WORK PLAN

REMOVAL ACTION WORK PLAN
JORGENSEN FORGE EARLY ACTION AREA

Prepared for

U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

On behalf of

Earle M. Jorgensen Company
10650 South Alameda Street
Lynwood, California 90262

Prepared by

Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, Washington 98101

Pacific Pile & Marine, L.P.
700 South Riverside Drive
Seattle, Washington 98108

April 2014

REMOVAL ACTION WORK PLAN
JORGENSEN FORGE EARLY ACTION AREA

Prepared for

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

On behalf of

Earle M. Jorgensen Company
10650 South Alameda Street
Lynwood, California 90262

Prepared by

Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, Washington 98101

Pacific Pile & Marine, L.P.
700 South Riverside Drive,
Seattle, Washington 98108

April 2014

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Purpose 1
1.2 Background 2
1.3 Work Plan Scope and Organization 3
2 REMOVAL ACTION DESIGN AND OBJECTIVES 4
2.1 Removal Action Description 4
2.2 Removal Action Objectives 7
2.3 Performance Standards 8
2.3.1 In-water Dredging and Off-site Disposal 8
2.3.2 Backfill of Dredge Areas 9
2.3.3 Shoreline Stabilization and Containment 9
3 PROJECT TEAM 11
3.1 Lead Responsible Owner 11
3.2 Lead Agency 12
3.3 Construction Management Team 13
3.3.1 Project Coordinator 13
3.3.2 Construction Management 13
3.3.2.1 Principal-in-Charge and Health and Safety Manager 14
3.3.2.2 Project Engineer 14
3.3.2.3 Construction Quality Assurance Officer 15
3.3.2.4 Field Sampling and Monitoring Lead 16
3.4 Contractor 16
3.4.1 Contractor Roles/Responsibilities 16
3.4.2 Contractor Personnel 17
3.4.2.1 Project Manager 17
3.4.2.2 On-site Construction Manager/Superintendent 18
3.4.2.3 CQC Manager/PPM Project Engineer 18
3.4.2.4 Health and Safety Manager 19
3.4.2.5 Dredging Superintendent 19
3.4.2.6 Shoreline Bank Excavation Superintendent 19

3.4.2.7 Subcontractors 19
3.5 Principal Stakeholders 19
3.5.1 Jorgensen Forge 20
3.5.2 Muckleshoot Indian Tribe 20
3.5.3 Boeing 20

4 COORDINATION WITH JORGENSEN FORGE, ADJACENT REGULATORY CLEANUPS, AND OTHER ACTIVITIES 21
4.1 Site Coordination, Access, and Security 21
4.2 Tribal Fishing Coordination 22
4.3 Boeing Duwamish Sediment Other Area Corrective Action 22
4.4 Jorgensen Forge Outfall Site Removal Action 23
4.5 South Park Bridge Construction 24
4.6 Terminal 117 Removal Action 24

5 CONTRACTOR WORK PLAN 26
5.1 Project Work Plan Overview 26
5.1.1 Summary of Contractor Means and Methods 26
5.1.2 Project BMPs 30
5.1.2.1 Dredge Material Unit Sequencing 31
5.1.2.2 Sand Cover 31
5.1.2.3 Dredging Equipment 31
5.1.2.4 Dredging Bucket 32
5.1.2.5 Dredge Bucket Positioning 32
5.1.2.6 Dredge Cuts on Slopes 33
5.1.2.7 Pile Removal 33
5.1.2.8 Dredge Slopes with Excavator 33
5.1.2.9 Water Management 34
5.1.2.10 Intertidal Sediment and Shoreline Bank Soil Removal 35
5.1.2.11 Backfill Placement 36
5.1.3 Temporary Facilities, Staging, and Access 36
5.1.4 Offsite Staging and Transloading 37
5.1.5 Project Schedule 37
5.2 Demolition Plan 37

5.2.1 Pre-Demolition Activities 38
5.2.2 Means and Methods 38
5.2.3 Schedule/Hours of Work 39
5.2.4 Demolition, Disposal and Salvage 39
5.3 Dredging/Excavation, Upland and Haul Barge Transport, and Dewatering Plan 40
5.3.1 Work Sequence 40
5.3.2 Means and Methods 41
5.3.3 Positioning Methods and Procedures 46
5.3.4 Quantity Tracking 46
5.3.5 Transloading Material 47
5.3.6 Schedule and Hours of Work 47
5.3.7 Water Quality Management 47
5.3.8 Notifications 47
5.4 Transload, Transport, and Disposal Plan 48
5.4.1 Summary of Dredging Transportation and Disposal Procedures 48
5.4.2 Summary of Shoreline Bank Transportation and Disposal 49
5.4.3 Generated Wastes 51
5.4.4 Proposed Disposal Facilities 52
5.5 Backfilling Plan 52
5.5.1 Material Sources, Products, and Suppliers 52
5.5.2 Means and Methods 53
5.5.3 Schedule and Hours of Work 55
5.6 Survey Plan 55
5.7 Vessel Management Plan 56
5.8 Traffic Control Plan 56
5.9 Contractor Quality Control Plan 57
5.10 Temporary Facilities and Controls and Environmental Pollution Control Plan 57
5.11 Water Management and Treatment Plan 58
5.11.1 Shoreline Bank Excavation and Stockpile Water Management 59
5.11.2 Dredge Water Management and Treatment 59
5.12 Facility Restoration 62

6 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL 63
6.1 Submittal Management 63

6.2 Weekly Progress Meetings 63
6.3 Inspection, Sampling, and Verification Activities.....64
6.3.1 Overview.....64
6.3.2 Verification Survey 64
6.4 Documentation and Reporting.....64
6.4.1 Contractor's Daily Quality Control Report.....64
6.4.2 Construction Quality Assurance Officer's Daily Report 65
6.4.3 Water Quality Monitoring Reports.....65
6.4.4 Hydrographic and Topographic Survey Reports 66
6.4.5 Sediment Verification Sampling.....66
6.4.6 Borrow Site Characterization Reports.....66
6.5 Field Change Documentation.....67
6.6 Post-Construction Documentation 67

7 LONG-TERM INSTITUTIONAL CONTROLS 71
7.1 Purpose and Objectives of Institutional Controls for RAB.....71

8 PROJECT SCHEDULE 73

9 REFERENCES 74

List of Tables

Table 1 Material Description and Disposal Facility 51

List of Figures

Figure 1 Jorgensen Forge Early Action Area
Figure 2 Removal Action Boundary
Figure 3 Project Team Organizational Chart
Figure 4a JFOS-Impacted Material Area Revised Dredge Prism and Containment Barrier Wall Alignment
Figure 4b JFOS-Impacted Material Area Cross-Sections
Figure 5 Dredge Plan
Figure 6 Dredge Water Removal Plant Layout and Process Flow Diagram
Figure 7 Pacific Pile & Marine TTD Facility Plan

List of Appendices

Appendix A-1	Anchor QEA CHASP (formerly Appendix K of the BODR)
Appendix A-2	Pacific Pile & Marine CHASP
Appendix B	Final Memorandum: Clean Water Act §401 Substantive Water Quality Requirements for the Jorgensen Forge Early Action Area Removal Action
Appendix C	Temporary Facilities and Controls and Environmental Pollution Control Plan
Appendix D	Demolition Plan
Appendix E	Dredge/Excavation, Haul Barge Transport, and Dewater Plan
Appendix F	Traffic Control Plan
Appendix G	Water Management and Treatment Plan
Appendix H	Transload, Transport, and Disposal Work Plan
Appendix I	Vessel Management Plan
Appendix J	Backfill Plan
Appendix K	Survey Plan
Appendix L	Planning Level Comprehensive Project Schedule

LIST OF ACRONYMS AND ABBREVIATIONS

Action Memo	Action Memorandum for a Non-Time-Critical Removal Action at the Jorgensen Forge Early Action Area of the Lower Duwamish Waterway Superfund Site in Seattle, Washington
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ASRF	Waste Management Alaska Street Reload Facility
BMP	best management practice
BODR	Basis of Design Report
Boeing	The Boeing Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHASP	Construction Health and Safety Plan
COC	chemical of concern
CQA	construction quality assurance
CQAO	Construction Quality Assurance Officer
CQAP	Construction Quality Assurance Plan
CQC	construction quality control
CRL	Columbia Ridge Landfill and Recycling Center
cy	cubic yard
DMU	Dredge Management Unit
DSOA	Duwamish Sediment Other Area
EAA	Early Action Area
Ecology	Washington State Department of Ecology
ECP	Temporary Facilities and Controls and Environmental Pollution Control Plan
EE/CA	Engineering Evaluation/Cost Analysis
EMJ	Earle M. Jorgensen Company
EPA	U.S. Environmental Protection Agency

Facility	Jorgensen Forge facility
GAC	granular activated carbon
gpm	gallons per minute
GPS	Global Positioning System
H:V	horizontal to vertical
JFOS	Jorgensen Forge Outfall Site
Jorgensen Forge	Jorgensen Forge Corporation
LDW	Lower Duwamish Waterway
mg/kg	milligrams per kilogram
MLLW	mean lower low water
MOU	Memorandum of Understanding
NTCRA	non-time-critical removal action
PCB	polychlorinated biphenyl
PPM	Pacific Pile & Marine, L.P.
PVC	polyvinyl chloride
RAB	removal action boundary
RACR	Removal Action Completion Report
RAO	removal action objective
RAWP	Removal Action Work Plan
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPM	Remedial Project Manager
RTK	Real Time Kinematic
RvAL	removal action level
SMS	Sediment Management Standards
SOW	Statement of Work
SPCC	Spill Prevention, Control, and Countermeasures Plan
SQS	Sediment Quality Standards

SWPPP	Stormwater Pollution Prevention Plan
Terrasond	Terrasond Engineering, Inc.
Tribe	Muckleshoot Indian Tribe
TSCA	Toxic Substances Control Act
TTD	Transload Transport and Disposal
USACE	U.S. Army Corps of Engineers
Waste Management	Waste Management National Services
WDFW	Washington Department of Fish and Wildlife Services
WQMP	Water Quality Monitoring Plan
WQMR	Water Quality Monitoring Report

1 INTRODUCTION

This Removal Action Work Plan (RAWP) has been prepared on behalf of Earle M. Jorgensen Company (EMJ) to present the scope of work for the removal action implementation at the Jorgensen Forge Corporation (Jorgensen Forge) facility (Facility) located in Tukwila, King County, Washington (Figure 1). This RAWP describes the construction activities planned as part of the implementation; sequencing; water treatment requirements; and coordination, construction quality assurance (CQA), and construction quality control (CQC) activities for the removal of contaminated sediments and associated shoreline bank soils in a portion of the Lower Duwamish Waterway (LDW) Superfund Site adjacent to the Facility.

This RAWP was prepared pursuant to the Administrative Settlement Agreement and Order on Consent for performing a Non-Time Critical Removal Action (NTCRA) (Settlement Agreement) issued by U.S. Environmental Protection Agency (EPA) Region 10 on November 5, 2012 under the EPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Docket No. 10-2013-0032 and attached Statement of Work (SOW).

1.1 Purpose

The purpose of the RAWP is to provide a detailed description of the removal action design, construction activities and sequencing, Contractor means and methods, water treatment, site monitoring, anticipated material staging and handling procedures, The Boeing Company (Boeing) Plant 2 Resource Conservation and Recovery Act (RCRA) sediment corrective action, Terminal 117 NTCRA, as well as tribal treaty-protected fishing rights and other LDW activities. This RAWP provides specifics on how the Contractor will implement: 1) the Contract Documents (for purposes of this document, the term Contract Documents refers to the Construction Drawings, Construction Specifications, and Addenda developed consistent with the Basis of Design Report [BODR; Anchor QEA 2013a]); and 2) the BODR and BODR Addendum (Anchor QEA 2014) approved by EPA—collectively referred to as the BODR in this document. The Contract Documents have been previously submitted under separate cover to EPA. This RAWP presents the Removal Action objectives (RAOs), sampling and analysis procedures, and quality assurance procedures for the Removal Action, and includes:

- Temporary Facilities and Controls and Environmental Pollution Control Plan (ECP; Appendix C)

- Demolition Plan (Appendix D)
- Dredge/Excavation, Haul Barge Transport, and Dewater Plan (Appendix E)
- Traffic Control Plan (Appendix F)
- Water Management and Treatment Plan (Appendix G)
- Transload, Transport, and Disposal Work Plan (Appendix H)
- Vessel Management Plan (Appendix I)
- Backfill Plan (Appendix J)
- Survey Plan (Appendix K)

1.2 Background

EMJ entered into an Administrative Order on Consent (AOC) with EPA on July 10, 2003 (EPA Docket No. CERCLA-10-2003-0111), to investigate whether the Facility, which is currently owned and operated by Jorgensen Forge and formerly owned and operated by EMJ, is or has been a source of polychlorinated biphenyls (PCBs) to the LDW. The analytical results of soil and sediment samples adjacent to the Facility collected during the investigation detected concentrations of PCBs and metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc) in sediment and soil on the shoreline bank in the LDW adjacent to the Facility. EPA determined that these concentrations present a risk to human health and the environment and met the criteria for conducting a NTCRA under CERCLA (EPA 2008a). EPA and EMJ entered into the First Amendment to the AOC in April 2008. This amendment required EMJ to prepare an Engineering Evaluation/Cost Analysis (EE/CA), Biological Assessment, and Clean Water Act Section 404(b)(1) Evaluation for the completion of a NTCRA of sediments and associated shoreline bank soil in the Jorgensen Forge Early Action Area (EAA) removal action boundary (RAB) that contain concentrations of chemicals that exceed the Washington State Department of Ecology (Ecology) Sediment Management Standards (SMS) Sediment Quality Standards (SQS). The RAB was approved by EPA in 2008 (EPA 2008b).

