonly employed on environmental dredging projects.

In addition to the physical characteristics analysis performed during the SedQAPP implementation work (see Section 3.2), pilot scale treatability testing was performed to supplement the project teams existing knowledge base regarding the particular nature of the Mill River sediments targeted for remediation. To this end, a review was made as to how many majority groups of sediment types were identified as impacted with lead.

It was determined that there are two prevalent sediment types in most impacted areas. The first is a brown, homogenous, silt, with a pudding like consistency, identified in the upper sediments in the majority of the study area. The second material is a little coarser with a higher percent solids content and located in the intermediate sediment depths. Containers full of the two material types described above were collected and delivered to WaterSolve, LLCs (WaterSolve) laboratory located in Grand Rapids, Michigan. WaterSolve proceeded to perform a variety of bench scale tests including the rapid de-watering test (RDT) and Geotube® Dewatering Test (GDT) tests on the finer material (deemed the more difficult to dewater). The work involved bench scale testing designed to simulate a variety of commonly used dewatering techniques, namely 1) plate and frame press, 2) belt filter press, 3) screw press and 4) Geotubes®.

In brief, the testing determined that if conditioned properly with polymers and coagulants, the material could be successfully dewatered to approximately 50% total solids content using most of the techniques evaluated. The complete treatability testing document (Dewatering Trial Performance - Mill River Dredging Project Fairfield, Connecticut dated December 2009) is included in Appendix VI.

6.6 Selected Processing Method

As noted above, there are several sediment processing/dewatering techniques that could be successfully utilized on this project. Geotubes® have been selected as the preferred dewatering method due to a variety of project specifics that make them the more viable option including:

- The ±6-acre upland parcel provides ample laydown area for the placement of Geotubes® and the construction of the associated filtrate collection and treatment facilities.
- Geotube® dewatering, while requiring skilled technicians to handle the setup and filtrate collection/treatment and polymer injection, is relatively uncomplicated compared to other

techniques which sometimes involves complex equipment that can breakdown and require long repair times. The Geotubes are fed directly from the dredge line (although a manifold system of piping to facilitate conditioning and filling of several bags simultaneously will likely be used) thereby eliminating the need to construct storage basins onsite (or using in-river scows for the same purpose.

- The treatability testing of Mill River sediments yielded favorable results thusly - Mill River Sediments conditioned and diluted to 14.6 percent solids yield the following results in the Geotube® Dewatering Test:

Time After Test	Percent Dry Weight Solids
3-Days	44.0%
5-Days	47.7%
7-Days	48.0%

As evidenced above, the Mill River sediments (at least based on the GDT) seem amenable to dewatering using Geotubes® with nearly 50% solids achieved in only 10-days. Given the large laydown area and a preliminary calculation by WaterSolve that the Upland parcel could hold the entire projects anticipated dredge volume in Geotubes® (stacked) at one time, thereby allowing the Geotubes® to sit several months and likely a dewatering favorable freeze thaw cycle, it seems reasonable to conclude that properly conditioned Mill River sediment dewatered in Geotubes® should produce filter cake upwards of 50% solids.

7.0 MATERIAL HANDLING AND DISPOSAL

7.1 Staging, Site Preparation and Access

The Former Exide Battery Facility property located at 2190 Boston Post Road, Fairfield, CT, i.e. the upland portion of the Site, will be utilized extensively for implementation of the SedRAP. At the completion of the 2005-2006 Upland RAP implementation, this approximately six-acre parcel was returned to pre-existing grade, including a top dressing of several inches of top-soil, and seeded. The property is currently a grassy field surrounded by chain link fencing. The parcel, which abuts Area II (Mill Pond) of the study area (the EGI property line actually extends into Mill Pond), will be utilized for, among other things, 1) the primary access point to the river for personnel and dredging equipment, 2) the dredged material de-watering, handling, characterization and stockpiling (and potentially stabilization) area 3) filtrate processing/treatment, 4) the loading area for trucks taking material to landfills, 5) the staging area for all equipment, and 6) the field offices for both the Contractor(s) and the Owner Representative/Engineer. Additionally, some remediation activities are planned for the river bank located along the west end of this parcel. These activities are discussed in Section 9.0.

Some site preparation will be necessary at project start-up to ensure that the site is suitable for the movement of heavy equipment. The contractor will be required to estimate the portion of the parcel that will be located within the primary footprint of the SedRAP project activities (equipment placement, truck traffic areas etc.) and the top soil will be stripped from these areas and stockpiled/stabilized to prevent erosion. Filter fabric will then be laid down and crushed stone will then be placed in the stripped areas and compacted in such a manner that the site will be workable without significant disturbance to the underlying soils. The contractor may propose to install asphalt paving in lieu of crushed stone but will need to account for, through the use of engineered controls, any stormwater run-off that may results from this paving.

Figure 9 depicts a conceptual site layout. Contractors may have their own preferences on how the site will be setup to best suit their needs.

Geotubes® will be placed (and filled) on a large, lined laydown area designed to collect filtrate and guide it (via gravity) to a water treatment area located in the western portion of the parcel. The exact specifications of this area are yet to be determined but, at a minimum, will include the following:

- Remove and stockpile topsoil and a minimum 1.5-feet of fill (topsoil and fill to be sold for reuse offsite)
- Grade excavation floor to drain to water treatment area, as appropriate
- Place minimum 2" of fine/medium sand
- Place heavy duty polyethylene plastic liner of minimum thickness 40-mils
- Place two layers of heavy felt

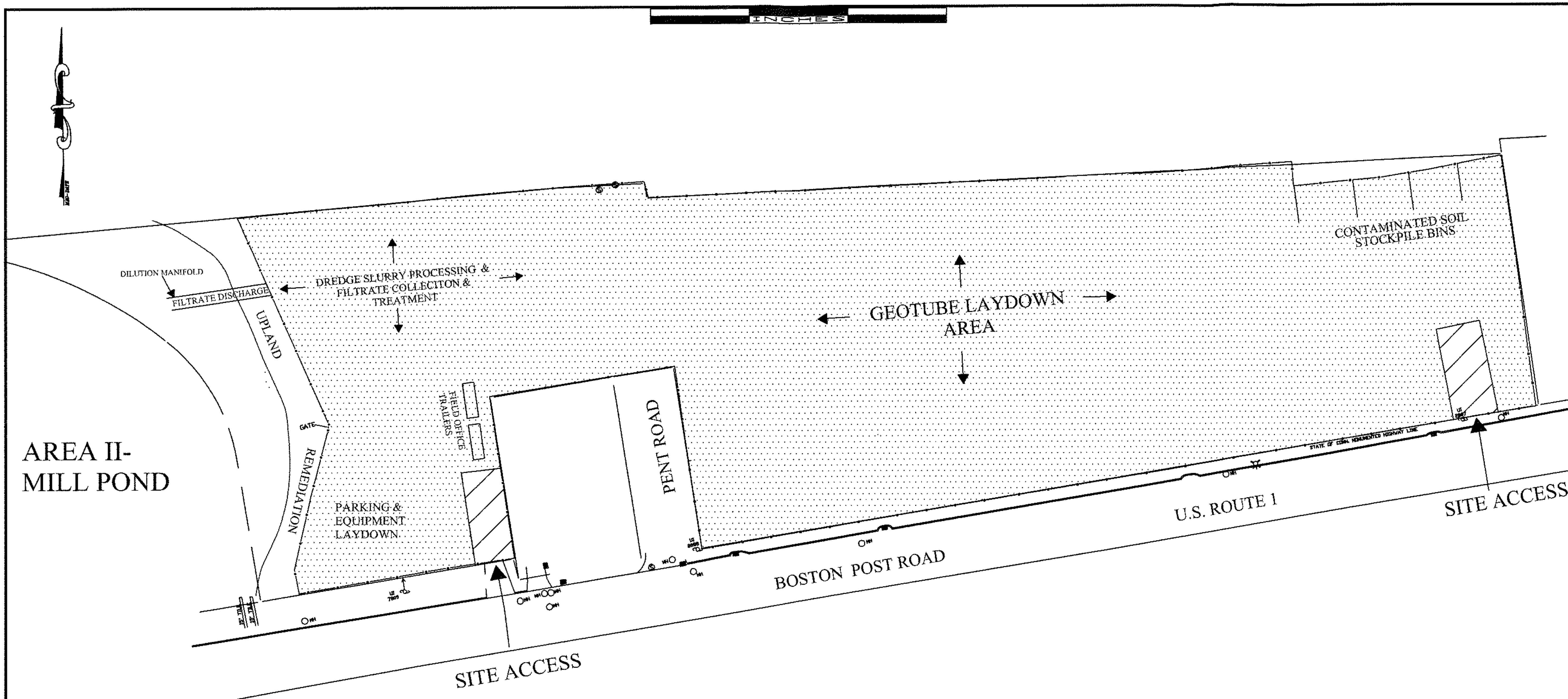


FIGURE 9
SITE STAGING CONFIGURATION
REMEDIAL ACTION PLAN
FOR LEAD IMPACTED RIVER SEDIMENTS
MILL RIVER AREAS I-V
THE FORMER EXIDE BATTERY FACILITY PROJECT
FAIRFIELD, CONNECTICUT

LEGEND

- (dotted pattern) LINED GRAVEL OR ASPHALT STAGING AREA
- (hatched pattern) STABILIZED CONSTRUCTION ENTRANCE/ ANTI-TRACKING PADS

Date:	9-16-11
Scale:	1"=80'
Proj. No.:	8014
File No.:	988014GW
Acad No.:	8014
Sheet:	1

CCA LLC — ENVIRONMENTAL - CIVIL - ENGINEERING - SURVEYING

40 Old New Milford Road
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- Place heavy duty polyethylene plastic liner of minimum thickness 40-mils
- Place two layers of heavy felt
- Place 12" of gravel

As stated previously, the upland parcel was the subject of an intensive remediation effort from 2005 thru 2006. This effort resulted in the removal and offsite disposal of approximately 37,000 tons of soil impacted primarily by lead. The effort resulted in, at great cost to EGI, a parcel that has been remediated to residential standards. The CTDEEP provided their approval of the upland clean-up in a letter dated May 20, 2009. The Contractor(s) selected to implement the SedRAP will be required to submit plans, prior to project startup, on how the handling, de-watering, storage, stabilization and off-loading of lead impacted river sediments **will be performed without any resultant pollution of the upland parcel by lead or any other substances.** It is anticipated the that a variety of measures will be necessary meet this requirement and the Contractor will be required to demonstrate that any such measures plans are appropriately designed.