EMJ submitted a Final EE/CA to EPA in October 2011 (Anchor QEA 2011). EPA provided conditional approval of the Final EE/CA with slight modifications in a letter dated September 29, 2011, and subsequently provided formal approval of the Final EE/CA. The selected removal action alternative (Alternative 4 in the Final EE/CA) was presented by EPA in the

Action Memorandum for a Non-Time-Critical Removal Action at the Jorgensen Forge Early Action Area of the Lower Duwamish Waterway Superfund Site in Seattle, Washington (Action Memo; EPA 2011). The issuance of the Action Memo completed the requirements of the AOC (EPA Docket No. CERCLA-10-2003-0111). EPA issued a certification of completion of the AOC to EMJ in October 2012.

Removal action design, construction, and long-term operations, maintenance, and monitoring are being conducted under the Settlement Agreement.

1.3 Work Plan Scope and Organization

This RAWP details the activities planned for in-water dredging, shoreline excavation, placement of backfill and shoreline containment, transport and off-site disposal of impacted sediments and soils, and associated construction and monitoring activities. The cleanup will be conducted as a NTCRA in accordance with EPA's selected removal action alternative documented in the Action Memo (EPA 2011) and detailed in the EE/CA (Anchor QEA 2011). The RAWP is organized into the following sections:

- Section 1 – Introduction
- Section 2 – Removal Action Design and Objectives
- Section 3 – Project Team
- Section 4 – Coordination with Jorgensen Forge, Adjacent Regulatory Cleanups, and Other Activities
- Section 5 – Contractor Work Plan
- Section 6 – Construction Quality Assurance/Quality Control
- Section 7 – Long-term Institutional Controls
- Section 8 – Schedule
- Section 9 – References

2 REMOVAL ACTION DESIGN AND OBJECTIVES

The following subsections provide an overview of the removal action, including a description of the EPA-approved alternative, the EPA-directed RAOs, and the performance standards established in the Contract Documents and the EPA-approved BODR.

2.1 Removal Action Description

The EPA-approved removal action alternative (EPA 2011) includes the removal of the vertical and horizontal extents of total PCB removal action level (RvAL) sediment and shoreline bank exceedances identified within the RAB. EPA set the RvAL to be equivalent to the Ecology SMS SQS for total PCBs. While metals (i.e., arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc) have also been identified as chemicals of concern (COCs), they are co-located with elevated concentrations of PCBs within the RAB and will therefore be removed upon removal of PCB RvAL exceedances.

In accordance with EPA's direction, the RAB was developed by screening the available sediment and shoreline bank soils and angled Geoprobe borings collected as part of the Jorgensen Forge Outfall Site (JFOS) Removal Action (see Section 4.4) total PCB data against the total PCB RvAL. Based on the findings of the data screening and the site-specific conditions described in the Final EE/CA (Anchor QEA 2011), the BODR, the EPA-approved RAB was identified as the 1.6-acre area shown in Figure 2, and is bounded by the following:

- To the east, by the top of the shoreline bank (including the top of the sheetpile and concrete panel walls) extending from the northern to southern Facility property boundaries, with two areas extending just beyond the top of shoreline bank, as discussed below
- To the south, by the extension of the southern Facility property boundary from the top of the concrete panel wall to the eastern boundary of the federal navigation channel
- To the west, by the eastern boundary of the federal navigation channel extending from the southern boundary to the Boeing Duwamish Sediment Other Area (DSOA) in-water cleanup boundary identified in the Memorandum of Understanding (MOU; EMJ et al. 2007; see Section 3.5.3) followed by the surveyed (during low tide on August 28, 2008) toe of riprap elevation north of the in-water cleanup boundary:

  - Per EPA's letter (2008b), the western boundary includes an isolated 20-foot extension into the federal navigation channel centered on core sampling station SD-322-S

- To the north, by three boundaries: 1) the Boeing DSOA in-water cleanup boundary on the southern end; 2) the Facility northern property line on the northern end; and 3) the JFOS containment barrier on the eastern end.

The removal action includes shoreline bank excavation and placement of slope containment materials. This portion of the shoreline is degraded, containing elevated chemical concentrations above the SMS SQS criteria and total PCB RvAL exceedances; highly armored and over-steepened (approximately 1 to 1 horizontal to vertical slope [1H:1V slope]) banks; and derelict creosote-treated piles, remnant overhanging asphalt pads, and other types of debris. Existing derelict creosote-treated piles, overhanging asphalt structures, and debris will be removed from the bank prior to excavation and slope containment. Upon excavation to the target depths, inert debris identified along the new surface may be allowed to remain in place if doing so would not affect the function of the overlying slope containment. The excavated materials with concentrations below the Toxic Substances Control Act (TSCA) thresholds will be transported by truck and disposed at an off-site RCRA-permitted Subtitle D disposal facility: either the Waste Management National Services (Waste Management) Columbia Ridge Landfill and Recycling Center (CRL) or Greater Wenatchee Regional Landfill, as described in Section 5.4. The excavated materials with concentrations above the TSCA thresholds will be placed directly into lined containers on a truck, and transported to the off-site RCRA-permitted Subtitle C Chemical Waste Management of the Northwest landfill, as described in Section 5.3.2.

Following completion of the shoreline bank excavation to the design grades and collection of post-excavation shoreline bank z-layer samples (see Section 6.4.5), clean slope containment materials will be placed on the post-excavation surface. The slope containment will be composed of a 1.5-foot "filter" layer amended with granular activated carbon (GAC; consisting of sandy gravel to gravelly sand), overlain by a 2.5-foot "armor" layer (consisting of light loose riprap), and further overlain by a 0.5-foot layer of habitat substrate (anticipated to consist of rounded or sub-rounded 2.5-inch minus gravel). The filter layer will act as a containment layer; the armor layer will function to protect the filter layer from erosion; and

the habitat layer will provide a uniform habitat substrate within the intertidal areas and function to fill the interstitial areas of the armor layer.

The removal action also includes dredging of the subtidal portions of the RAB (elevation cutoff to be determined based on tidal elevations during construction). Dredged sediment with concentrations below the TSCA threshold will be direct loaded into sealed sediment material barges, and will be continually dewatered during loading. The dewater effluent will be conveyed to an on-barge water treatment system and the treated water will be discharged back into the LDW in the direct vicinity of the dredging activities. The removed materials will be transported by barge to the downstream Pacific Pile & Marine, L.P. (PPM) Yard where it will be offloaded directly into truck-and-trailer combinations for transportation and disposal at either the CRL or Greater Wenatchee Regional Landfill, as described in Section 5.4.

The removal action area will be divided into five Dredge Management Units (DMUs). Following completion of dredging to the design grades, survey approval, and collection of post-dredge sediment z-layer samples within a DMU, clean sand backfill materials will be placed on the post-excavation surface. An interim sand backfill layer of a nominal 6 inches will be placed within a DMU as soon as practical, followed by the remainder of the backfill material required to achieve final design grades. The final 2-foot layer of sand backfill will not be placed until dredging is complete within the entire RAB. Placement of interim backfill within a completed DMU will not occur until dredging activities in the adjacent downstream DMU are greater than 50 feet away. This will provide a spatial buffer for potential residuals migration into backfill areas.

The removal action will be completed such that impacts are minimized to the existing sheetpile wall and concrete panel walls (located along southwest portion of shoreline), as well as to existing in-use concrete foundations and structures within close proximity to the top of the shoreline bank. Construction limits, as shown on the Drawings, include offsets from existing structures to minimize potential damage.

2.2 Removal Action Objectives

The removal action is being prepared prior to the Record of Decision (ROD) for the LDW Superfund Site; therefore, final RAOs and final removal action standards, including the vertical point of compliance, target media RvALs, and sediment removal action boundaries, have not been determined. For the purpose of this RAWP, prepared prior to completion of the ROD, the following EPA-directed (EPA 2010) RAOs were used to maintain consistency with the current RAOs required throughout the LDW Superfund Site:

1. Human Health – Seafood Consumption. Reduce human health risks associated with the consumption of resident LDW seafood by reducing sediment and surface water concentrations of COCs to protective levels.
2. Human Health – Direct Contact. Reduce human health risks associated with exposure to COCs through direct contact with sediments and incidental sediment ingestion by reducing sediment concentrations of COCs to protective levels.
3. Ecological Health – Benthic. Reduce toxicity to benthic invertebrates by reducing sediment concentrations of COCs to comply with Ecology SMS SQS.
4. Ecological Health – Seafood Consumption. Reduce risks to crabs, fish, birds, and mammals from exposure to COCs by reducing concentrations of COCs in sediment and surface water to protective levels.
5. Groundwater and Sediment Protection. Reduce migration of contaminants in groundwater to sediments to reduce risks to human health and the environment.

To achieve these RAOs in the 0-to 1.5-foot vertical point of compliance, EPA directed the use of the SQS for total PCBs (12 milligrams per kilogram [mg/kg] of normalized organic carbon) as the appropriate delineating criterion and the appropriate RvAL for sediment removal and/or shoreline containment in the RAB (EPA 2010). The use of the total PCB SQS criterion as the RvAL for sediment removal and shoreline containment is consistent with the LDW Slip 4 EAA, Terminal 117 EAA, and Boeing Plant 2 DSOA EAA cleanups. Removal of sediments containing total PCB RvAL exceedances will result in the removal of all other COC SQS exceedances.

As identified in EPA's Action Memo (EPA 2011), the EPA-selected removal action will meet the above RAOs with the exception of the RAO for human seafood consumption over the long term. The Action Memo states:

> *The RBCs* [Risk Based Concentrations] *necessary to protect unlimited human seafood consumption are very stringent. The goal for the LDW as a whole is to get as close to them as practicable. Achieving them may be impossible as they are more stringent than background concentrations, including natural background as defined by MTCA. However, this sediment removal will remove all contaminant concentrations over its aerial extent and will replace them with clean fill material meeting the backfill levels for final actions. Upon completion therefore, these formerly contaminated sediments will meet all cleanup goals and levels until they are recontaminated, to however marginal degree, by surrounding LDW concentrations, and LDW sources generally. These later post-NTCRA levels will be addressed by the LDW Record of Decision in a manner consistent with the rest of the LDW since the Jorgensen Forge EAA will remain part of the LDW site after this NTCRA is completed. It is important to emphasize that protective levels of COCs, particularly PCBs, are well below background concentrations, so it will not be possible, based on everything we know at this time, over the long term, to completely eliminate any unacceptable risk from this pathway without limiting fish consumption to some degree.*

2.3 Performance Standards

To achieve the Jorgensen Forge EAA RAOs, performance standards were established in the BODR (Anchor QEA 2013a). These performance standards were used to guide the removal action design, and will be applied to construction, construction verification, and long-term monitoring activities, and are detailed in Sections 2.3.1 through 2.3.3.

2.3.1 In-water Dredging and Off-site Disposal

The following in-water dredging and off-site disposal performance standards have been established to apply to the work:

- Impacted sediment, defined as sediments containing total PCB concentrations greater than the total PCB RvAL, shall be removed within the EPA-approved RAB.

- The work shall be completed consistent with best management practices (BMPs) in order to minimize dredge residuals, releases, and recontamination of adjacent areas outside the RAB.
- The work shall be completed consistent with BMPs and the EPA-prepared 401(c) Water Quality Memorandum (Appendix B) requirements in order to minimize water quality impacts outside the compliance boundary.
- The dredged sediment shall be transported to an off-site offloading facility and subsequently hauled and disposed at an approved landfill facility.

2.3.2 Backfill of Dredge Areas

The following backfill performance standards in dredge areas have been established to apply to the work:

- Areas dredged to remove sediments and soils exceeding the total PCB RvAL shall be restored to roughly the pre-removal grade with backfill material. Some areas within and directly adjacent to the navigation channel and on the shoreline bank may be at lower elevations following backfilling than pre-removal grade.
- The gradation of the backfill material shall be such that the surface of the backfill material generally remains stable without significant erosion over time.
- Imported backfill material shall meet defined chemical and geotechnical goals.
- The work shall be completed consistent with BMPs in order to minimize adjacent slope instability and dredge residuals migration.
- The work shall be completed consistent with BMPs and the EPA-prepared 401(c) Water Quality Memorandum (Appendix B) requirements in order to minimize water quality impacts outside the applicable compliance boundaries.

2.3.3 Shoreline Stabilization and Containment

The following shoreline stabilization performance standards have been established to apply to the work:

- The shoreline bank shall be regraded to a flatter slope to promote better long-term stability.

- The nearshore bank sediment, soil, piles, concrete, and debris excavated from the designated shoreline shall be disposed of at an approved landfill facility.
- The excavated surface of the shoreline bank shall be contained and armored to resist erosion and instability. The surface armoring shall be designed to resist bed shear velocities induced by a 100-year flood flow, 100-year wind-induced waves, vessel-induced waves from typical passing vessels, and anticipated propeller wash from vessels that operate in the area. The armoring design also accounts for projected sea level rise in the Puget Sound area.
- The target total thickness of the shoreline bank containment shall be a minimum of 4 feet thick and will include a 1.5-foot filter material layer, overlain by a 2.5-foot armor layer, overlain by a 0.5-foot habitat material layer.
- Imported shoreline bank stabilization materials shall meet defined chemical and geotechnical goals.
- The work shall be completed consistent with BMPs in order to minimize slope instability during construction, the duration of in-water work based on tidal elevations during construction, and the migration of excavation residuals.
- The work shall be completed consistent with BMPs and the EPA-prepared 401(c) Water Quality Memorandum (Appendix B) requirements in order to minimize water quality impacts outside the compliance boundary.

3 PROJECT TEAM

The following subsections present the formulation of the Project Team, including roles and responsibilities of the parties involved in the removal action activities. A Project Team Organization Chart is presented in Figure 3. The Project Team comprises the following entities:

- **Lead Responsible Owner:** EMJ – Responsible for implementing the RAWP in accordance with the AOC with EPA
- **Lead Agency:** EPA – Lead agency responsible for overseeing implementation of the RAWP
- **Construction Management Team**: Responsible for construction management and administration
  - Farallon Consulting – Project Coordination
  - Anchor QEA – Project Management and Administration
- **Construction Contractor**: PPM – Responsible for performing the construction in conformance with the Contract Documents and BODR
- **Principal Stakeholders** (further described in Section 3.5)**:**
  - Jorgensen Forge – Current owner and operator of facility and subject to the terms and conditions of the MOU, which provides EMJ the necessary access to the Jorgensen Forge property for performance of the work.
  - The Muckleshoot Indian Tribe (Tribe) – The Tribe has usual and accustomed tribal treaty fishing rights to the LDW. Project work is being coordinated so as to not impact tribal fishing rights.
  - Boeing – Boeing is owner of the property directly north of the project site and is performing the Plant 2 RCRA sediment corrective action.

Specific Project Team roles and responsibilities and contact persons are listed in Sections 3.1 through 3.5.

3.1 Lead Responsible Owner

An AOC has been executed between EPA and EMJ for performance of the removal action. In the AOC, EMJ is designated as the Lead Responsible Owner responsible for performance

of the EAA removal action activities and is designated as Owner in the Contract Documents. The EMJ Program Manager for this project is Gil Leon. The EMJ Program Manager will have authority to direct the Contractor and coordinate directly with EPA.

3.2 Lead Agency

EPA is the lead agency responsible for overseeing and authorizing the removal action activities. In this capacity, EPA will review information described in the BODR and this RAWP for consistency with the RAOs, the AOC, and Applicable or Relevant and Appropriate Requirements (ARARs). Specifically, EPA will be responsible for:

- Performing oversight to assure compliance with the BODR and RAWP
- Coordinating involvement of all other federal and state agencies
- Reviewing, negotiating, and approving any changes or modifications to the removal action as defined in the BODR and RAWP, as may be required during performance of the work

The EPA Remedial Project Manager (RPM) for this project is Rebecca Chu, EPA Region 10. Ms. Chu will represent EPA during performance of the project. The EPA RPM shall notify EMJ if they identify any concerns regarding the implementation of the removal action. EMJ, or a designated representative, will propose to the EPA RPM response measures or recommendations, as appropriate. EPA, as appropriate, will make final decisions to resolve such issues or problems that may change the removal action scope.

The EPA RPM will be supported by the EPA Region 10 Environmental Review and Sediment Unit, Water Quality Manager, Erika Hoffman. She will provide support to the RPM as required for the EPA Environmental Review and Sediment Management Unit, serve as the agency water quality monitoring contact, and make technical decisions regarding water quality monitoring results and response actions.

The EPA RPM will also be supported by the U.S. Army Corps of Engineers (USACE) in performance of project oversight. The USACE has entered into an Interagency Agreement with EPA to provide oversight support during this removal action. The USACE Oversight Manager is not yet identified for this project.

3.3 Construction Management Team

The following sections identify the construction management team.

3.3.1 Project Coordinator

Farallon Consulting will provide Project Coordinator services for the project. The Project Coordinator will be responsible for the following:

- Primary point of contact for regulatory communications
- Direct line of contact between EMJ, EPA, Jorgensen Forge, Boeing, Tribes, and the Contractor
- Developing and submitting formal communications between EPA and EMJ
- Maintaining a complete correspondence and project file
- Attending all necessary meetings with EMJ and EPA and providing any necessary input on behalf of EMJ

Amy Essig Desai, Principal Scientist, Farallon Consulting, will serve as the Project Coordinator.

3.3.2 Construction Management

Anchor QEA will provide construction management services for the project.
In this capacity Anchor QEA will provide the following services:

- Establishing and maintaining lines of communication between Project Team members
- Establishing and maintaining the project record-keeping system
- Internal coordination of contracting and construction management
- Coordinating with Construction Quality Assurance Officer (CQAO) and Project Engineer to communicate information to EMJ Project Coordinator
- Monitoring construction schedule and communicating approaching milestones and deviations
- Processing Contractor submittals
- Responding to Contractor's requests for information
- Tracking changes in construction documents
- Reviewing Contractor's requests for payment

- Preparing field reports and record documents
- Processing change order requests
- Performing compliance sampling and analysis

Sections 3.3.2.1 through 3.3.2.4 list the specific Construction Management personnel and their roles and responsibilities.

3.3.2.1 Principal-in-Charge and Health and Safety Manager

David Templeton, Principal, Anchor QEA, will serve as project Principal-in-Charge and Health and Safety Manager. In this role, Mr. Templeton will provide senior oversight to the Project Engineer. Mr. Templeton will also direct the implementation of the site-specific Anchor QEA Construction Health and Safety Plan (CHASP; Appendix A-1). This CHASP will cover all Anchor QEA personnel providing support for the work. The Contractor and their subcontractors will operate under their own Contractor CHASP (see Section 3.4.2.4 and Appendix A-2).

3.3.2.2 Project Engineer

The Project Engineer will be Ryan Barth, P.E., Anchor QEA. The Project Engineer will be specifically responsible for the following:

- Coordinating and maintaining lines of communication between Project Team members
- Coordinating and documenting preconstruction meetings, project partnering meeting, and project progress meetings as required
- Establishing and maintaining the project record-keeping system
- Monitoring construction schedule and communicating approaching milestones and deviations to team members
- Coordinating appropriate team member review of Contractor deliverables, including submittals, requests for information, and requests for payment
- Coordinating appropriate team member review of information provided by the Contractor for compliance with the Construction Specification requirements
- Performing/coordinating Contract Documents compliance monitoring inspections

- Coordinating review of compliance monitoring inspection information for compliance with Contract Documents
- Notifying the Contractor of any non-compliance regarding the Contract Document requirements
- Distributing weekly construction progress reports including water quality monitoring compliance reports
- Notifying appropriate team members of non-compliance issues, including EPA notification of water quality monitoring exceedances
- Performing inspections as required in the Construction Specifications
- Approving Project Record Documents upon project completion
- Approving the Contractor's proposed independent surveying firm
- Approving Contractor submittals as required in the Construction Specifications
- Approving the pre-construction and final dredging and excavation acceptance surveys
- Approving final backfill, filter material, riprap, and habitat substrate acceptance surveys

3.3.2.3 Construction Quality Assurance Officer

The CQAO assigned to this project will be from Anchor QEA and has not yet been identified. The CQAO reports to the Project Engineer and will be responsible for overseeing the implementation of the Construction Quality Assurance Plan (CQAP; Appendix D of the BODR; Anchor QEA 2013a). The CQAO will specifically be responsible for the following:

- Conducting daily inspection and documentation of Contractor's work
- Maintaining a daily field log to record observations, measurements, inspections completed, data received, communications, water quality exceedances, environmental controls, and issues/resolutions as required by the CQAP
- Reviewing Contractor's daily and weekly quality control reports
- Reviewing field reports to verify that appropriate field methods and quality control procedures are being implemented in accordance with the procedures specified in the CQAP and inclusive of the requirements of the Water Quality Monitoring Plan (WQMP; Appendix E of the BODR; Anchor 2013a)
- Preparing weekly water quality monitoring reports for distribution by the Project Manager

- Directing post-dredge z-layer sediment sampling activities and field personnel
- Directing post-excavation shoreline z-layer sampling activities and field personnel
- Directing perimeter surface sediment sampling activities and field personnel
- Coordinating additional construction inspections as required

3.3.2.4 Field Sampling and Monitoring Lead

The Field Sampling and Monitoring Lead assigned to the project will be Elizabeth Appy, Anchor QEA. Ms. Appy will direct soil and sediment sampling and monitoring personnel responsible for conducting the field activities, performing instrument calibrations, performing quality assurance and quality control procedures, and documenting sampling and monitoring activities in daily field reports. The Field Sampling and Monitoring Leader will specifically be responsible for the following:

- Directing water quality monitoring activities and associated field personnel
- Verifying that field sample collection and processing procedures, field monitoring activities, and field monitoring results are properly documented and field forms are completely filled out
- Verifying that appropriate calibration and quality control/quality assurance procedures are being implemented
- Notifying the CQAO in the event that water quality exceedances are observed, and providing the CQAO with all necessary supporting field documentation as required to document exceedances

3.4 Contractor

PPM has been selected as the Contractor to perform the removal action. PPM will be responsible for implementing the removal action in accordance with the Contract Documents and Change Orders as may be issued during progress of the work.

3.4.1 Contractor Roles/Responsibilities

The PPM roles and responsibilities will include:

- Preparing and implementing project planning documents
- Site control

- CQC
- Coordination of site access with Jorgensen Forge
- Health and safety for all Contractor and subcontractor personnel on the project site
- Erosion and sediment control
- Demolition activities
- Dredging, excavation, haul barge transport, and dewatering
- Offloading operations of dredge material barges at the PPM Yard directly into truck-and-trailer combinations
- Upland and on-barge water treatment
- Backfilling and shoreline containment
- Vessel management
- Surveying
- Setup and management of temporary facilities and controls
- Environmental pollution control
- Traffic control
- Upland water management and barge dewatering and treatment

3.4.2 Contractor Personnel

Contractor key personnel will include the Project Manager, On-site Construction Manager/Superintendent, CQC Manager, Health and Safety Manager, In-water Dredging Superintendent, and Shoreline Bank Excavation Superintendent. The roles and responsibilities of these key personnel are described below.

3.4.2.1 Project Manager

Greg Anderes is assigned as the PPM Project Manager and will be responsible for directing project work including quality, cost, safety, and schedule performance, and providing direction and support for field and technical activities. In addition, Mr. Anderes has final approval of Contractor plans and operating procedures necessary to meet quality objectives.

3.4.2.2 On-site Construction Manager/Superintendent

Marty Locke is the PPM On-site Construction Manager/Superintendent and is responsible for day-to-day management of the work conducted by PPM in the field. The On-site Construction Manager/Superintendent will be specifically responsible for:

- Executing the work in full compliance with the Contract Documents
- Maintaining construction progress in accordance with the project schedule
- Working to resolve work-related problems and day-to-day project management
- Supervising the In-water Dredging Superintendent and Shoreline Bank Excavation Superintendent
- Supervising PPM subcontractors (see Section 3.4.2.7)
- Providing CQC compliance monitoring data to the Project Engineer
- Coordinating as necessary with the CQAO.