Access to the upland parcel will be through the two current double gate access points from Boston Post Road located on the east and west sides of the site. The access points may be supplemented or expanded as necessary to suit the needs of the Contractor(s). Access to the river (Mill Pond section) will be made via the vegetated river bank located on the west side of the Upland parcel. Accessing the river from this location will require some tree/brush removal and likely some lowering of the slope of the bank. Figure 9 illustrates the proposed site staging configuration. On-shore remediation activities targeted for this river bank area (discussed in Section 9.0) are likely to result in vegetation removal and a slope reduction of the river bank.

7.2 Sediment Storage

Use of Geotubes® for dewatering negates the need for soil stockpiles/cells etc. as each Geotubes® once filled, acts as its own self contained stockpile. Wind/water erosion is a non-factor except for Geotubes® that have been broken open for load out – which will be prohibited during heavy rain. Any Geotubes® that have been opened but not fully loaded will be required to be covered with plastic at days end and during down times when the threat of rain is imminent. The reasons for this are twofold, 1) rain soaked material means higher disposal costs and possibly could result in material that is too wet to load/haul and 2) Runoff from opened Geotubes® would end up at the water treatment plant where it is likely to clog filters.

In addition to the above, two soil/sediment stockpile cells will be constructed using concrete barriers (construction block) arranged such that each cell will have a capacity not to exceed 250 cu.yds. The cells will be underlain with 20 mil high density polyethylene (HDPE) sheeting, and the sheeting will be draped over and affixed to the tops of the concrete barriers. Full cells are to be kept covered with 6 mil plastic sheeting or equivalent when not being filled or characterized to avoid wind blown loss and saturation due to precipitation. The purpose of these cells will be to contain (for characterization and load out) lead impacted soils generated during river bank remedial efforts described in Section 9.0 (for characterization and load out), and to provide a containment apparatus for miscellaneous materials not confined to Geotubes® generated during project closeout such as grit removed from the water treatment system.

7.3 Characterization

Characterization (i.e. composite sample collection and analysis for landfill acceptance criteria) of the dewatered river sediments will be the responsibility of the Contractor and will need to be coordinated with the disposal facility(s) in regard to the acceptance criteria of said facility. Included in the analytical characterization will be the determination of leachable lead (TCLP) for comparison to the regulatory criteria of 5.0 mg/L. Lead contaminated material exceeding the TCLP regulatory level for lead, as determined by the waste characterization program of the contractor concerned, will be either transported and disposed of as hazardous waste at an appropriately approved landfill or stabilized on-Site and disposed of at an approved RCRA lined landfill. Characterization is to be timed in accordance with the Geotube® loadout schedule and will be performed by inserting a small diameter core sampler through the bags to collect composite material rather than by prematurely opening the container.

7.4 Treatment & Disposal

In general the contractor will be required to dredge, properly handle, transport and dispose of contaminated material (hazardous and non-hazardous), including characterizing the material, manifesting the loads, and obtaining approval from EPA-approved RCRA landfills and RCRA Out-of-State lined landfills.

Lead contaminated material (dewatered sediments and soils (from limited upland remediation activities discussed in Section 9.0)) will be transported off-site to a lined permitted RCRA subtitle C or D landfill. Lead contaminated material exceeding the TCLP regulatory level for lead of 5 mg/l, as determined by the waste characterization program of the contractor concerned, will be either transported and disposed of as hazardous waste at an appropriately approved landfill or stabilized on-Site and disposed of at an approved RCRA lined landfill. In short, stabilization, for the purposes of this project, will pertain to the addition of a phosphate-like reagent (in pellet or powdered form) to lead impacted material to bind lead in the material, and therefore reduce the leachability of lead. Stabilization reagents will be added to materials inside the lined cells and usually added and homogenized using an excavator bucket.

Stabilization of material characterized to be hazardous for TCLP lead only (above 5 mg/l) can result in a significant reduction in disposal costs. However, on-site stabilization requires a Temporary Authorization from CTDEEP (to be acquired by the Contractor) which only allows for a 30-day stabilization window. While CTDEEP does allow for a single extension of this authorization, careful planning will be necessary to get the maximum benefit of this authorization in the time allowed. Such planning may include the targeting of known high lead concentration remediation areas coincidently and/or the segregation of stockpiles (in compliance with CTDEEP regulations and as site storage capacity allows) of materials characterized to be lead impacted until dredging is completed and a single round of stabilization can be undertaken. The use of Geotubes® may complicate stabilization efforts, likely requiring that Geotubes® identified as hazardous be double-handled (opened and placed into trucks for transport to a stockpile cell, mixed with agent, characterized then reloaded into trucks transport to landfills).

7.4.1 Non-Hazardous Materials

Materials (dewatered sediments, river bank/upland soils) characterized as non-hazardous or rendered non-hazardous through stabilization will be loaded onto dump trucks from the storage/stabilization cells and disposed of (under bill of lading) at a lined permitted RCRA subtitle C or D landfill.

7.4.2 RCRA Hazardous Materials

In the event that materials identified to be RCRA hazardous are not able to be stabilized, due either to the nature of the material or the time constrictions associated with the Temporary Authorization, such materials will be transported under hazardous waste manifest and stabilized/disposed of at an appropriately permitted/EPA-approved hazardous waste landfill. As stated in an earlier section, all efforts will be made to minimize the amount of hazardous material taken to landfills.

7.5 De-watering Wastewater Handling, Treatment & Discharge

It is anticipated that river bottom sediments will be dredged at total solids content of approximately 10%. Dewatering this slurry will result in a significant amount of decant and filtrate water that will need to be handled, treated and discharged. Given the volume of water to be generated and the limited additional capacity of the Town of Fairfield sanitary sewer system, it will be necessary to discharge the decant/filtrate waters back to the Mill River. Such discharge will require registration under a USEPA National Pollutant Discharge Elimination System (NPDES) permit and will require treatment and testing to confirm the discharge is suitable for re-release into Mill River.

Selection of filtrate treatment methodologies will be predicated on the results of bench scale treatability studies.

8.0 CONTROLS

A variety of site controls will be necessary to ensure the project is implemented with the minimum redistribution of sediments in the Mill River, as well the minimum disturbance to the upland site and surrounding areas (i.e. neighboring properties, access points to the river). The contract documents will require implementation of these controls, which include those described below. Both the Contractor and the Owner's Representative will be responsible for ensuring that the controls are properly implemented and maintained.

8.1 Fugitive Sediment Mitigation

The redistribution of some sediment is unavoidable during the implementation of any dredging project. The key objectives are to localize any redistribution as much as possible through the use of best management practices, engineered controls and to monitor any increases in river water turbidity (an indicator of increased resuspension of sediments) so that operations can be adjusted as necessary. The following sections discuss such controls and monitoring in greater detail.

8.1.1 Best Management Practices

There are several best management practices that can be utilized to aid in the minimization of sediment redistribution during implementation of SedRAP. The first such practice has already been discussed, namely, the selection of the hydraulic suction dredging method which, for the reasons presented in Section 5.0, is less likely to result in the resuspension/redistribution of sediments during remediation than other available methods. Additional best management practices will include 1) the adjustment of dredge head velocity as dictated by observed turbidity levels, 2) the mitigation (utilizing diversion piping or other methods) of outfall flows in remediation areas (see Section 3.1 for a description of study area outfalls), and 3) the cessation of dredging during high river current conditions such as following an extreme rainfall event (alternately, dredging may be moved to quiescent areas if any such events occur during the course of the project).

The placement and positioning of in-water equipment/structures (dredges, barges, piles etc.) will also be managed in a way which will eliminate/minimize the redistribution of river sediments.

8.1.2 Turbidity Mitigation

Resuspension of sediments is defined by the USEPA as "the remixing of sediment particles and pollutants back into the water by storms, currents, organisms, and human activities, such as dredging". Resuspension of sediments must be kept to a minimum during remedial activities as the suspended sediments could potentially migrate and settle in other areas of the river.