3.4.2.3 CQC Manager/PPM Project Engineer

J.C. Clark will serve as the joint PPM CQC Manager and PPM Project Engineer to implement the CQC Plan and ensure compliance with the requirements of the Contract Documents, and provide engineering support to the project. The CQC Manager's/PPM Project Engineer's responsibilities will specifically include:

- Assuring compliance with the quality control requirements of the Contract Documents
- Coordinating survey and other special inspections of the work, as required
- Overseeing the quality control of subcontractors and suppliers
- Reporting quality control data and issues to the Project Manager and CQAO
- Reviewing and coordinating submittals and approvals as required by the Contract Documents
- Performing follow-up quality control inspections of subcontractor work, as required
- Conducting and/or coordinating quality control inspections and testing as required by the Contract Documents
- Preparing and/or reviewing daily CQC reports
- Producing task plans, operating procedures, technical reports, and submittals, and redlining construction drawings as the work progresses
- Cost and material tracking

3.4.2.4 Health and Safety Manager

Joseph Adami will serve as the PPM Health and Safety Manager to develop and implement the Contractor CHASP (Appendix A-2). The Contractor CHASP will contain details of the chain of command and personnel responsibilities, as required by the Contract Documents. Mr. Adami will ensure that PPM personnel have the appropriate current federal and state health and safety training necessary to perform the work. Any visitors who request access to the work areas will be required to coordinate access with the Contractor and review and sign the Contractor CHASP Acknowledgement Form to confirm that they understand and agree to abide by the provisions of the Contractor CHASP.

3.4.2.5 Dredging Superintendent

Dustin Simp will serve as the PPM In-water Dredging Superintendent responsible for managing all aspects of the dredging and in-water backfilling work in the field.

3.4.2.6 Shoreline Bank Excavation Superintendent

Craig Cearly will serve as the PPM Shoreline Bank Excavation Superintendent responsible for managing the shoreline bank excavation and shoreline containment work in the field.

3.4.2.7 Subcontractors

PPM will utilize the following subcontractors to perform the work:

- **Waste Management** – Waste Management will provide transport and disposal services to PPM.
- **Terrasond Engineering, Inc.** – Terrasond will provide independent professional upland and in-water surveying. John Fisher will manage the survey operations.
- **WaterTechtonics, Inc.** – WaterTechtonics will provide the equipment for the on-barge water treatment process and on-site personnel to manage this equipment.

3.5 Principal Stakeholders

The Principal Stakeholders with interests in the project are Jorgensen Forge, the Tribe, and Boeing. The roles, responsibilities, and contact persons for each stakeholder are described below.

3.5.1 Jorgensen Forge

Jorgensen Forge is responsible for providing the Contractor, subcontractors, and EMJ and their representatives with access to the Facility as necessary to complete the removal action. The Jorgensen Forge contact is Miles Dyer, Director of Environmental Compliance.

3.5.2 Muckleshoot Indian Tribe

The Tribe has usual and accustomed tribal treaty fishing rights to the LDW. Project work is being coordinated so as to not impact tribal fishing rights. Glenn St. Amant is the lead tribal representative.

3.5.3 Boeing

The MOU requires the coordination and cooperation of all parties conducting cleanup within the adjoining Boeing DSOA and RAB. Brian Anderson will be the primary point of contact for this coordination with Boeing.

4 COORDINATION WITH JORGENSEN FORGE, ADJACENT REGULATORY CLEANUPS, AND OTHER ACTIVITIES

The following subsections present the coordination elements, site access, and security protocols required at the Facility. They also detail the other coordination elements including the directly downstream Boeing DSOA corrective action, the South Park bridge construction, tribal fishing activities, and the Terminal 117 removal action.

4.1 Site Coordination, Access, and Security

The Facility is a secure site with entry and exit to the shoreline bank area allowed through the main gate located on East Marginal Way South. The Contractor will follow all of Jorgensen Forge's security protocols upon entry to the Facility. In the event that the Contractor needs access into or out of fenced or gated locations elsewhere on the Facility, the Contractor must notify the Jorgensen Forge representative at least 24 hours in advance to arrange for additional security oversight. The Contractor's employees, and all subcontractors' and material vendors' employees, shall check in at the Facility main gate and obtain a visitor badge on a daily basis. The Contractor will submit a complete list of personnel expected to be on the Facility within the duration of the work. Entry of the Contractor's employees, subcontractors, or vendors not listed shall be coordinated in advance through the Jorgensen Forge representative. All personnel entering the Facility shall carry current photo identification. Deliveries of materials and equipment shall be coordinated in advance through the Jorgensen Forge representative and shall arrive at the main gate.

Jorgensen Forge's security procedures require that all visitors to the Facility comply with a Visitor Security Plan, in accordance with the security requirements imposed by Jorgensen Forge's contracts with the U.S. Navy, U.S. Navy suppliers, and other defense-related firms. The Visitor Security Plan establishes specific requirements for visitor security and access to the Facility. Jorgensen Forge also requires that all visitors have the appropriate safety training for the work they will perform and are citizens of the United States. All non-United States citizens must be escorted at all times. A chain-link fence secures the entire western boundary of the Facility adjacent to the RAB. The removal action will require reconfiguration of the shoreline bank east of this fence, so the fence will need to be relocated farther east. In accordance with the Visitor Security Plan, Jorgensen Forge requires that a

fence be maintained and secured during completion of the removal action activities to restrict access to only those individuals with the appropriate security clearance and safety training. Any ingress or egress through this fence or the main access gate will require clearance by a security guard and possession of a visitor badge.

Jorgensen Forge will provide the necessary safety training for all visitors that will enter the Facility through this fence or the main gate. This training will be coordinated with the Jorgensen Forge Safety Director and to the extent possible be performed prior to initiation of construction and during a single scheduled session. Visitors must don the appropriate safety gear (as communicated during the safety training) during their access on the Facility. Anchor QEA personnel assigned to work at the Jorgensen Forge EAA will be required to review and understand the Anchor QEA CHASP (Appendix A-1). The Contractor and its subcontractors are responsible for the health and safety of their employees and will therefore operate under the Contractor CHASP (Appendix A-2). The CHASP will be specific to the work to be conducted and the associated hazards with that work. Any visitors who request access to the work areas and are not covered under a site-specific CHASP will be required to review and sign the Contractor CHASP Acknowledgement Form to confirm that they understand and agree to abide by the provisions of the CHASP.

4.2 Tribal Fishing Coordination

EMJ has coordinated with the Tribe representatives to determine when the Jorgensen Forge EAA construction needs to be completed to prevent potential impacts to tribal treaty fishing. The Tribe indicated that their fishing activities would initiate at the earliest September 7 so no fishing impacts would be caused if the in-water removal and backfilling activities are completed by September 6. Based on this feedback, EMJ has established a construction substantial completion date of September 6 with the Contractor to prevent potential impacts to tribal fishing.

4.3 Boeing Duwamish Sediment Other Area Corrective Action

Boeing is conducting an interim corrective action under RCRA adjacent to the Boeing Plant 2 Facility in the area immediately adjacent and downstream from the RAB (Figure 2). This corrective action area is termed the DSOA and Southwest Bank Corrective Measure and

is also identified as an EAA by EPA. EPA collectively defined the DSOA and the Jorgensen Forge EAA as Early Action Area 4. Due to the adjacency and shared cleanup boundaries of these EAAs, the First Amendment to the Investigation AOC (EPA 2008a) between EMJ and EPA incorporated a MOU executed by EMJ, Jorgensen Forge, and Boeing. The MOU requires the coordination and cooperation of all parties conducting cleanup within the adjoining Boeing DSOA and RAB. In accordance with the MOU, the adjacent cleanup designs are coordinated and will be constructed so that the goals for both cleanups are achieved.

The Jorgensen Forge EAA cleanup will proceed first and extend up to the in-water and toe of shoreline slope cleanup boundaries with the Boeing DSOA. The Boeing DSOA cleanup will then be initiated in the fall of 2014. EPA is requiring that Boeing is responsible for ensuring that their cleanup activities do not lead to recontamination within the Jorgensen Forge RAB and that any adverse impacts (e.g., slope stability, removal/relocation of containment materials, etc.) to the newly constructed shoreline bank in the RAB are mitigated to achieve the Jorgensen Forge EAA design criteria.

The primary point of contact for coordination with this interim corrective action is Brian Anderson of Boeing. Should events during performance of the Jorgensen Forge EAA removal action or subsequent Boeing interim corrective action require coordination between EMJ and Boeing, EMJ will contact Mr. Anderson. Any coordination efforts will subsequently be communicated to the appropriate parties (e.g., EPA, Jorgensen Forge, other regulatory personnel, Contractor).

4.4 Jorgensen Forge Outfall Site Removal Action

Jorgensen Forge and Boeing performed a NTCRA (termed the JFOS Removal Action) under a Second Modification to the AOC (EPA CERCLA Docket No. 10-2011-0017) with the EPA Office of Emergency Response. This Removal Action included the advancement of additional angled Geoprobe borings within the JFOS-Impacted Material Area (formerly called the “blue wedge”) in the northwest corner of the Facility in October 2013 and the installation of a sheetpile wall containment barrier (termed a cofferdam in this RAWP) in February 2014 (Figures 4a and 4b). As discussed in the BODR Addendum (Anchor QEA

2014) and soil quality data report prepared by Sound Earth Strategies (2013), total PCB RvAL exceedances exist within the RAB east of the containment barrier wall in borings JFOS-BH03, JFOS-BH04, and JFOS-BH05 at variable depths below ground surface between approximately 0 feet mean lower low water (MLLW) elevation and -15 feet MLLW. Total PCB concentrations greater than the TSCA threshold (50 mg/kg) exist from approximately 0 feet MLLW to -11 feet MLLW (Figures 4a and 4b). The TSCA materials will be removed and disposed of in a permitted Subtitle C disposal facility in accordance with TSCA regulations and the BODR Addendum (Anchor QEA 2014).

The primary point of contact for coordination on the JFOS Removal Action is Will Ernst of Boeing. Should events during the removal action require coordination with Boeing, EMJ will contact Mr. Ernst. Any coordination efforts will subsequently be communicated to the appropriate parties (e.g., EPA, Jorgensen Forge, regulatory personnel, and the Contractor).

4.5 South Park Bridge Construction

The South Park Bridge spans the LDW at approximately River Mile 3.3 to 3.4 and is currently being replaced by King County. Bridge work is being performed using both land-based and floating equipment, including large barge-mounted, floating derricks. Bridge work will also involve various support vessels such as tugboats and material barges. At the time of the development of this RAWP, the bridge construction schedule identified that the construction would be completed by the time the Jorgensen Forge EAA construction was initiated. If schedule delays result in extension of the bridge construction schedule into the July through September 2014 period, the Contractor will coordinate as necessary with the bridge contractor (Kiewit-Massman joint venture) if barge traffic from the Jorgensen Forge EAA construction transits through the bridge construction area.

4.6 Terminal 117 Removal Action

This RAWP does not account for coordination with the cleanup that will be conducted in the EPA-identified EAA-5 at Terminal 117, directly across the LDW from the Jorgensen Forge property (Figure 1), as it is scheduled to be completed in Spring 2014. The Project Coordinator, Amy Essig Desai of Farallon Consulting, will continue to communicate the

Jorgensen Forge EAA construction schedule with Roy Kuroiwa of the Port of Seattle to determine whether adjacent cleanup coordination becomes necessary.

5 CONTRACTOR WORK PLAN

The following subsections present the Contractor's planned methods to implement the removal action in accordance with the Contract Documents and BODR. The Contractor's detailed work plans for the various work elements are provided in Appendices C through L.