Of the five remedial options discussed in Section 5, No Further Action and Monitored Natural Recovery do not require sediment resuspension mitigation as sediments will remain in place (not including naturally occurring resuspension, i.e. during storms). For the remaining three options (Capping-in-Place, Dredging, and Excavation-in-the-Dry), sediment resuspension mitigation would be necessary, and the technique used for all three would be the use of a turbidity curtain, or wall, in the immediate Remediation Area (RA). The potential for sediment resuspension associated with the different options is discussed in Section 5 and on Table 1.

Remediation areas (or "dredge cells") will be formed through placement of turbidity curtains as illustrated on Drawings 13 & 14, *Potential Remediation Cell Layout Non-Restrictive of Anadromous Fish Runs*, which partition the river in such a way as to allow passage of anadromous fish and, therefore, dredging during the anadromous fish migration period (April 1 thru July 15). As noted in Drawing 13, dredging will not be allowed in Dredging Cell #1 – Area III during the anadromous fish migration period because installation of a turbidity curtain that doesn't restrict fish passage is not possible in that area.

According to USACOEs 2008 document entitled *Technical Guidelines for Environmental Dredging of Contaminated Sediments*, silt curtains are most effective in relatively shallow, quiescent water, without significant tidal fluctuations. Largely due to the Harbor Road tide gates (which cause the upper study areas to function more like an impoundment than a flowing, fully tidally influenced estuary) all of the study areas with the exception of Area IV (Southport Harbor), meet this criteria for successful deployment of silt/turbidity curtains.

To confirm this conclusion, CCA, during preparation of the SedRAP, performed river current measurements at 24 locations in Study Areas I, II, III & V and compared those measurements to the generally accepted rule that turbidity curtains work most effectively in current velocities of 2.5 ft/sec or less. The measurements, collected over rising and falling tides indicated a flow velocity of <0.1 ft/sec during the rising tide and little or no current during the falling tide at most locations with the exception of the main channel portions of Study Areas II & III where measurements ranging from <0.1 to 1.0 ft/sec were noted; still well below the 2.5 ft/sec threshold.

While the above supports EGI's justification for the use of turbidity curtains, selecting and properly deploying the curtains is just as important to ensure that sediment is not unduly mobilized during their use. In consideration of the above, CCA has recommended that the Contractor be required to deploy, the American Boom & Barrier Corporations PC-2 model turbidity curtain (or equivalent). This turbidity curtain was successfully employed during a dredging effort in the Thames River where current velocities are much higher than in the Mill River. The PC-2 curtain model consists of PVC-coated filter fabric affixed to 6 inch square Styrofoam floats. Uncoated filter fabric windows allow passage of water and trap fugitive sediments. A galvanized 5/16" chain runs the length of the bottom to provide ballast. Sections of the curtain (30 ft. long) will be fastened on land to the prescribed length via steel cable quick connects running along the boom, and the curtain will be moved into position via rowboats. Though the curtain itself will not come in contact with the river bottom (it will be set 0.5 ft. off the bottom where feasible), and the end points of the curtains will likely be anchored to points on dry land, it will be necessary to anchor the curtain to the river bottom at various angle points which form the various dredge cells. The setting and retrieving of these anchors will be done gently and during slack tide whenever possible to minimize any resultant disturbance of bottom sediments. The somewhat undulating bottom topography of Mill River will require in-the-field adjustments to be made on how deep the bottom of the turbidity curtain is set. This will be accomplished by taking soundings every thirty-feet along the curtain and adjusting the depth accordingly, with the overall goal being setting the curtain at the deepest point possible.

The Contractor will be required to deploy anchors of the proper style and weight to prevent dragging. In the event of an impending storm event dredging activities will be halted sufficiently in advance to allow turbidity curtain fabric to be retracted (curtains will remain anchored but the fabric will be pulled up from the water column and secured to the float line) to prevent the possibility that the curtains could be dragged or otherwise damaged. Further, when turbidity curtains are moved to prepare individual "Dredge Cells", no component of the curtains (e.g. fabric, ballast, anchors) will allowed to be drag along the river bottom.

8.2 Turbidity Monitoring

It is not possible to extract (via dredging or excavation (with associated equipment mobilization, sheet pile driving etc.)) river bottom sediments without creating some resuspension. To comply with the Consent Order, heavy equipment will need to work in and around the river. While selection of hydraulic dredging as the remediation method will result in lower resuspension than other techniques, monitoring will be performed to ensure that any resuspended sediment is kept to a minimum and limited to the area immediately adjacent to the dredge intake and, in particular, does not migrate outside of the turbidity curtain constructed around the remediation area being dredged.

Monitoring for sediment resuspension will be performed using both visual and electronic methods. The purpose of the monitoring will be to quickly identify excessive sediment resuspension when/if it occurs and amend dredging procedures as expeditiously as possible to avoid the redistribution of lead impacted sediments within or outside of remediation areas.

Given the fine grain size and brown color of the majority of the study area sediments, it is anticipated that sediment particles suspended in any significant quantity will cloud the river water and allow visual identification of areas where considerable sediment re-suspension is occurring. Visual monitoring will be performed regularly by both the dredging Contractor via real time onboard video camera(s) and the Engineer.

While a visual turbidity monitoring program is a common sense qualitative approach to identifying significant resuspension events in real time, a quantitative monitoring program using electronic field instrumentation will also be implemented to ensure that chronic lower level sediment redistribution is not occurring. This program will be implemented by the Engineer, and a dedicated field scientist will be responsible for the proper implementation, monitoring and reporting of program throughout the project and at project completion.

The key to an effective electronic turbidity monitoring program is to ensure that the monitoring equipment is properly selected, positioned and monitored. The following sections detail the proposed methods for accomplishing these goals.

8.2.1 Equipment

Turbidity meters will be the optical backscattering type and will meet or exceed performance criteria as established by USEPA method 180.1. They will have a range of at least 0 to 250 Nephelometric Turbidity Units (NTUs), and will measure in real-time. Data will be recorded by submersible data loggers housed in buoys powered by solar panels and back-up batteries, which will be connected via a wireless local area network (LAN) signal to the cell phones of the remediation contractor foreman and CCA field manager, as well as to an onsite laptop computer. A text message will be instantaneously and automatically sent to the foreman and CCA field manager when turbidity levels exceed the prescribed limit, and remediation operations will be immediately halted.

8.2.2 Monitoring Locations

In situ turbidity meters will be placed approximately 100 & 200-feet directly downstream (or upstream, depending on tide stage) from the outside of the turbidity curtain. In some areas, the downstream shoreline and/or other obstacles (such as bridges and tide gates etc.) will prohibit this particular spacing of the monitoring stations. In such cases, the stations will be placed as deemed appropriate in the field, with a bias towards ensuring that any fugitive sediment is intercepted by said placement.

The Mill River is expected to have some quantifiable turbidity due to a natural suspended sediment load. This "background" turbidity will be measured and used as a baseline to which the turbidity measurements taken downstream of the active dredging areas can be compared. To accomplish this, one in situ turbidity meter will be placed upstream (or downstream, depending on tide stage) a minimum of 250 feet from the turbidity curtain to measure background water quality. Figure 10 illustrates the placement of turbidity monitoring stations during an ebb or low tide scenario. A daily log noting the monitoring station placement and measurements, will be maintained by the Engineer.

Given the shallow water depths noted in the study areas, turbidity monitoring will generally occur at one depth, at the mid point of the water column. During dredging in the deeper water areas (greater than ten feet deep, there are a limited number of remediation areas that are this deep), the Engineer will evaluate the need for placement of two turbidity monitors (at differing depths) in the water column at each monitoring location. This evaluation will be performed both visually and by taking spot turbidity measurements at different points in the water column to determine if there is an appreciable difference (noted cloudy water at a certain depth or greater than twenty percent difference in turbidity measurement) in turbidity at depth in these deeper water areas. If an appreciable difference is noted, turbidity monitoring (at the two downstream locations and the background station) will be performed at two points for each monitoring station - one point one third of the water column below the surface of the water, and one point two thirds of the water column below the surface. The two readings will be averaged for data analysis purposes, but dredging operations will halt if one of the readings exceeds the prescribed turbidity limit. Figure 10 is an illustration of a possible turbidity monitoring station scenario during ebb/low tide.

8.2.3 Monitoring Frequency

Readings will be taken using real-time equipment (see section 8.2.2) at intervals of five minutes during dredging operations, beginning thirty minutes before dredging operations begin and ending thirty minutes after dredging operations cease.

8.2.4 Parameters

The electronic turbidity monitors utilized will record measurements in Nephelometric Turbidity Units (NTUs).

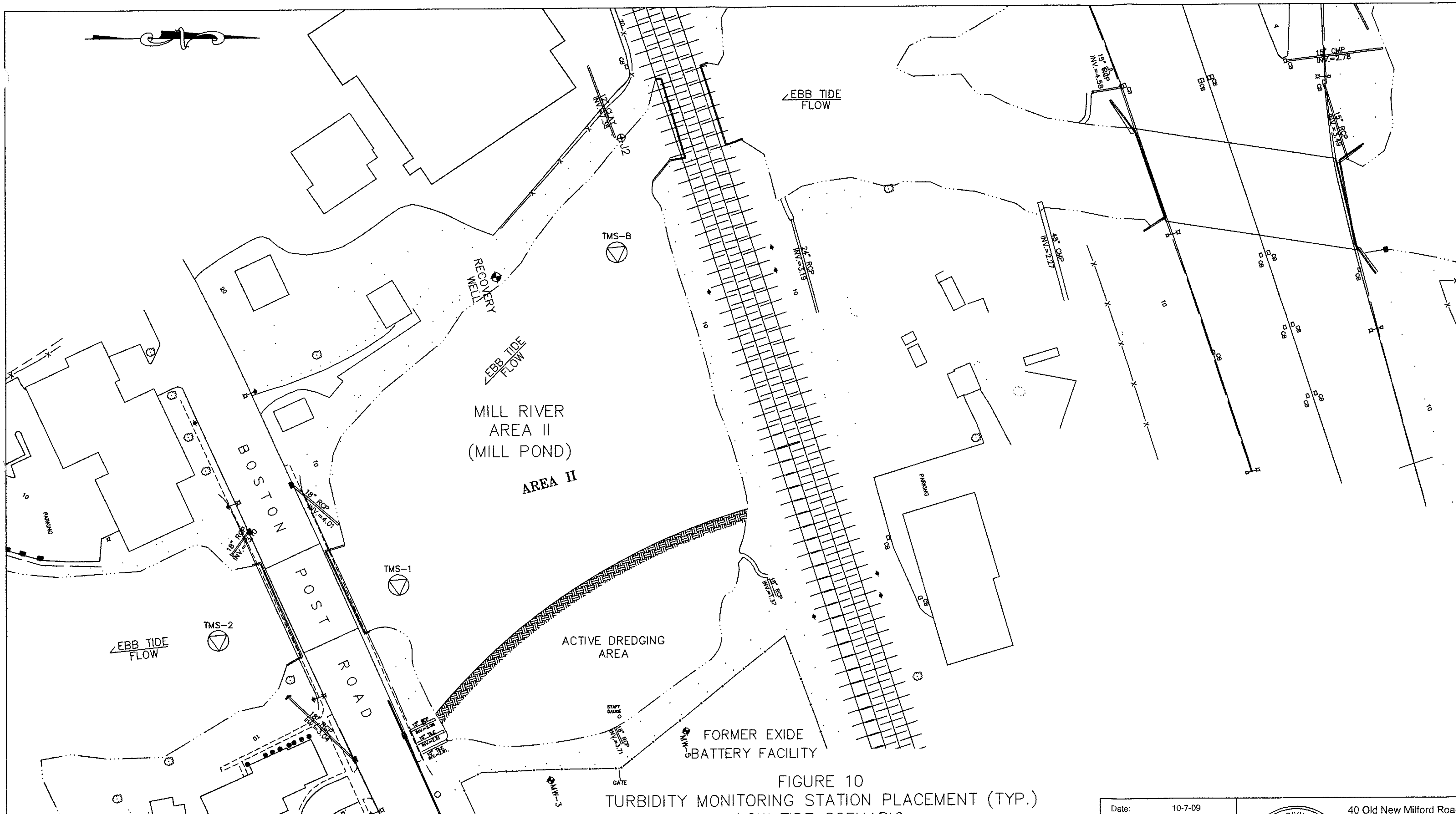

FIGURE 10
TURBIDITY MONITORING STATION PLACEMENT (TYP.)
LOW TIDE SCENARIO
REMEDIAL ACTION PLAN FOR LEAD IMPACTED RIVER SEDIMENT
MILL RIVER AREAS I–V
THE FORMER EXIDE BATTERY FACILITY PROJECT
2190 BOSTON POST ROAD, FAIRFIELD, CONNECTICUT

TURBIDITY CURTAIN
EDGE OF WATER
MONITORING STATION

Date:	10-7-09
Scale:	1"=80'
Proj. No.:	98-8014
File No.:	File No.:
Acad No.:	988014-SURV
Sheet:	Fig. 10

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8.2.5 Action Levels, Record Keeping & Reporting

The following numerical action levels will be used for the in-river turbidity monitoring stations on this project, note that the action levels pertain to readings collected from the downstream monitoring station and compared to the background monitoring station:

- Five (5) NTUs when background turbidity is 0 - 20 NTUs;

- When the background turbidity is monitored above 20 NTUs, the downstream monitoring station will be allowed up to a 35% increase over background before action is taken

If the above criteria are exceeded, the following actions will be undertaken:

0 -30 Minutes After Exceedance Registers

The floating downstream turbidity monitoring station will instantaneously notify the Engineer (Owners Representative), the dredge operator and the Contractors Project Manager in the event of the exceedance. The Engineer and Contractors Project Manager will communicate with the dredge operator to determine if a visible plume is observed exiting the turbidity curtain and if anything occurred during dredging that might explain the exceedance.

>30 Minutes After Exceedance

If, after 30 minutes the downstream monitor is still reporting an exceedance of the numerical criteria, the Engineer will visit the in-water downstream monitoring station. The fixed turbidity monitor will be checked and the turbidity measurement will be confirmed using a hand held turbidimeter and a manually collected sample of river water, collected at the midpoint of the water column and adjacent to the fixed station. If the supplemental measurement confirms the exceedance or if a visible plume is seen exiting the turbidity curtain, engineered controls will be put in place to halt the exceedance. Said controls may include adjusting the cutterhead forward speed and/or dredge pump flow rate, removing debris from the dredge cutterhead, moving or removing objects from the river bottom, and/or evaluating the turbidity curtain for damage.

Turbidity meters will be calibrated daily, using the same calibration standard from the beginning to the end of the project. Calibration results will be recorded daily and summarized in the final report.

The turbidity monitoring program may be supplemented with additional monitoring stations, turbidity monitors or alternative equipment at any time if the Engineer determines that the monitoring program is not sufficient for its intended purpose.

As stated, the Engineer will be responsible for implementation of the turbidity monitoring program. The Engineer will also be responsible for recording keeping in regard to the program. Records will consist of electronic files (e.g., PDF, Excel) containing the real time instrument measurements as well as dedicated log books will record: daily calibration data, daily monitoring station placement, tide data, corrective actions taken and any other pertinent information. These log books will be kept in the Engineers field office and will be summarized in a final report at project completion.

8.3 Confirmation Sampling of River Sediments

Confirmation samples of bottom sediments inside remediation areas (see shaded areas in the attached drawings) will be collected for determination of residual lead concentration immediately following dredging. The sample collection may be undertaken over a portion of areas inside the turbidity curtain or following dredging of the complete remediation areas in the smaller areas. The purpose of this sample collection will be to confirm the adequate removal of the previously mapped lead impacted sediments and to ensure that, as the dredge moves through a particular remediation area sediment re-suspension around the dredge did not result in the re-deposition of lead impacted sediments in nearby completed work areas. River bottom depth measurements will also be taken to confirm proper depth of dredging in each area.

Confirmation bottom sediment samples will be collected, inside a particular remediation area, at a frequency of one sampling point for every one thousand square feet of river bottom dredged along an equally spaced grid and will be field located using GPS. The samples will be collected from the top six inches of the river bottom and analyzed for total lead on an expedited laboratory turn around time (same day reporting will be requested). If lead is detected above the cleanup criteria in these sediments, the dredge will be directed to the area(s) where the sample exceedence was detected and will dredge six inches deeper beginning at that sample point and will proceed half way to each neighboring grid point where favorable confirmation data was collected.

In addition to the above, sidewall samples will be collected around the perimeter of the dredged area by locating perimeter samples 30-feet in each quadrant (four total) radiating out from the original grid (core sample collection) point that is the center point of each individual hexagonal dredge prism. This will result in core samples being collected 2.5-feet from the edge of the dredged areas in the north and south quadrants and 5.0-feet from the edge of the dredged area in the east and west quadrants. In areas where dredge prisms adjoin each other, the core samples will be collected along the outsides of the dredge prism agglomeration. The depth of the sidewall samples to be analyzed will be determined by the highest lead concentration inside the given dredge prism (or prism agglomeration) adjoining the sample locations.

If during the river bottom or sidewall sample collection efforts residual sample sediments are found to be lead impacted, a thorough evaluation of dredging protocol will be undertaken to determine whether these sediments are in situ sediments, and the dredge is not being operated at the proper depth or if the residual lead impacted sediments are the result of sediment redeposition due to excessive resuspension during dredging. In either case, protocols will be amended, as necessary; to ensure that sediment lead concentrations meet the cleanup criteria following dredging. Such amendments may include lowering the dredge velocity or instituting better checks on dredge depth. Dredging equipment will not be moved from a particular remediation area until confirmation sampling can ensure the sediments exhibiting lead concentrations above the cleanup criteria do not remain.

For the purposes of confirmation sampling, each dredging cell will be considered independently, since sampling will need to be done, and determined to be acceptable, before the turbidity curtain/equipment can be moved to set-up the next cell. A remediation area will be deemed successfully remediated when the confirmation samples meet the clean up criteria (220 mg/kg lead in Areas I – IV; 400 mg/kg lead in Area V) with a calculated 95% upper confidence interval. Any single sample that exhibits total lead content greater than twice the cleanup criteria will require additional dredging, in a 6-inch depth from that sample to the midpoint to the nearest "clean" sample in each direction.

The confirmation sampling program will be implemented by the Engineer. Confirmation sample data will be maintained in the field trailer and will be summarized in a final report.