5.1 Project Work Plan Overview

PPM has been selected to perform the following work elements:

- Mobilization
- Installation of security fencing and set up of temporary facilities
- Protection of existing features
- Creation of import, export, and debris sizing stockpile areas
- Pulling of timber piles and shoreline bank demolition and debris removal
- Excavation of shoreline bank
- Excavation, stockpiling, and replacement of riprap within the JFOS-Impacted Material Area
- Excavation of Non TSCA and TSCA-level sediments within the JFOS-Impacted Material Area
- Transportation and disposal of Non TSCA and TSCA-level sediments excavated from within the JFOS-Impacted Material Area
- In-water dredging of sediments within the RAB
- Transportation and disposal of removed materials and debris
- Placing clean backfill and shoreline containment
- Facility restoration and decontamination
- Installing permanent fencing
- Demobilization

5.1.1 Summary of Contractor Means and Methods

PPM will begin the work with the installation of temporary security fencing along the RAB top of shoreline bank and setup of temporary facilities for PPM and Construction Management Team personnel. A stockpile containment area just east of the top of the shoreline bank at the Facility will be constructed to allow for temporary stockpiling of

excavated shoreline bank materials and associated debris. A detailed summary of the stockpile area setup and management is provided in Appendix C. In summary, the stockpile area will contain excavated impacted soil and capture any water that may drain or come into contact from the soil. The stockpile area will be built with an impermeable polyvinyl chloride (PVC) liner, crushed rock, and ecology blocks. Ecology blocks will be placed around the three sides of the stockpile area. A PVC liner will be placed over the blocks and down onto the footprint of the stockpile area. As necessary, additional subgrade will be placed below the liner and graded to facilitate gravity drainage of water (water that passively leaves the materials in the stockpile area or rainfall) that comes into contact with the overlying liner. Permeable crushed rock will then be placed on top of the liner as a protective layer and a berm will be formed against the ecology blocks. The installed liner will be graded to a slope so as water passively leaves the soil it will flow to the enclosed section of the stockpile area for a 4-inch pump to remove the water and process it through the water treatment system as defined in the Water Management and Treatment Plan (Appendix G).

An unlined debris sizing area will be established on the existing concrete pad just east of the shoreline bank to manage oversized debris. This area will be cleaned as necessary to minimize the presence of soils potentially adhered to debris and the potential for trackout. Protective measures (e.g., use of steel plates, crushed rock, etc.) will be implemented to minimize the potential for impacts to the concrete pad. Measures will be taken (e.g., crushed rock and liner system similar to stockpile area) to ensure any water that comes into contact with the concrete pad passively flows to a sump. From the sump, the water will be pumped through the water treatment system as described in the Water Management and Treatment Plan (Appendix G).

Import material stockpile areas will be established for clean excavated material and clean import materials in an area segregated from contaminated material storage and handling to prevent cross contamination of clean material. Weather-proof signs will be posted to clearly designate each area and aid in tracking of materials.

Following the installation of security fencing and setup of temporary facilities, PPM will perform outfall abandonment and demolition activities, including removal of debris within

the intertidal shoreline bank area. It is expected that there will be varying degrees of buried debris and demolition materials encountered during shoreline bank excavation based on visual observations of the bank. Timber pile removal will be conducted prior to shoreline bank excavation using a Hitachi 1200 excavator.

PPM will perform the shoreline bank excavation from land. Work will be performed at low tide to the extent practicable to maximize extent of intertidal shoreline excavation performed from the land. The target elevation for this excavation is approximately +4 feet to +2 feet MLLW. Excavation activities will proceed from south (upriver) to north (downriver) along the shoreline. Subsequent placement of the shoreline containment material will not occur until the in-water dredging is completed and the final in-water backfill is placed. As such, there will be a number of weeks between bank excavation and placement of shoreline containment material to allow for post-excavation and pre-shoreline containment bank z-layer sampling activities. The PPM Superintendent will coordinate sampling activities with the CQAO.

Concurrent with the shoreline bank excavation, the shoreline behind the JFOS will be excavated to +11 feet MLLW to the extents shown on the JFOS design drawings Sheets S1.1 and S2.1 dated January 20, 2014 (B&T Engineering 2014). This excavation will be performed in accordance with the JFOS requirements under a separate contract between Jorgensen Forge and their selected contractor (i.e., this work is not being performed under the EMJ EAA scope of work). Following this grading, PPM will commence excavation of the materials within the cofferdam from two different excavators staged on a barge. In accordance with the JFOS design document requirements, during excavation within the cofferdam PPM will maintain the water surface elevation at a minimum +11 feet MLLW by pumping water from the LDW into the cofferdam, if necessary.

The upper non-TSCA sediments/soils within the cofferdam to the bottom elevation of the shoreline containment (see Figures 4a and 4b) will be removed first and handled, dewatered, transported, and disposed at an offsite RCRA Subtitle D landfill. Following Project Engineer approval that the bottom shoreline containment elevations have been achieved, the TSCA materials within the cofferdam will be dredged, handled, dewatered, transported, and disposed at an offsite RCRA Subtitle C landfill. A number of BMPs will be employed to

minimize the potential for releases to the LDW or transload facility during completion of this work (see Sections 5.3 and 5.4 for more details).

Dredging will be initiated at the southern boundary of the RAB and proceed north (upriver). The dredge materials will be placed into sediment haul barges, the standing water will be pumped to the on-barge water treatment system and discharged back to the LDW in the work area, and the sediment haul barges will be transported downstream to the PPM Yard (or similar EPA-approved transload facility) for transloading directly into unlined trucks for subsequent disposal at a RCRA Subtitle D landfill. A detailed description of these activities is provided in Section 5.3. Shoreline bank excavation will always precede the adjacent in-water dredging to minimize the potential for slope instability. Dredging will be sequenced to remove materials from higher elevations (upslope) to lower elevations (downslope).

PPM will initiate backfilling activities with the placement of an interim 6-inch layer of backfill within the cofferdam following the Project Engineer's approval that the removal elevations have been achieved. The placement will occur following some period of time that will allow settling of resuspended particulates to occur within the cofferdam. PPM will place clean backfill material in the dredging areas, proceeding from south to north following dredging but prior to placement of shoreline containment materials to prevent potential sloughing and disturbance of remaining sediments. As discussed in Section 5.1.2.2, an interim 6-inch layer of clean backfill will be placed as soon as practicable following completion of dredging within the six identified Contractor-defined DMUs; Figure 5. The CQAO will coordinate with the PPM Superintendent to schedule post-dredge z-layer sediment sampling activities following survey approval within the cofferdam and each DMU and prior to placement of the interim backfill layer.

PPM will place clean backfill sand in the area below the toe trench (approximately -5 feet MLLW elevation) prior to placing shoreline containment layers in the area above the toe trench to maintain slope stability. The layers will consist of a minimum 1.5-foot filter layer (gravelly-sand or sandy-gravel amended with 0.5% GAC), followed by a minimum 2.5-foot riprap armoring layer, and then a minimum 0.5-foot habitat substrate layer. The toe trench will be backfilled as described in the Contract Documents. Additional details on backfilling and shoreline containment activities are presented in Section 5.5.

As shown on Sheet C-1 of the Construction Drawings, there are four structures that exist directly adjacent to work areas. The following construction work area offsets have been established from these structures to prevent damage during the construction operations:

- 5-foot excavation and backfilling offset from gas cooling towers concrete pad foundation located on the western central portion of top of bank
- 5-foot excavation and backfilling offset from shop/storage building on the northwest corner of the Facility
- 5-foot excavation and dredging offset from the existing sheetpile and concrete panel walls located on the southern portion of the Facility

PPM will mark these offsets in the field and excavation, dredging, and backfilling operations will be performed so as to protect these structures.

Following the Project Engineer's approval that all shoreline containment layers have been placed in accordance with the Contract Documents, PPM will perform restoration activities to return the Facility to preconstruction conditions. Site restoration will include decontaminating and removing construction equipment, removing temporary facilities and controls, restoring stockpile areas, removing upland water treatment equipment and associated storage tanks, and removing temporary security fencing. PPM will install permanent fencing as shown on Sheet C-6 of the Construction Drawings once no further access is required to the shoreline bank.

5.1.2 Project BMPs

Consistent with the Contract Documents and BODR, the following section details the BMPs that have will be implemented during the removal action to reduce suspension of sediment and soil into the water column while maintaining construction productivity.

5.1.2.1 Dredge Material Unit Sequencing

This BMP involves the following action:

- Complete dredging within each DMU (Figure 5) to the design elevations prior to initiating dredging in the downstream, adjacent DMU; bathymetric surveys will be used to confirm the design removal elevations are achieved.

Within a DMU, dredging will be completed south to north in nearshore and channelward areas. The nearshore and channelward areas will be approximately 30 feet by 50 feet and the upper elevation of the nearshore area is anticipated to reside between 4 feet to 2 feet MLLW, depending on tidal elevations. Dredging in each area will be limited to a maximum 4-foot cut on each pass. If the design cuts extend deeper than 4 feet, additional south to north dredge passes will be performed as required in each lane until the design elevations are achieved. All dredging within a DMU will be completed prior to moving north/downstream to the directly adjacent DMU.

5.1.2.2 Sand Cover

An interim clean sand cover (approximately 6 inches) will be placed over dredge cuts in each DMU, as soon as practical after DMU dredging is complete. This interim clean sand cover will limit the potential for re-suspension and release of sediment from the loosened post-dredging residual material.

Additional backfilling will be phased as appropriate, once all upstream and adjacent dredging is complete. Additional backfilling will not be performed until a minimum 50 feet of dredging has been approved in the adjacent downstream DMU (e.g., additional backfilling will not occur in DMU 3 until the southern 50 feet of dredging in DMU 2 is completed; see Figure 5).

5.1.2.3 Dredging Equipment

This BMP involves the following action:

- Select the appropriate dredging equipment (excavator or derrick) based on the RAB conditions and accuracy requirements.

The primary dredging equipment to be used for the removal action will be an excavator (also known as an articulated fixed-arm dredge) with an enclosed environmental bucket as required by the Contract Documents. As described in the Contract Documents, areas where an excavator with an enclosed bucket is unable to remove the encountered materials due to the physical characteristics (e.g., material is too stiff, large debris, piles), a conventional derrick with clamshell, grapple, or vibratory hammer will be used.

5.1.2.4 Dredging Bucket

This BMP involves the following actions for dredging activities outside of the cofferdam:

- Use an enclosed, environmental-type bucket to limit sediment loss to the extent possible.
- A standard clamshell bucket maybe required for dense sediments and debris removal.

An enclosed, environmental-type bucket will be used during dredging operations to limit sediment loss and re-suspension to the extent possible. Larger debris that has been identified in the RAB, such as trees, large concrete blocks, intact and broken piles, and molten debris, is likely beyond the lifting capacity of an enclosed bucket. In areas where an enclosed bucket is unable to remove the encountered material, a heavier bucket with digging capabilities, or a conventional wire-supported clamshell dredge or grapple will be required.

5.1.2.5 Dredge Bucket Positioning

This BMP involves the following action:

- Use sub-foot accuracy Global Positioning System (GPS) for accurate bucket positioning.

Dredge bucket positioning will be performed using on-board Real Time Kinematic (RTK) GPS digital equipment, capable of displaying the location of the dredge bucket within 4 to 6 inches horizontally and vertically, to help capture the target material by the dredge.

5.1.2.6 Dredge Cuts on Slopes

This BMP involves the following action:

- Implement stair-step dredge cuts for steeper slopes to reduce sloughing of sediment.
- Dredge from the top of the slope downward.

Stair-step dredge cuts will be made to limit the bank sloughing that can occur with deep vertical cuts into sediment (referred to as "box cuts"). Dredge cuts that extend several feet vertically into the sediment bed will eventually slough to a flatter and more stable slope. The sloughed sediment will be remolded with water and will come to rest on the bed as a lower density, higher water content, and lower strength generated residual that is more easily eroded and suspended than native intact sediment. Stair-stepping the dredge cuts help reduce the formation of generated residuals and reduces the potential for sediment re-suspension and release. In addition, slopes will be excavated from the top down to avoid raveling and sloughing.

5.1.2.7 Pile Removal

Piles will be removed with conventional construction equipment in a manner that minimizes the release of sediment. Conventional marine construction equipment, such as a derrick configured with pile-pulling and heavy lifting equipment, will be used. If the addition of a vibratory hammer is required, care will be taken not to destabilize slopes and banks. If individual piles cannot be removed, then they will be cut off at the sediment/soil excavation surface or at least 3 feet below the final grade, whichever is deeper.

5.1.2.8 Dredge Slopes with Excavator

This BMP involves the following action:

- Use an excavator dredge, as appropriate, for improved bucket control on steeper slopes.

Steep slopes will be dredged using an excavator. The purpose of dredging steeper slopes using an excavator, as opposed to a cable-deployed bucket, is to limit the disturbance of impacted sediment on the slope during dredging and, in turn, to limit sediment re-

suspension and release. A cable-deployed bucket from a conventional derrick or crane barge can tip and slide downslope as the bucket engages the inclined face of a submerged steep slope, increasing sediment disturbance. Also, a cable-deployed bucket is like a pendulum and positioning a swinging bucket can be difficult to accurately track on a steep slope. Alternatively, a bucket deployed on the fixed arm of an excavator can be held in place at a known location and elevation on the slope while the bucket is closed, reducing the disturbance of the sediment on the slope. A digging bucket may need to be deployed on the excavator if harder sediment and/or larger debris are encountered, as described in the Contract Documents and BODR.

5.1.2.9 Water Management

This BMP involves the following action:

- Prohibit direct overflow of water in sediment haul barges back to the LDW without prior processing and management as dredging return water.
- Manage and remove upland stockpile water that comes in contact with stockpiled material.

Water generated during construction operations will be managed so as to prevent the release of sediment/soil and associated contaminants back into the LDW.

For dredging occurring outside of the cofferdam, the dredge material placed in barges by the dredge using an enclosed bucket will consist of both sediment and water because water is not allowed to drain from the bucket. Dredging within the cofferdam will necessarily require the use of an open bucket given the visible extent of debris within the cofferdam and the types of buckets required to achieve removal directly adjacent to the sides of the sheetpile wall. During the use of the enclosed bucket, an average bucket may be only half-full of sediment over the course of the project due to relatively thin cuts intended to avoid removal of non-impacted sediment and to avoid over-penetration of the bucket. The volume of water placed in the barges for an environmental dredging project can therefore equal the volume of sediment dredged from the LDW. Thus, this approximately 13,000-cubic yard (cy) dredging project is expected to result in that volume of sediment placed into barges plus another 13,000 cy of water. This is roughly consistent with the volume of water collected with the

equipment during the first season of dredging for the Boeing DSOA, where approximately 0.7 cy of water (140 gallons) was collected for every 1 cy of sediment dredged. See Section 5.1.2.9 for specific information regarding the estimated daily rate of water that will need to be managed and treated during the dredging activities.

Water management will also include the use of upland stockpiling management procedures to contain excavated shoreline soils within stockpile and debris sizing areas such that cross contamination with clean import materials does not occur. Stockpiles will be surrounded by Ecology blocks, lined with an impervious material, and protected from weather and disturbances by an impervious covering when stockpiling is not occurring. Upland project water that contacts contaminated stockpiled soil and runoff from the stockpile and debris sizing areas will be managed, collected, treated, and/or disposed of.

Further details of the water management system are presented in Section 5.11.

5.1.2.10 Intertidal Sediment and Shoreline Bank Soil Removal

This BMP involves the following action:

- Conduct intertidal sediment and shoreline bank soil excavation "in the dry" to the degree reasonably possible using land-based equipment.

Intertidal sediment and shoreline bank soil excavation will be performed from upland, in the dry, to the greatest extent practicable to minimize the potential for release of impacted intertidal sediment and shoreline bank soils to the LDW. The work will be done during daylight hours during very low tides, which occur only during May through August of each year.

Intertidal sediment and shoreline bank soil will be excavated using shoreline-based excavation equipment. Downslope excavation limits will be set back at least 2 feet from the water line at all times. When and where possible, the shoreline excavation will be completed prior to dredging, as the in-water removal activities proceed generally from upstream to downstream. Excavation and dredging from upslope to downslope will reduce

slope failures that can re-suspend sediment and will enable the capture of any material that moves downslope during shoreline excavation work.

Additional measures to minimize potential erosion in the intertidal zone will include removing large pieces of debris remaining on the surface and using the excavator bucket or similar equipment to compact the newly excavated surface during periods when shoreline excavation is not being conducted. A temporary erosion and sedimentation control fence will also be installed prior to shoreline excavation and maintained during all ongoing excavation activities.

5.1.2.11 Backfill Placement

This BMP involves the following actions:

- Wash backfill materials prior to delivery and use at the Site.
- Release in-water backfill from the bucket as close to the backfill surface as the operator feels possible and protective.

Washed backfill minimizes backfill fines and results in less turbidity in the water column during placement. Backfill material will be released close to the backfill surface to reduce the contact between placed material and the water column, resulting in less suspended solids.

5.1.3 Temporary Facilities, Staging, and Access

Work performed for this project will require support facilities that will be set up and staged in phases throughout the removal action duration. These include the site work zone layout and security fence, office trailers and facilities, the parking area and transport route to the work area, water access, utilities, haul roads, excavated soil and associated debris stockpile area, shoreline bank layer clean import material stockpile area, and equipment storage and maintenance areas. A detailed discussion of these temporary facilities is included in the ECP (Section 5.10 and Appendix C).

5.1.4 Offsite Staging and Transloading

See Section 5.4 and Appendix H for a description the offsite staging and transloading procedures for dredged materials.

5.1.5 Project Schedule

In-water dredging operations will occur during high-tide windows. This time will vary day to day due to the consistently shifting times of high tides. Dredging will occur on one 12-hour shift during the high-tide window. During periods of semi-diurnal tides, a second 12-hour shift may be used to accelerate the schedule, if needed.

Shoreline excavation operations will occur during low-tide windows. This time will vary day to day due to the consistently shifting times of low tides. Excavations will occur on one 10-hour shift during the low-tide window. During periods of semi-diurnal tides, a second 10-hour shift may be used to accelerate the schedule, if needed.

Due to operations occurring at times of high and low tide windows, overall project operations can vary from 24-hour days during diurnal tides to only 12 to 18 hours on semi-diurnal tides. A detailed project schedule will be developed and updated weekly as required by the Contract Documents. Anticipated daily work hours for the various phases of the project are as follows:

- Mobilization and site preparation: 7:30 am to 5:30 pm
- Upland excavation and demolition: 10-hour shifts (up to two shifts), times may vary
- Dredging and backfill activities: 12-hour shifts (up to two shifts), 24 hours per day
- Restoration and demobilization: 7:30 am to 5:30 pm

5.2 Demolition Plan

The following subsections present a summary of the PPM planned demolition methods. A detailed description of demolition activities is provided in Appendix D. Work will be conducted in accordance with the Contract Documents. Shoreline demolition activities are required prior to excavating impacted shoreline bank soils. Demolition activities include the following:

- Removal of the current western property fence along the shoreline top of bank
- Removal of timber piles
- Removal of miscellaneous bank debris including concrete, brick, wood, and slag
- Partial removal, as needed, and grouting of eight stormwater outfalls

5.2.1 Pre-Demolition Activities

Prior to beginning demolition activities, PPM will delineate the work area boundaries by survey. Staging areas and support zones will be established and marked. The existing property security fencing around the shoreline work area will be supplemented with temporary security fence panels, as shown on Sheet G-4 of the Construction Drawings. Access and staging areas will be fenced to control and delineate the active work area and to keep the public from entering the work area in accordance with the Jorgensen Forge security requirements.

PPM will request locates from The Utilities Underground Location Center (One-Call utility locating service) and a private utility locating service. Locations of utilities that are in close proximity to areas that may be disturbed will be identified, recorded, and protected as needed. Existing groundwater monitoring wells, not scheduled to be decommissioned, will be protected from heavy equipment using steel plates or other means.

A Site Stormwater Pollution Prevention Plan (SWPPP; Appendix C Attachment A) will be implemented and stormwater BMPs will be installed, including the installation of a silt fence and a floating containment boom along the base of the shoreline bank.

5.2.2 Means and Methods

The existing chain link fencing along the western property shoreline top of bank will be removed by PPM laborers. The chain link will be rolled (diameter less than 30 inches) and stockpiled for off-site disposal. Fence posts will be removed using a Hitachi 270 excavator with a bucket and thumb, and will be stockpiled for off-site disposal as well.

Timber piles will be pulled from the water with a barge-mounted Hitachi 1200 excavator. The removed piles will placed on a sediment barge. Water generated from the pile removal

will be treated by the water treatment system as described in Section 5.11. The piles will be sized, in maximum 10-foot lengths, with the Hitachi 1200 excavator and off-loaded by the PC1000 excavator directly into truck-and-trailer combinations for disposal. Any piles broken during removal will be cut off at the excavation surface or 3 feet below finished grade, whichever is deeper. Variable size excavators with a bucket and thumb will be used to remove debris from the shoreline. Large concrete and debris will be sized as appropriate to facilitate offsite transport and disposal using a hydraulic hammer attachment. Sizing of shoreline bank debris removed from the uplands will be performed in the stockpile area designated for demolition debris sizing, which is the existing concrete pad just east of the shoreline top of bank. This area will be protected (e.g., steel sheets) as necessary to minimize damage during sizing operations and, if necessary, will be graded and lined to facilitate gravity drainage of any water generation in this area to a sump area. Any collected water will be treated and disposed offsite as discussed in the Water Management and Treatment Plan (Appendix G). Alternatively, significantly large debris may require sizing in place to facilitate transfer to the stockpile area.

Removal and plugging of outfall pipes will be completed by PPM laborers and the Hitachi 450 excavator with 2.5-cy bucket and thumb attachment. After removing the required length, the remaining culvert will be plugged with grout. The grouting will be conducted during a falling tide in the dry and care will be taken (e.g., through the use of spill tubs or buckets) to minimize the release of grout to adjacent soils.

5.2.3 Schedule/Hours of Work

Demolition is initially estimated to take 7 days and will be conducted starting in mid-July 2014. Demolition activities are anticipated to occur during a single 10-hour shift, 6 days per week. Typical work hours will be 7:30 am to 5:30 pm; however, these hours may change if needed to complete certain tasks or meet project schedule requirements.

5.2.4 Demolition, Disposal and Salvage

The materials that may be generated during demolition activities include, but are not limited to, the following:

- Timber piles

- Slag
- Concrete
- Brick
- Miscellaneous construction or metal debris
- Plastic or metal piping
- Aluminum or steel fencing
- Cleared and grubbed vegetation
- PVC or steel well casing materials

Section 5.4.3 details expected material descriptions, quantities, and disposal/recycling destinations for the materials expected to be generated during demolition activities.

5.3 Dredging/Excavation, Upland and Haul Barge Transport, and Dewatering Plan

The following subsections present a summary of the PPM planned dredging and excavation, haul barge transport, decontamination, and dewatering methods and a detailed summary is provided in Appendix E. Work will be conducted in accordance with the project Contract Documents.

5.3.1 Work Sequence

The overall work task sequence is expected to be:

1. Mobilize upland equipment for excavation activities.
2. Install BMPs and construct stockpile and debris sizing loading areas.
3. Perform debris removal on the shoreline bank using upland equipment.
4. Excavate shoreline bank soil that is able to be removed using upland equipment (approximately +4.0 feet MLLW elevation and higher) from the south end of RAB shoreline at the sheetpile wall to the northern boundary of the RAB at the southern end of cofferdam.
5. Concurrent with shoreline bank excavation, perform excavation using water-side equipment of the non-TSCA materials within the cofferdam down to the bottom elevation of the shoreline containment (see Figures 4a and 4b). Perform final survey

to obtain approval that the bottom shoreline containment elevations have been achieved.

6. Following completion of all non-TSCA removal activities within the cofferdam, complete the removal of the TSCA materials using water-side equipment to the design grades shown in Figures 4a and 4b. Perform final survey to obtain approval that the bottom removal elevations have been achieved.
7. Place 6-inch layer of interim backfill within cofferdam area using water-side equipment.
8. Perform compaction of the final exposed soil surface using upland equipment to minimize slope erosion until shoreline containment materials are placed.
9. Perform final survey and obtain approval that shoreline bank excavation design elevations are achieved.
10. Relocate dredging equipment upriver and begin dredging remaining sediment to be removed (approximately +4.0 feet MLLW elevation and lower) from the southern RAB boundary downstream to the northern RAB boundary in each DMU (Figure 5). As described in Section 5.1.2.2, 6 inches of interim sand cover will be placed over each DMU as soon as practical following survey approvals.
11. Perform final survey and obtain approval that dredging design elevations in each DMU have been achieved. Perform decontamination of upland storage areas and equipment.
12. Decontaminate dredging, dewatering, and water treatment equipment, and barges.
13. Demobilize dredging, dewatering, and water treatment equipment, and barges.

5.3.2 Means and Methods

PPM will mobilize upland equipment to the Facility through the main gate. Debris removal and demolition activities will be performed following this upland equipment mobilization and site preparation. Additional details on demolition activities are included in the demolition plan (Section 5.2). Production rates may vary depending on difficulty removing piles, concrete, and slag. Shoreline bank debris will be loaded directly into an articulated haul truck for transport to the stockpile and debris sizing area at the Facility, where it will be appropriately sized for transport using an excavator with a hydraulic hammer attachment and laborers.

Once the majority of large debris has been removed, shoreline bank excavation will proceed from south to north. Shoreline bank excavation is estimated to be above +4 feet MLLW elevation and will be completed in the dry using a land-based Hitachi 470 excavator. PPM will coordinate with Boeing/Jorgensen Forge on the shoreline containment barrier being installed (i.e., barrier shown on Sheet S1.1 of JFOS design drawings dated January 21, 2014 (B&T Engineering 2014) with west-east orientation extending from southeast corner of the cofferdam). The design of this barrier wall is currently unknown so the design needs to be communicated to PPM so their equipment and work can be staged and performed without interfering with or adversely impacting the barrier wall.