8.4 Erosion Control

Erosion and Sedimentation Control measures will be installed at "upland" work areas prior to the start of site activities. All erosion and sedimentation controls will be installed following the guidelines outlined in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. Erosion and Sediment control features will be inspected by qualified personnel once in every seven days and within 24-hours of a storm event.

Erosion and sedimentation controls employed at the site/work areas may include:

Measures	Definitions
Stabilized Construction Entrance	A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving the site to or from a public right-of-way street, alley, sidewalk, or parking area.
Construction Road Stabilization	The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas. As discussed in Section 7.1, a significant portion of the site will be stripped of top soil and covered over with either geotextile and gravel or asphalt paving.

Measures (cont.)	Definitions (cont.)
Silt Fence	A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage area of disturbed soil.
Dust Control	The control of dust resulting from land-disturbing activities.
Structural Streambank Protection	Stabilization of eroding streambanks by the use of designed structural measures, such as rock riprap, gabions, pre-cast concrete wall units and grid pavers.
Riprap Slope Protection	A layer of stone designed to protect and stabilize areas subject to erosion.
Temporary Critical Area Plantings	Providing erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.
Permanent Critical Area Plantings	Establishing grasses and /or shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.
Protecting Vegetation During Construction	The protection of trees, shrubs, ground cover and other vegetation from damage by construction equipment.

A detailed Erosion and Sedimentation Control Plan will be developed, by the Engineer, in conjunction with contract documents. Contractors will be required to follow/implement this Plan as well register under any applicable CTDEEP general permits. The minimization of erosion on the upland site (staging areas) and the riverbanks (river access areas) will be considered a priority due to the proximity to the water.

8.5 Odor and Vector Controls

Sulfide concentrations in study area sediments may be sufficient, in some areas, to produce the sulfurous (i.e. rotten egg smell) noted during sample collection when the sediment samples were exposed to air. The storage of river sediments on the upland site (during dewatering, stabilization and off-loading) therefore, has the potential to offend neighboring property occupants/passersby. If organoleptic screening of the upland processing/storage area indicates that objectionable odors are noticeable at three downwind property boundary, or if complaints are filed by the public, dewatering and storage procedures will be reviewed to determine additional operating protocols that can be implemented to mitigate the odors. Such protocols may include the use of deodorizing sprays that can be applied to tops of Geotubes®.

It is likely that the sediments handled on the subject site will contain some aquatic organisms such as bivalves and annelids (worms). The presence of these creatures may draw vectors that feed on these creatures, such as birds and rodents, to the site. The vector risk will be somewhat mitigated by the fact that sediments will be contained in the Geotube® containers. Nonetheless, the Contractor will be required to neatly maintain and any sediment stockpiles or opened Geotubes®. Predatory bird decoys will also used if necessary. Rodents will be mitigated by the proper management of sediments and, if necessary, an exterminator will be called.

8.6 Spill Control

River sediment remediation contractors shall be required to prepare a Spill Control and Countermeasures Plan (SPCC) prepared in accordance with *40 CFR § 112, Oil Pollution Prevention*, relating to the temporary storage and/or use of petroleum products during river sediment remediation activities.

River remediation activities will include the use of heavy equipment both in the river and on the upland site. The potential for petroleum product spills from fuel delivery, equipment malfunction, or equipment damage will exist during site activities. Discharge prevention measures such as regular inspections, following safe filling procedures, and warning signage should be employed. In addition to regular inspections, all site personnel will be watchful for any evidence of equipment leaks or product spills. In the event of a product discharge, countermeasures should be maintained on-site. Specifically, spill control equipment (spill kits) designed for both on-land and in-water use will be available. Drainage control equipment should also be maintained on site to prevent any product from leaving the site via overland flow (and into the storm drainage system located along Route or directly into Mill River) in the event of a discharge.

All waste materials generated during a spill response or cleanup will be disposed of in accordance with applicable federal, state, and local regulation.

Record keeping and emergency contact/notification procedures should be outlined in the contractor SPCC. The following table includes emergency contact information:

Agency	Phone
Fire Department	911
Police Department	911
Ambulance	911
St. Vincent Immediate Health Care Medical Center	203-259-3440 911
National Response Center U.S. Coast Guard	24-Hour Hotline 800-424-8802
Center For Disease Control	404-488-4100
US EPA Emergency Response	800-424-8802
CT DEEP Oil & Chemical Spills Unit	24-Hour Hotline 860-424-3338

8.7 Contractor Oversight

In addition to confirmation sampling and turbidity monitoring, the Engineer will be the primary onsite point of contact for the public and public officials, and will perform general oversight of the Contractor(s) to ensure that the project is implemented in accordance with the SedRAP and Contract Documents. The Engineer, also operating as the Owner's Representative on this project, will be on-site (in the river and/or on the Upland site) at all times during working days, from project start-up to completion. The Engineer will be in regular contact with the Contractor and will document project implementation through visual observation, confirmation sampling, field measurement, photography and written reports (daily, weekly, and final).

The Engineer will have the authority to issue stop work orders if work practices are deemed unsafe or not in accordance with the RAP and Contract Documents.

8.8 Health and Safety

A site specific Health and Safety Plan (HASP) has been developed for CCA employees engaging in sediment remediation oversight, confirmation sampling, turbidity monitoring, and other related activities. This plan is included in Appendix IV. Contractors and subcontractors will be required to provide their own HASP, which should include the guidelines outlined in the CCA HASP as well as protocols for working with heavy equipment. Compliance with the HASP is required of all CCA, LLC employees who enter the working areas of this project.

All on-site personnel, whether employees of the Engineer, Contractor or subcontractors will be required to have successfully met the 40 hour training requirement pursuant to OSHA 29 CFR 1910.120 (Hazardous Waste and Emergency Response or "Hazwoper"). and be up to date with their 8-hour annual refresher course and annual medical monitoring.

Health and Safety personnel include the Health and Safety Manager (HSM), who is responsible for the development of safety protocols and procedures. The HSM oversees project health and safety including worker qualifications, the assignment of safety-related duties to qualified personnel. The site Health and Safety Officers (HSO) work under the HSM and are responsible for on-site health and safety activities. An HSO has stop-work authorization and must be present at all times during site activates.

8.8.1 In-River

Personnel engaged in contractor oversight, confirmation sampling, turbidity monitoring, and other related activities that will generally be performed in a boat in the river should follow boating safety procedures. Personal Protective Equipment (PPE), including a personal floatation device, should be worn. The boat manufacturer's specified weight capacity should not be exceeded, and gear should be stowed securely to avoid unexpected shifts. Personnel should stay seated in the boat, however if sample collection indicates standing is necessary, personnel should keep their center of gravity as near to the center line of the boat as possible.

8.8.2 Chemical Hazards

Chemical hazards which may be associated with exposure to impacted sediments include lead, aluminum, and PCBs. The potential for exposure to petroleum hydrocarbons, volatile organics, and other metals may exist associated with other site activities. PPE should be utilized to minimize exposure to chemical hazards.

8.8.3 Physical Hazards

Physical hazards include slip and fall hazards, hazards associated with operations conducted in the vicinity of contractor equipment, and machinery. Personnel should wear PPE for protection from potential falling objects, projectiles, and noise hazards.

8.9 River Bank Restoration

The mobilization of dredging equipment to the edge of and, in some cases, into the Mill River will result in some damage to the river bank. Additionally, the out-of-water upland remedial (SuppRAP) activities will, necessarily, result in a significant disruption of the eastern shoreline/river bank of Mill Pond. Appropriate precautions, in accordance with SedRAP Erosion Control Plan, will be implemented to minimize the impacts of these encroachments. When, and if, damage does occur, river banks will be returned to grade using clean fill. This fill material will be brought in from an offsite source and shall be a natural mineral soil substantially free of wood and other foreign matter. Fill material will be subjected to laboratory testing, for physical and chemical parameters, as well as a source review, before said material is accepted for use in this project.

In general, fill material will be placed and lightly compacted in the disturbed river bank areas as necessary to restore grade to pre-existing conditions. Following fill placement, disturbed areas will be seeded using a blend of native plant species seeds appropriate for the micro-environment of the lower Mill River corridor. Erosion control mats, straw, or other methods to control erosion and seed loss will be utilized, as appropriate, to ensure adequate re-vegetation of river banks.

As stated, the Mill Pond shoreline/river bank abutting the upland site will be heavily disturbed during the implementation of the remedial activities discussed in the following section. These activities, which will be performed at project startup, will be followed with heavy use of this area as the primary egress point for the river. The cumulative result will be a lowering of the grade of this shoreline. Site restoration here will involve the gentle grading of this river bank to match the existing upland grade, followed by seeding. The current fence line separating the upland site and Mill Pond will be replaced.

8.10 Staging Area Restoration

As discussed in Section 7.1, preparation, including top soil removal and the placement of gravel and/or asphalt, of the upland site (the site staging area) will be necessary at project start-up to ensure the site is workable for heavy equipment and dump trucks. Additionally, anti-tracking pads will have been placed at both site access points, assuming both are utilized during the project. Restoration of the upland site will involve removal (and proper offsite disposal) of all gravel and/or asphalt paving and restoration to pre-existing grade using, if necessary, clean fill approved by the Engineer and the top soil striped and stockpiled at project startup. The anti-tracking pads will be removed in a similar manner.

Any stockpiling cells, wastewater impoundments or similar structures constructed for the processing or storage of the river sediments will be broken down and taken off site. Underlying soils will be tested to ensure they were not impacted by lead during project implementation and depressions left by these structures will be restored in a manner similar to above.

9.0 CONCURRENT OUT-OF-RIVER REMEDIATION

9.1 East bank of Mill Pond

During implementation of the 2005/2009 Upland RAP the fence line located at the top of the river bank located on the east side of Mill Pond was selected as the limit of work. Accordingly, several remedial activities that were terminated at this limit need to be addressed. Added to the list of items that need further remediation in this area are the surficial soils identified as lead impacted during grid sampling of this river bank in 2008 (during SedQAPP implementation). The use of this river bank as the primary entry/egress point for the SedRAP will result in removal of the fence and disturbance of the river bank. Therefore, at project start-up, it will be necessary to address these items before any significant work occurs in the river or along the river bank.

The following is a detailed discussion of the residuals documented and in each area along with the proposed methodology for remediation for each item.

9.1.1 Surficial Soils

At the request of the CTDEEP an investigation of the surficial soils located along the river bank on the east side of Mill Pond was undertaken in October 2008 during implementation of SedQAPP. This study involved the collection of shallow (top two feet) soil samples along a grid inside the vegetated river bank situated between the Mill River study Area II shoreline and the western fence line of the upland portion of the subject site. The grid was started five feet perpendicular to the fence and every ten feet thereafter trending west until the waters edge was encountered. Sample locations were adjusted in the field as necessitated by trees and the shoreline of Mill Pond. The final sample locations are presented in Figure 11.

A total of twenty-eight (28) locations were sampled and submitted to the analytical laboratory for total lead analysis. Half of the samples collected were also submitted for SPLP lead analysis. Total lead concentrations ranged from 57 mg/kg to 1,600 mg/kg and eleven (11) of the samples analyzed exhibited total lead concentrations in excess of the RSRs RES DEC for lead (400 mg/kg) in soil. SPLP lead concentrations ranged from 27 ug/L to 340 ug/L, all of which exceed the RSRs GA PMC of 15 ug/L and the surface water protection criteria (SWPC) of 13 ug/L. Twenty-two of the twenty-eight samples exhibited an exceedance of at least one of the above referenced numerical criteria.

Given the difficulty of performing deeper soil borings on the relatively steep river bank, it is instead proposed that the surface soils determined to

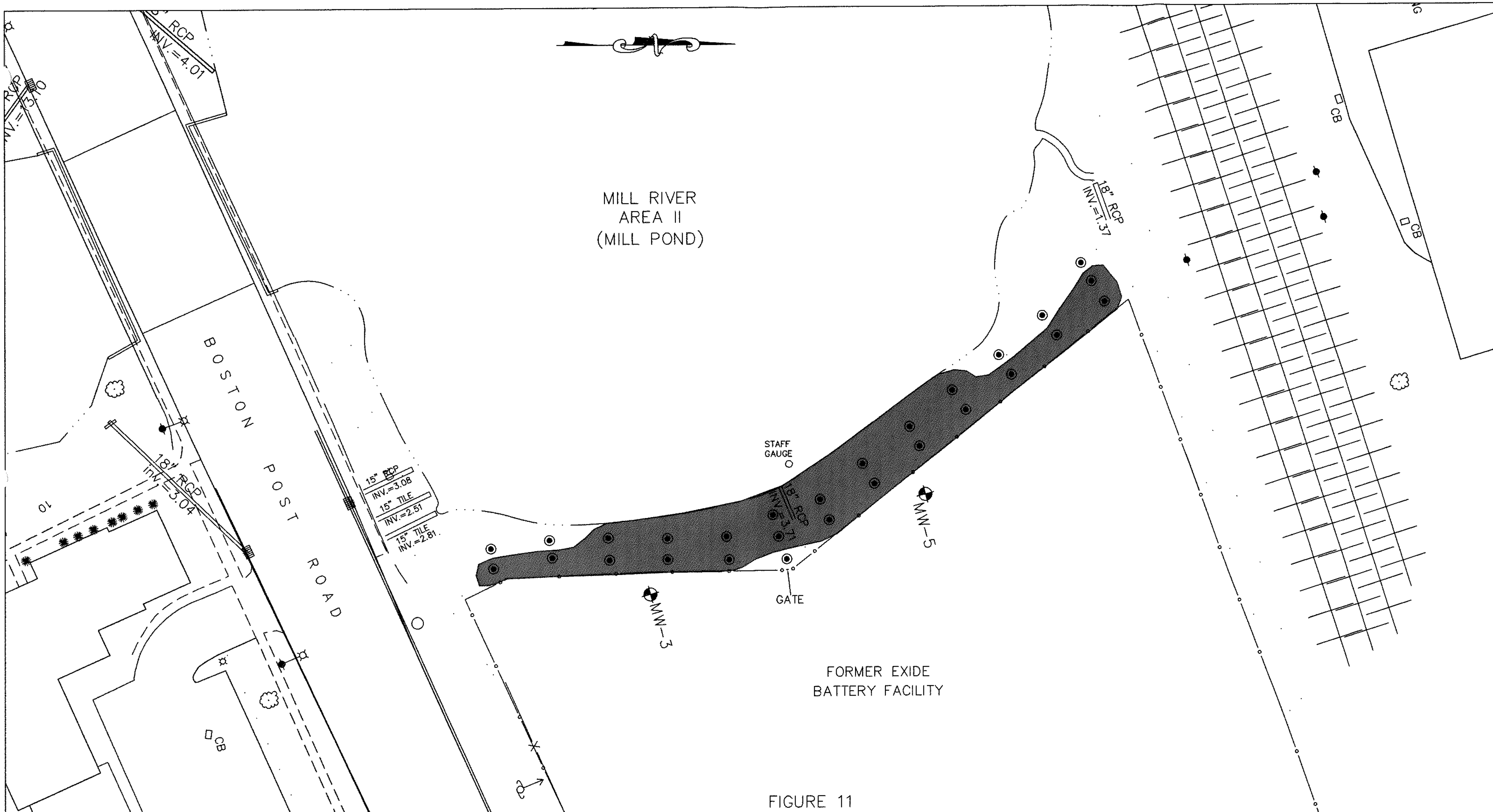

FIGURE 11
PROPOSED RIVER BANK REMEDIATION AREA
SURFACE TO 2 FEET BELOW GRADE
REMEDIAL ACTION PLAN FOR LEAD IMPACTED RIVER SEDIMENT
MILL RIVER AREAS I–V
THE FORMER EXIDE BATTERY FACILITY PROJECT
2190 BOSTON POST ROAD, FAIRFIELD, CONNECTICUT

PROPOSED REMEDIATION AREA
EDGE OF WATER
2008/2009 SED. QAPP SAMPLE LOCATION

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be impacted will be remediated (excavated for off-site disposal) and field screening of the exposed soils will be performed to determine if deeper excavation id warranted. The shading in Figure 11 illustrates the proposed remediation area based on the soil sample data.

To perform the remediation, the river bank will be first cleared of vegetation in the area where the grid sampling was performed (following removal of the north-south trending fence line and the installation of erosion controls). Next, an excavator positioned at the top of the river bank will scrape the top two feet of soils from the areas illustrated Figure 11 upslope and load the materials into a dump truck for placement into a storage cell. The two foot cut depth will be field confirmed using survey equipment as the elevation at each grid point has already been recorded.

The exposed soil surface will then be evaluated in the field organoleptically (for signs of staining or other signs of contamination) and for total lead content using a handheld x-ray fluorescence (XRF) spectrum analyzer device (Niton Model XLp – Americium 241 source) for the field screening for lead in soil. Field screening using the Niton XRF will involve spot reading taken on the exposed soil surface at approximately every five feet along the grid. The excavation will be advanced deeper if field screening indicates that in situ soils remain lead impacted. If these soils do not exhibit residual lead impacts, then formal confirmation soil samples will be collected in accordance with the procedures set forth in Section 9.2.

9.1.2 Leach field Fingers

Following successful completion of the above described remedial activity, the remnants of the former industrial wastewater leach field system will be remediated. These three remnants, historically referred to as gravel leach field fingers, were excavated to the north-south trending fence line during the 2005/2006 Upland RAP implementation. The portions of these structures extending beyond this fence were sealed with bentonite under the fence. Figure 12 illustrates the location of these structures.

The gravel comprising these structures is located approximately two feet below grade and extends to a depth of approximately 9-10 feet below grade. During the Upland RAP implementation effort, portions of the former industrial waste water leaching system, particularly the soils immediately underlying the leaching galleys, were found to be lead impacted. The gravel leachfield fingers, however, did not exhibit lead impacts, presumably because of the nature of the material (homogenous large gravel with little/no fines) and the design of the former system prevented lead impacted sludge from making it to these fingers.

Accordingly, the fingers on the east side of the river bank fence were excavated and evaluated through field screening and ultimately, were re-used as fill onsite.

A similar methodology is planned for the gravel finger residuals located on the west side of this fence. The gravel material will be excavated and evaluated, by the Engineer, for field determination of lead contamination using the Niton XRF. If this material is determined to not be lead impacted, than if will be re-used onsite. It is expected that the excavation will extend to or slightly below the water table and will be planned for low tide to minimize the inflow of river flow into the excavation as the fingers are expected to extend to the edge of Mill Pond.