A shoreline bank excavation production rate of 500 cy per day is anticipated. A grade checker will work alongside the excavator operator to ensure the proper sloping and sufficient soil removal is being performed as the Hitachi 470 excavator moves north. This material will either be loaded directly into trucks and containers for transport to the permitted off-site disposal facility, or it will be loaded into an articulated haul truck for transport to the soil/sediment stockpile area at the Facility. Stockpiled materials will be loaded into trucks and containers with an excavator for transport to the permitted off-property disposal facility.

Material transport trucks entering the Facility will be lined with plastic from a scaffold and platform setup along the access route to the material load-out area. Once the trucks have been lined, PPM will load the trucks in the stockpile area or directly from the excavation area, depending on access. During loading operations, plastic will be placed on the ground within the truck loading area, where there is potential for spillage from the excavator. PPM personnel will clean up any spilled materials when loading is complete. Trucks will be equipped with automatic tarps and will be inspected prior to leaving the load-out area to ensure that there is no spilled material on the exterior of the truck. Any material found on the truck will be removed prior to departure from the load-out area. A grade checker will verify that the design excavation elevations have been achieved prior to requesting the final survey. The final shoreline bank survey will be performed following completion of all excavation that can be completed in the dry using upland equipment.

Once the shoreline bank excavation activities are completed and approved, the material storage areas and equipment will be decontaminated. Equipment will be pressure washed in the stockpile area and decontamination fluids will be collected and conveyed to the water treatment system tanks. The decontamination fluids and rinse water from decontaminating the water treatment tanks will be either transported to a permitted off-site disposal facility or discharged to the sanitary sewer under a King County Industrial Waste Discharge Permit. Any remaining soil will be cleaned out of the tanks by hand and disposed in drums at CRL or Greater Wenatchee Regional Landfill. The stockpile area liner will be transported by truck and disposed at either the CRL or Greater Wenatchee Regional Landfill, as described in Section 5.4.

Concurrent with the shoreline bank excavation, the JFOS-Impacted Material Area inside of the cofferdam will be excavated using both the Hitachi 1200 and the long reach Hitachi 470 staged on a barge. The Hitachi 470 long reach excavator will be walked from the beach onto the barge using temporary equipment ramps. The 1200 Hitachi will begin the initial excavation of the overlying non-TSCA materials in the cofferdam to the extents identified in Figures 4a and 4b. This excavator will be equipped with a standard, open bucket and thumb in order to reach the corners of the cofferdam, inside the web of the sheetpile, and to handle the heavy visible debris in the area. Following the Project Engineer's approval of the non-TSCA removal, the Hitachi 470 will be used to remove the TSCA level material to the extents identified in Figures 4a and 4b. The open bucket will be raised to the water surface slowly to minimize releases (water or soils/sediments) from larger debris that may be hanging out of the bucket and then lifted over the top of the cofferdam and transferred as discussed below depending on the nature of the materials. The sediment haul barge surface will be higher than the top of the cofferdam wall and a spill apron consisting of a PVC sheeting will be extended from the barge deck down to the sheetpile wall to minimize losses to the LDW during transfer of the excavated materials into the lined containers.

The non-TSCA materials will be transferred to a sealed sediment haul barge that will be weighted to facilitate passive dewatering to a water collection area on one side of the barge. Water that gravity drains to this area will be pumped to the adjacent on-barge water treatment system using a 6-inch Godwin pump, treated, and discharged back to the LDW in the work area as described in Section 5.11. The de-watered sediment haul barges will be

transported downstream approximately 1 mile to the PPM Yard (or similar EPA-approved transload facility) and the materials will be loaded directly into lined trucks for offsite disposal at CRL as discussed in Section 5.4.

The TSCA-materials will be transferred directly into lined containers staged on the barge. Standing water within the lined containers will be actively removed from the containers using the 6-inch Godwin pump and pumped to the water treatment system located on the water treatment barge. Depending on the material consistency, the container will only be filled three-quarters full to ensure that material is not spilled during the transportation to the landfill. In accordance with the JFOS design document requirements, if necessary during excavation within the cofferdam, pumps will be used to maintain the water surface elevation within the cofferdam to a minimum +11 feet MLLW water level. The de-watered containers will be transported downstream approximately 1 mile to the PPM Yard (or similar EPA-approved transload facility) and a landside crane will be used to pick the lined containers off the barge and place them directly onto a truck chassis for offsite disposal at Chemical Waste Management of the Northwest.

Following the completion of the excavation within the cofferdam, dredging equipment will be relocated downstream to initiate the open-water dredging at the southern RAB adjacent to the concrete panel wall and proceed downriver to the northern RAB. As detailed in Appendix E, the dredging will start from +4 to +2 feet MLLW depending on tides, work an approximately 50-foot by 30-foot section in front of the dredge barge, and move from top of slope to middle of slope. The barge will then shift position downstream approximately 30 feet and another 50-foot-wide section will be completed from top of slope to middle of slope. This process will be repeated until the dredging reaches the boundary of the DMU (Figure 5). The barge will then be repositioned back upstream to where dredging was started and complete from the middle of the slope to the toe of slope in the 50-foot by 30-foot dredge section. The barge will then be shifted approximately 30 feet downstream and the process will continue until the barge reaches the boundary of the DMU. Once the DMU is surveyed and approved, the barge will reposition itself on the southeastern corner of the next DMU and begin the sequence over again.

The above dredge sequencing will continue south to north in the dredge prism until the design dredging elevations are achieved. Daily progress surveys will be performed to ensure the final neat line dredge surface has been achieved before moving too far north of a DMU and before conducting the Final Dredging Acceptance by DMU survey for review and approval by the Project Engineer. Daily production rates will be difficult to estimate, as it will depend on the depth of cut at the particular point of dredging, whether the dredge is performing a cleanup pass, and type and density of sediment encountered. It is expected to be between 500 and 1,200 cy per day with an average production rate of approximately 600 to 700 cy per day.

The dewatered sediment haul barges will be transported downstream via tugs to the PPM Yard (or other EPA approved facility) for off-loading. See Section 5.4 for details regarding this transloading facility. Following transloading of the sediments from the haul barge directly into lined truck-and-trailer combinations, tugs will transport the empty sediment haul barges back upstream. Additional details on haul barge transport are included in the Vessel Management Plan (Section 5.7 and Appendix I).

Once dredging activities are approved complete, the dredging equipment, dewatering and water treatment equipment, and barges will be decontaminated. Sediment accumulated in the water treatment tanks will be transferred to the sediment barge. The inside of the sediment haul barges will be cleaned using the dredge bucket and then by hand using shovels. Sediment will be transferred into a single sediment haul barge. When the majority of the sediment has been removed from each barge, the barge will be rinsed by pumping water into the barge and running the rinse water through the barge water treatment system. A final decontamination process will be needed on the water treatment system; however, the amount of sediment is anticipated to be minimal. The final sediment barge off-loaded at the PPM Yard (or other approved facility) will be rinsed with water pumped from the waterway and sent through the barge water treatment system. The final decontamination of sediment and associated rinse water from the barge water treatment system will be performed using a vacuum truck. The final vacuum rinse water will be either transported to a permitted off-site disposal facility or discharged to the sewer under a King County Industrial Waste Discharge Permit.

A detailed summary of PPM's decontamination procedures is provided in Appendix E.

5.3.3 Positioning Methods and Procedures

The dredge barge will be positioned at the start of dredging activities and the fixed spuds will be lowered. The dredge excavator is equipped with DredgePak and an RTK GPS positioning indicator on the bucket. Prior to initiating dredging, all target design elevations will be loaded into DredgePak, and the dredge operator will use these elevations to guide the dredging activities. The RTK GPS sensor will allow for accurate dredging and maximum efficiency during sediment removal. This information is continually transferred to the DredgePak monitoring screen to allow the operator to precisely dredge sediments to the required depths. Once dredging has been performed within the reach of the excavator, the dredge barge will be moved using the walking spud and tugs to reposition in the next planned dredge zone. This movement will continue between the walking spud and the tugs to achieve removal of all required design elevations. Additional details on dredge positioning are included in the Survey Plan (Section 5.6 and Appendix K).

5.3.4 Quantity Tracking

The shoreline bank excavation quantities will be documented through the completion of a final intertidal survey by the PPM independent surveyor, following completion of excavation activities. Additionally, a portion of the shoreline bank excavation areas may be surveyed by Terrasond from the survey boat during high tides. The final survey will be reviewed and approved by the Project Engineer.

Daily progress surveys will be performed to track the progress of dredging activities and ensure the design elevations within a DMU are achieved before proceeding to the next downriver DMU. As soon as practical following Final Dredging Acceptance by DMU survey approval by the Project Engineer for each DMU, an approximately 6-inch-thick interim clean sand cover will be placed throughout the DMU. Final backfill placement will be conducted once dredging in every DMU is approved to be complete by the Project Engineer and surveyed to ensure the final backfill design elevations are achieved. Additional details on survey methods are included in the Survey Plan (Section 5.6 and Appendix K).

5.3.5 Transloading Material

See Section 5.4 for a description of the procedures for transloading material.

5.3.6 Schedule and Hours of Work

Debris removal, shoreline bank excavation, and dredging are estimated to take approximately 40 days and will be conducted starting in mid-July. Debris removal and shoreline bank excavation are scheduled to be performed during one 10-hour shift, 6 days per week. The debris removal shift is scheduled to occur during daytime hours and the shoreline bank removal shift is schedule to occur during night hours due to low tides. Dredging operations are schedule to be performed 24 hours a day, 6 days per week.

5.3.7 Water Quality Management

See Section 5.11 and Appendices C and G for a description of the upland and on-barge water management and treatment procedures.

5.3.8 Notifications

The following notification will be made by PPM:

1. Send a letter, with a copy to the Engineer, to the Commander, Thirteenth Coast Guard District, 915 Second Avenue, Seattle, Washington, 98174-1067, at least 14 days prior to the commencement of dredging, notifying the Coast Guard as to the start of dredging operations.
2. Immediately report any spills to the state waters, spills on to land with the potential for entry to state waters, any other significant water quality impacts, distressed or dying fish, and buried chemicals, to the Project Engineer.

The following notifications will be made by the Project Engineer:

1. Report any water quality violations to EPA, per the 401 Water Quality Memorandum and Washington State Department of Fish and Wildlife Services (WDFW) per the WDFW Biological Opinion.
2. Report any dead, dying, or distressed fish to WDFW.

3. Provide ongoing construction schedule notifications to the Tribe to minimize impacts to tribal treaty fishing rights and practices.

5.4 Transload, Transport, and Disposal Plan

The following subsections summarize the PPM Transload, Transport, and Disposal Work Plan for the removal of impacted sediments and associated shoreline bank soils and the detailed plan is provided in Appendix H. The removal action is expected to remove an estimated 13,900 cy of sediment and 5,900 cy of shoreline bank soils.

5.4.1 Summary of Dredging Transportation and Disposal Procedures

PPM will haul loaded sediment barges downstream approximately to the PPM upland waterfront Transload Transport and Disposal (TTD) Yard (or other approved facility) located at 700 South Riverside Drive on the LDW (Figure 7). The sediment barges will be unloaded directly into truck-and-trailer combinations; no offloaded materials will come into contact with the ground. The PPM TTD Yard has been used for off-loading impacted sediments from the following regional EPA and Ecology managed cleanups and has sufficient waterfront access and productivity to support the offloading rates anticipated for this work:

- Pacific Sound Resources Superfund Cleanup Site for USACE in 2004 – Subtitle D and Subtitle C materials
- Lake Washington Derelict Drydock Demolition for DNR in 2009 – Subtitle D materials
- Harper Pier Removal for Department of Natural Resources in 2013 – Subtitle D materials
- Olympia Yacht Club Dredging in 2014 – Subtitle D materials

The non-TSCA materials will be offloaded from the sediment barges using an upland excavator and placed directly into 30-ton capacity truck-and-trailer combinations for subsequent hauling to the Waste Management Alaska Street Reload Facility (ASRF) located at 70 South Alaska Street in Seattle, Washington. Waste Management will rehandle the materials at the ASRF for reload into gondola rail cars and transport to the RCRA Subtitle D permitted CRL for use as alternative daily cover at the landfill. If significant debris is

encountered (greater than 50% debris), the materials will be hauled to the Greater Wenatchee Regional Landfill.

The JFOS-Impacted Material Area TSCA materials will be excavated from the uplands and placed directly into lined trucks at the Facility so no off-loading of these materials at the PPM Yard will occur.