Field screening and formal confirmation sampling of in situ soils will be performed only if the material excavated is determined to be lead impacted and, therefore, a reasonable potential exists for residual lead impacts to in situ soils.

9.1.3 Former Roof Drain Pipe

During implementation of the Upland RAP, the major roof drain outfall from the former plant buildings was excavated to and terminated at the river bank fence line. This fifteen inch diameter tile pipe is located at approximately nine feet below grade and during the Upland RAP work approximately one foot of lead impacted soil was discovered (and subsequently remediated) to be underlying this pipe. There is approximately thirty linear feet of this pipe remaining, starting under the fence where it was cut and sealed and ending at the edge of Mill Pond at SS-38 (the historic designation for the outfall of this pipe). This remaining section is illustrated in Figure 12.

Remediation of this pipe will be completed following the removal of the river bank fence lines, vegetation and completion of the remedial task described in Section 9.1.1. Remediation will begin with the removal of the overburden until the pipe is exposed. The overburden material will be field screened for lead content prior to re-use as backfill material. Once exposed, the pipe will be crushed in place (using the excavator bucket) and the pipe debris and the underlying one foot of soil will be excavated and placed into a stockpile cell for characterization and offsite disposal.

The floor of the pipe trench excavation will then be evaluated in the field organoleptically (for signs of staining or other signs of contamination) and for total lead content using a Niton XRF for the field screening for lead in soil. Field screening using the Niton XRF will involve spot reading taken

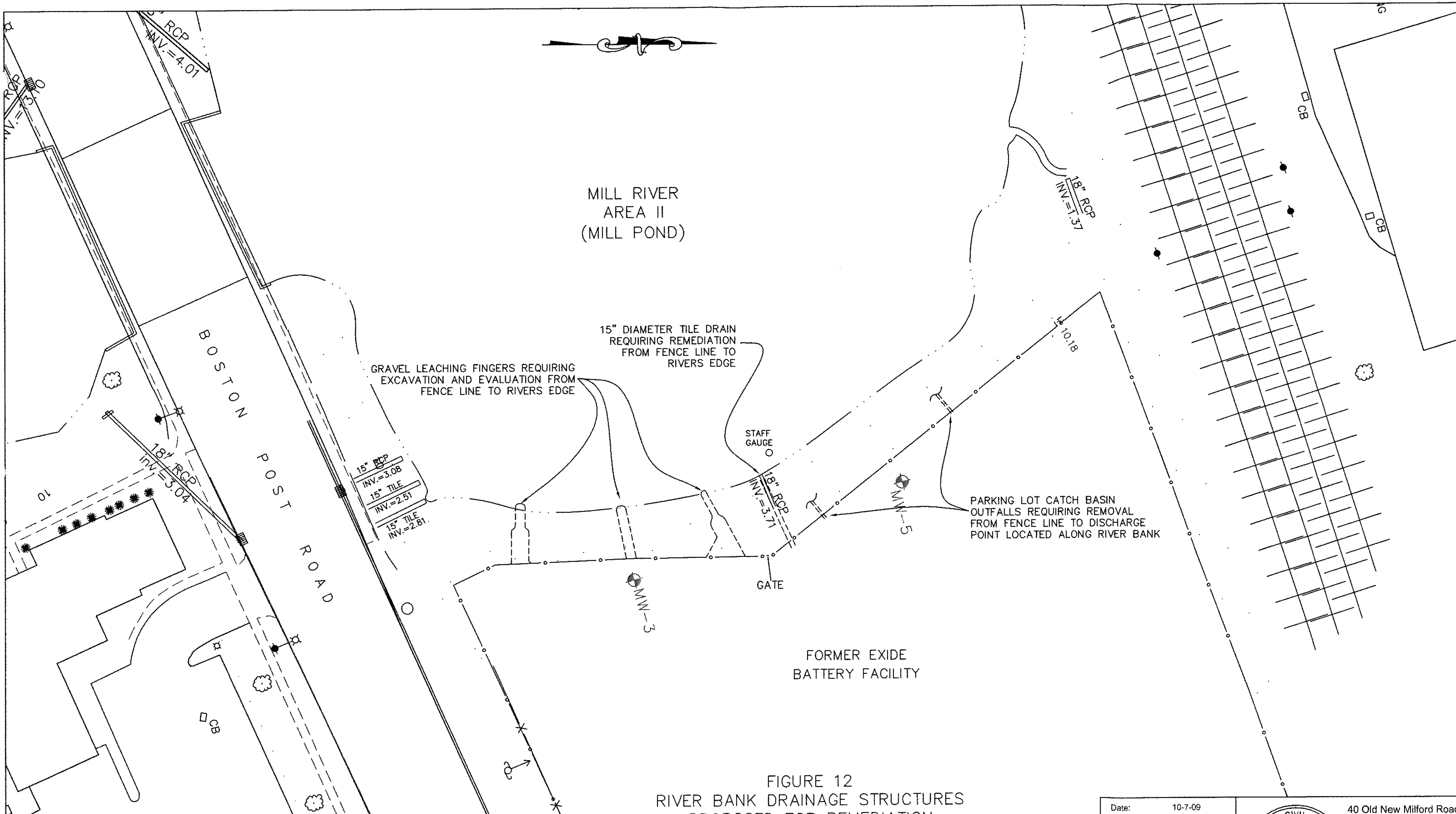

FIGURE 12
RIVER BANK DRAINAGE STRUCTURES
PROPOSED FOR REMEDIATION
REMEDIAL ACTION PLAN FOR LEAD IMPACTED RIVER SEDIMENT
MILL RIVER AREAS I–V
THE FORMER EXIDE BATTERY FACILITY PROJECT
2190 BOSTON POST ROAD, FAIRFIELD, CONNECTICUT

EDGE OF WATER ———···———

Date:	10-7-09
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on the exposed soil surface at approximately every ten feet along the trench.

The excavation will be advanced deeper if field screening indicates that in situ soils remain lead impacted. If these soils do not exhibit residual lead impacts, then formal confirmation soil samples will be collected in accordance with the procedures set forth in Section 9.2.

9.1.4 Former Catch Basin Pipes

During the Upland RAP field work two small parking lot catch basins were encountered just north of the roof drain pipe described above. These catch basins, which were located immediately adjacent to the river bank fence, were removed and their small diameter (four inch) outfall pipes were cut and sealed under the fence line. Confirmation sampling associated with these structures indicated no residual lead contamination.

The remnants of these structures will be removed following removal of the river bank fence, vegetation and completion of the remedial task described in Section 9.1.1. Remediation will begin with the removal of the overburden until the pipes are exposed. The overburden material will be field screened for lead content prior to re-use as backfill material. Once exposed, the pipes will be crushed in place (using the excavator bucket) and the pipe debris and the underlying one foot of soil will be excavated and placed into a stockpile cell for characterization and offsite disposal. The floor of the pipe trench excavations will then be evaluated in the field organoleptically (for signs of staining or other signs of contamination) and for total lead content using a Niton XRF for the field screening for lead in soil. Field screening using the Niton XRF will involve spot reading taken on the exposed soil surface at approximately every ten feet along the trenches. The excavations will be advanced deeper if field screening indicates that in situ soils remain lead impacted. If these soils do not exhibit residual lead impacts, then formal confirmation soil samples will be collected in accordance with the procedures set forth in Section 9.2

9.2 Confirmation Sampling

As described above, field screening of in situ soils will be performed in the four river bank work areas. Once field screening results are acceptable, formal laboratory samples will be collected to demonstrate compliance with the RSRs DEC & GA PMC for lead and leachable lead, respectively. In the remedial area described in Section 9.1.1 confirmation samples will be collected along at each grid point which, given the ten foot spacing, corresponds to the one-sample-per-hundred-foot of excavation floor spacing used during implementation of the Upland RAP. For the activity proposed in Section 9.1.1 only, laboratory analysis for leachable lead (SPLP) will be performed at each confirmation sample location due to a somewhat questionable correlation between total and leachable lead concentrations noted during investigation in this area. Confirmation sampling performed in the trench excavations described in Sections 9.1.2 thru 9.1.4 will also follow the Upland RAP methodology from pipe trench confirmation sampling, specifically one sample will be taken every ten linear feet. Confirmation sampling in the areas described in Section 9.1.2 is qualified by the conditions set forth in that section.

9.3 Material Handling & Storage

The material excavated from the gravel fingers area (Section 9.1.2) will be handled in accordance with the methods discussed in that section. In all of the upland work areas discussed above, overburden removed to access the target areas (i.e. impacted surface soils, piping) will be field screened for total lead content and for staining or other signs of contamination. Material determined to be un-impacted will be reused as backfill. The target material, which is the top two feet of soil for the area described in section 9.1.1 and the piping and one foot underneath for the other areas (except the gravel fingers area) will be excavated and loaded directly into a dump truck which will then transfer the material to the onsite stockpile cells. Additional materials will be excavated as dictated by field screening.

These stockpile cells will be constructed using concrete barriers (construction block) arranged such that each cell will have a capacity not to exceed 250 cu.yds. The cells will be underlain with 20 mil high density polyethylene (HDPE) sheeting, and the sheeting will be draped over and affixed to the tops of the concrete barriers. Full cells are to be kept covered with 6 mil plastic sheeting or equivalent when not being filled or characterized to avoid wind blown loss and saturation due to precipitation. Characterization of excavated materials will take place in these cells.

9.4 Characterization

The material excavated from the four river bank remediation areas discussed above will be placed into a single stockpile cell as the volume of the material is expected to be less than the 250 cu. yd capacity of the cells. Once remediation of all four areas is complete, a composite sample for laboratory analysis will be collected (from the stockpiled material) following the requirements of the landfill(s) where the material will be taken. Included in the analytical characterization will be the determination of leachable lead (TCLP) for comparison to the regulatory criteria of 5.0 mg/L.

9.5 Treatment & Disposal

Lead contaminated material exceeding the TCLP regulatory level for lead, as determined by the waste characterization program of the contractor concerned, will be either transported and disposed of as hazardous waste at an appropriately approved landfill or stabilized on-Site and disposed of at an approved RCRA lined landfill. Characterization is to be performed as expeditiously as possible to minimize the storage time of soils. All material will be transported under bill of lading or hazardous waste manifest, as appropriate.

9.5.1 Non-hazardous Soil

Soil determined to be non-hazardous will be transported off site to a lined permitted RCRA subtitle C or D landfill under non-hazardous waste manifests or bills of lading.

9.5.2 Hazardous Soil

As with the de-watered sediments, lead contaminated soil exceeding the TCLP regulatory level for lead of 5 mg/l, as determined by the waste characterization program of the contractor concerned, will be either transported and disposed of as hazardous waste at an appropriately approved landfill or stabilized on-Site and disposed of at an approved RCRA lined landfill. In short, stabilization, for the purposes of this project, will pertain to the addition of a phosphate-like reagent (in pellet or powdered form) to lead impacted material to bind lead in the material and therefore reduce the leachability of lead. Stabilization reagents will be added to materials inside the lined cells and usually added and homogenized using an excavator bucket.

10.0 POST-REMEDIATION MONITORING

Monitoring of river bottom sediments will be undertaken following project completion to confirm the successful removal of lead in bottom sediments at concentrations above the cleanup criteria.

10.1 Sediment

As discussed in Section 8.3, localized "real-time" confirmation sampling of river bottom sediments will be undertaken as dredging progresses to confirm that sediments exhibiting lead concentrations above the cleanup criteria in a given location are removed prior to movement of the dredge to another location. While this effort is a necessary and important aspect to implementation of the SedRAP, namely, to insure proper dredging depth and turbidity controls as the project progresses, it will be necessary to perform a single study area wide post-remediation sediment sampling effort following project completion to confirm the effectiveness of the project in the removal of lead above the cleanup criteria, on a large scale. Implementation of a post-remediation monitoring program is an acknowledgment that despite the "real-time" confirmation sampling and the design and implementation of best management practices to minimize the redistribution of lead impacted river sediments, the potential exists that equipment movement and/or natural processes have the potential to re-distribute sediments (some of which may be lead impacted) over the course of what will be a multi-seasonal project.

The post-remediation sampling program will follow the triangular grid based system designed for the SedQAPP implementation (also used for the "real-time" confirmation sampling of sediments) but will differ some. Specifically, the SedQAPP plan called for the collection of river bottom sediments to a depth of 36-inches below river bottom (deeper samples were collected in some areas as necessitated by findings). Since the SedRAP implementation will result in the removal of any sediment identified within the sediment profile which exceeded the cleanup criteria, post-remediation sampling to that depth will be unnecessary. Rather, the top 6-inches of sediment will be collected at each grid point location (see Drawings 15 & 16 for an illustration of the proposed post-remediation confirmation sample locations). The sediment collected will be containerized and analyzed for total lead content. The physical and hazardous waste characterization analysis performed on sediments during the SedQAPP implementation will be unnecessary as the data gathering associated with this effort is for the confirmation of lead impacted sediment removal only, whereas the previous study sought to gather data for treatment and disposal purposes in addition to the mapping of the distribution of lead in river bottom sediments.

The data gathered from the post-remediation mapping effort will be reviewed, tabulated and presented in a final report. Determination of the overall success in removing lead impacted river sediments above the cleanup criteria will be made following careful review, including statistical analysis, of the data gathered.

11.0 PROJECT PERMITTING

Implementation of the SedRAP contained herein will require the application for, and acquisition of, permits from federal, state and local agencies. Given the long regulatory review process germane to some of these permits, the application process has already been initiated. The following sections summarize the permits that EGI has been informed are required for this project, along with the status of each permit application and the expected time frame for acquisition. A matrix summarizing this information for all of the permit applications is presented as Figure 13.

11.1 Federal

There are two federal permits that will be acquired as part of this project, namely the Army Corps of Engineers General Category II Permit and the EPAs National Pollutant Discharge Elimination System (NPDES) permit (administered in Connecticut by CTDEEP). Formal application for these permits will be submitted following submittal of the final SedRAP.

11.2 State

State permits that will be acquired include the General Permit for Coastal Remedial Activities Required by Order, the General Permit for Contaminated Soil and Sediment Management and the General Permit (Registration) for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. Formal applications for these permits will be submitted upon approval of this RAP

11.3 Local

EGI is, with the assistance of soil scientists and local permitting experts, evaluating the applicability of any Town of Fairfield permits that might be related to the implementation of this project.

Figure 13
Project Riverside - Sediment Remediation Program
Mill River, Fairfield, Connecticut
Permitting Summary

The following is a list of permits and certifications that may be required to remediate lead-impacted sediments in the Mill River/Southport Harbor, Fairfield Connecticut:

- United States Army Corps of Engineers (ACOE) Category II General Permit.
- Connecticut Department of Energy & Environmental Protection (CTDEEP)
    - Registration for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities
    - Federal (USEPA) National Pollutant Discharged Elimination System (NPDES) Permit (administered by CTDEEP)
    - Contaminated Soil and/or Sediment Management (GP for Staging and Transfer)
    - Office of Long Island Sound Programs (OLISP)
        i. General Permit for Coastal Remedial Activities Required by Order

Pursuant to the above listed permits completion of a number of (CTDEEP) forms, including the following, will likely be required:

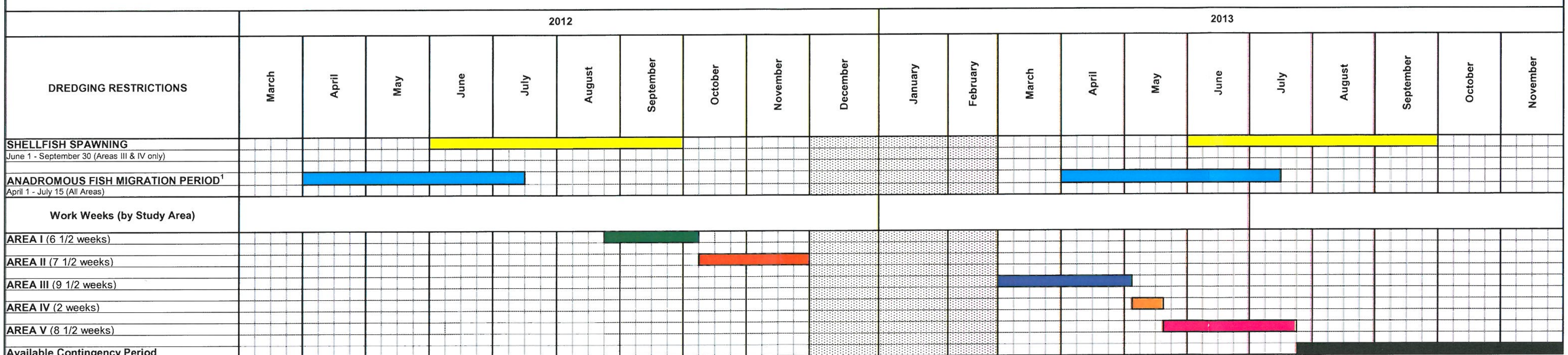
Permit Application Transmittal Form (DEP-APP-001)
Applicant Compliance Information (DEP-APP-002)
Certification of Notice Form – Notice of Application (DEP-APP-005A)
Connecticut Natural Diversity Database Review request Form (DEP-APP-007)
Applicant Background Information Form (DEP-APP-008)
Office of Long Island Sound Programs General Permit Registration Form (DEP-LIS-GP-REG)
General Permit for Contaminated Soil and Sediment Management (DEP-SW-REG-001)
General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (DEP-PED-REG-015)

In reviewing the above forms and form instructions, several of them are common forms required to be submitted when applying for approvals under one or more of the above described CTDEEP permits or certifications. The major forms require substantial attached materials such as drawings, engineering reports and notification documentation.

12.0 REMEDIAL ACTION PLAN IMPLEMENTATION SCHEDULE

Figure 14, below, presents a timeline for the dredging of the five study areas that accommodates the seasonal shellfish spawning and anadromous fish migration periods as well as the winter months. This timeline is subject to change due to prolonged regulatory review or other project delays.

Figure 14: Revised (4-25-12) RAP Implementation Timeline
Remedial Action Plan for Lead Impacted Sediments
Mill River Study Areas I-V
The Former Exide Battery Facility Project
2190 Boston Post Road, Fairfield CT



[1] = Dredging will be permitted during this period subject to the implementation of engineered controls (e.g. "dredge cells" and real time monitoring).

= winter shut-down period