In summary, dredged materials will include the following transportation and disposal steps:

- Sediment haul barge transported downstream from the RAB to PPM Yard (Figure 7) using tugs
- Sediments offloaded from sediment barge directly into 30-ton truck-and-trailer combinations using an excavator and transported to the Waste Management ASRF
- Sediments reloaded from truck-and-trailer combinations to railcars at the ASRF
- Rail cars transported from ASRF to CRL (debris content less than 50%) or Greater Wenatchee Regional Landfill for final disposal

5.4.2 Summary of Shoreline Bank Transportation and Disposal

The shoreline bank excavation will be completed during the low tides to maximize removal in the dry. The excavated shoreline bank material and associated debris will be loaded into trucks for offsite transport and disposal. PPM will construct a temporary scaffold and platform setup on the Facility to facilitate lining the material transport truck beds with plastic prior to entering the material load-out area. PPM will use an excavator to load the lined trucks in the material load-out area or directly from the shoreline bank excavation area, depending on access. During loading operations, plastic will be placed on the ground, where there is potential for spillage from the excavator. PPM personnel will clean up any spilled materials when loading is complete to minimize the potential for migration of materials outside the load-out area. Trucks will be equipped with automatic tarps and will be inspected prior to leaving the load-out area to ensure that there is no spilled material on the exterior of the truck. Any material found on the truck will be removed prior to departure from the load-out area.

Due to disposal facility requirements, debris will be sized to approximately no larger than 2 feet by 2 feet prior to loading into trucks. This sizing will be performed in an unlined concrete pad area to avoid damage to the plastic lined area for containment of soil materials. Protective measures (e.g., use of steel plates, crushed rock, etc.) will be implemented to minimize the potential for impacts to the concrete pad.

The CRL can only use disposed materials for alternative daily cover that contain less than 10% debris. Therefore, materials with greater than 50% debris will be segregated to the extent feasible in the stockpile area, loaded into trucks, and shipped directly to the Greater Wenatchee Regional Landfill. To maximize the disposal of materials that can be used as alternative daily cover and reduce disposal costs, to the extent feasible PPM will attempt to minimize loading materials with greater than 50% debris by mixing debris into the soil stockpile area. Trucks containing less than 50% debris will be transported to the ASRF facility and reloaded into gondola rail cars, transported and disposed at the CRL.

In summary, shoreline bank materials with less than 50% debris will include the following transportation and disposal steps depending on the debris content:

- Loaded from the stockpile area or directly from the shoreline bank into lined trucks using an excavator
- Transported to the ASRF, rehandled as necessary to achieve less than 10% debris, and reloaded into gondola railcars
- Rail transport from ASRF to CRL for final disposal

In summary, shoreline bank materials with less than 50% debris will include the following transportation and disposal steps depending on the debris content:

- Loaded from the stockpile and/or debris sizing area or directly from the shoreline bank into lined trucks using an excavator
- Transported directly to the Greater Wenatchee Regional Landfill for final disposal

5.4.3 Generated Wastes

Table 1 provides the expected waste material descriptions, quantities, sizing requirements, and disposal facilities. Due to the limited anticipated amount of recyclable materials, no material recycling is proposed.

Table 1
Material Description and Disposal Facility

Description	Estimated Quantity	Sizing Requirement	Disposal Facility
Shoreline Bank Soil with Debris*	5,900 cy	Debris (less than 2 feet by 2 feet)	80% CRL 20% Greater Wenatchee Regional Landfill
Non-TSCA Dredged Material	13,900 cy	Debris (less than 2 feet by 2 feet)	CRL
JFOS-Impacted Material Area TSCA Material	375 cy	Debris (less than 2 feet by 2 feet)	Chemical Waste Management of the Northwest
Timber Piles	780 linear feet (LF)	4 LF maximum	CRL or Greater Wenatchee Regional Landfill
Chain link Fence	550 LF	Rolls 30-inch diameter maximum	Greater Wenatchee Regional Landfill
Concrete/Asphalt/Slag	TBD	2 feet by 2 feet	Greater Wenatchee Regional Landfill
Miscellaneous Debris/Logs	TBD	4 LF	CRL or Greater Wenatchee Regional Landfill
Culvert Pipe	70 LF	8 LF	CRL
Clearing and Grubbing Vegetation	TBD	NA	CRL

Notes:
* Material with greater than 50% debris will be disposed at Greater Wenatchee Regional Landfill and material with less than 50% debris will be disposed at CRL. Planning level estimates of debris content include 20% disposal at Greater Wenatchee Regional Landfill.
CRL = Columbia Ridge Landfill
LF = linear feet
NA = not applicable
TBD = to be determined

5.4.4 Proposed Disposal Facilities

The following disposal facilities will be used:

- CRL is a RCRA Subtitle D permitted landfill located at 18177 Cedar Springs Lane, Arlington, Oregon
- Greater Wenatchee Regional Landfill and Recycling Center is a Subtitle D permitted landfill, 191 South Webb Road, Douglas County, Washington
- Chemical Waste Management of the Northwest is a RCRA/TSCA Subtitle C permitted landfill located at 17629 Cedar Springs Lane, Arlington, Oregon

Copies of the applicable permits for each of the above disposal facilities are located in Appendix H.

5.5 Backfilling Plan

The following subsections present a summary of the PPM backfilling plan and detailed information is provided in Appendix J. This information includes a summary of the material sources, products, and suppliers, as well as the means and methods for transporting, placing, and measuring the placement of backfill materials. Work will be conducted in accordance with the project Contract Documents.

5.5.1 Material Sources, Products, and Suppliers

The required backfill materials include the following:

- Upland backfill (gravel borrow)
- Backfill (clean, free draining sand)
- Select filter material (clean, free-draining sandy gravel or gravelly sand) uniformly amended with 0.5% granular GAC
- Light loose riprap
- Habitat substrate (clean rounded or sub-rounded gravel)

The physical and chemical requirements for these materials are included in the Construction Specifications (Appendix H of the BODR; Anchor QEA 2013a). Material will be provided by CalPortland. Potential quarry sources include CalPortland's Pioneer Aggregates (#B 335) in

DuPont, Washington and CalPortland's White River Quarry (#2A487) in Enumclaw, Washington. Final quarry sources, materials, and chemical characteristics will be approved by the Project Engineer and provided to the EPA RPM for final approval prior to use. In accordance with the Construction Specifications PPM will provide:

- Import materials source report with gradation and chemical analysis of borrow source samples
- Documentation of the origin of backfilling source materials
- Inspection of the borrow source(s)
- 50-pound representative composite samples of materials from each borrow source
- Product specifications for GAC and the means of GAC content verification

5.5.2 Means and Methods

Prior to in-water backfill placement, final sub-tidal surveys of each DMU will be performed as described in Section 5.6. As each DMU is dredged, surveyed, and approved as complete by the Project Engineer, approximately 6 inches of interim sand cover will be placed over the approved DMU as soon as practical given equipment availability, access, and post-dredge z-layer sampling activities. The backfilling activities will proceed from south to north and backfill placement will not occur until dredging in the adjacent downstream DMU is approved as complete (e.g., backfill placement will not occur in DMU 1 until dredging is approved as complete in DMU 2). Following placement of this initial sand cover throughout the DMU, final backfill material will be placed in each DMU to the final elevations following the Project Engineer's approval that dredging in all DMUs is complete. Once dredging is complete and final backfill placement begins, a multi-beam survey will be performed daily within backfilled areas by Terrasond until the final design grades are achieved and approved by the Project Engineer. A more detailed discussion on hydrographic surveys is included in the Survey Plan presented in Section 5.6 and Appendix K.

In-water backfilling will be performed prior to placement of the shoreline containment backfill to prevent potential sloughing and disturbance of remaining sediments. The in-water area below the toe of shoreline bank trench, which resides at approximately -5 feet MLLW elevation, will first be backfilled with clean sand material to the final design surface. Once complete, the shoreline containment will be placed above the toe of the shoreline bank

trench. The shoreline containment will consist of a minimum 1.5-foot filter layer (gravelly-sand or sandy-gravel amended with 0.5% GAC), overlain by a minimum 2.5-foot riprap armoring layer, and overlain by a minimum 0.5-foot habitat substrate layer. Approximately 40% of the shoreline containment backfill will be placed in-water due to intertidal toe trench elevation. The remaining approximately 60% will be placed in the dry (above the water surface elevation), from the upland area using a long reach excavator. BMPs for shoreline containment placement in the dry and in-water backfill placement are discussed in Section 5.1.2.11.

Prior to shoreline containment placement, a final intertidal survey will be performed within all areas excavated from the upland as described in Section 5.6. Once shoreline containment placement begins, grade checks will be performed daily by PPM surveyors until final grades for each containment layer are achieved. Surveying will be achieved by a combination of grade staking, visual placement methods, and the use of a grade checker equipped with an RTK-GPS unit. When final grades are achieved, a final survey of that containment layer will be submitted to the Project Engineer for approval. A more detailed discussion on upland surveys is included in the Survey Plan presented in Section 5.6 and Appendix K.

In-water backfill will be placed with the Web barge and a Hitachi 1200 excavator. The Hitachi 1200 excavator will be equipped with RTK GPS hardware that is utilized by Hypack's Dredgepack software. This software provides the operator with the visual controls to see where the bucket is vertically and horizontally in the dredge prism. The Web barge is also equipped with a heading sensor to determine its orientation in the dredge prism. The use of these tools allows for placement of an accurate thickness of material, provides the operator with guidance on when to release materials above the bottom profile, and minimizes turbidity during placement. In-water backfill placement will occur using two backfill material haul barges each with 2,000-ton capacities. The Web will obtain backfill from these barges using the Hitachi 1200 excavator and place the backfill to the required elevations. Backfill placement will be sequenced such that one backfill haul barge is being used for placement of backfill while the other is either being transported via tug to the selected backfill material source (CalPortland) for loading or being staged with backfill material for future use. Certified tonnage displacement curves will be provided separately for the two backfill barges.

Shoreline containment material will be placed from the uplands using an excavator and bucket. The excavator will load the material into the bucket, place the bucket at the lowest elevation for material placement, and spread or pull the materials upward toward the excavator to achieve the design layer thickness. As the excavator proceeds downriver, the grade checker will perform checks on the completed surface and mark where additional cut and fill is required to achieve the shoreline containment backfill grades. The excavator will balance the cuts and fills, using additional material as necessary until the grade checker approves the final surface elevations. While the excavator is working to achieve final surfaces in a particular portion of the bank, support equipment may stockpile material on the shoreline bank ahead of the excavator for future shoreline containment placement; however, all stockpiled materials will be placed before the tides inundate the backfill area. PPM will take the necessary precautions to minimize the potential for slope instability caused by the placement of stockpiled material on the shoreline bank prior to grading. Riprap will be keyed into the underlying filter layer with pressure from the back of the excavator bucket to improve stability. It is estimated that at least 500 cy of backfill can be placed in one shift.

The filter material layer placed from the toe trench to the top of the shoreline bank will contain 0.5% GAC blended into the filter sand and gravel at the quarry. Because the GAC is lighter than the sand and gravel and has a high porosity, it has a tendency to float to the top of the filter material when placed in water. To minimize this, the filter materials will be wetted prior to placement, allowing the GAC to settle at the same rate as the filter sand. Wetting will also occur during upland placement to minimize the potential for the surficial GAC to float as the tide rises and inundates the shoreline.

5.5.3 Schedule and Hours of Work

Backfilling is initially estimated to take 9 days and will be conducted starting in mid-August 2014. Work will be performed 10 to 12 hours a day, 6 days a week, depending on tidal elevations.

5.6 Survey Plan

A project Survey Plan prepared by PPM is included in Appendix K. The purpose of the Survey Plan is to provide details on how PPM will perform surveying and positioning

control during all phases of work. The Survey Plan includes information on the survey methods, equipment, personnel, and subcontractors to be utilized during the execution of the work. The objectives of the Survey Plan include the following:

1. Hydrographic survey equipment setup and establishment of site control points
2. Site topographic survey setup and pre-construction survey
3. Land based and water based equipment positioning instrumentation setup and equipment
4. Details on survey vessel equipment, computer software, and electronic tide measurement equipment, and associated survey hardware
5. Information on independent surveyor (i.e., Terrasond) qualifications

5.7 Vessel Management Plan

A project Vessel Management Plan prepared by PPM is included in Appendix I. The purpose of the Vessel Management Plan is to provide detail on navigation coordination and vessel management during the in-water work activities, which include dredging, debris removal, backfilling, and on-barge water treatment. The objectives of the Vessel Management Plan include the following:

1. Identification and specifications of all in-water equipment to be utilized on the project
2. Identification of navigation routes
3. Waterway coordination and compliance with navigation rules and regulations
4. Means and methods for monitoring and controlling waterway vessel traffic
5. Vessel mooring plan

5.8 Traffic Control Plan

A project Traffic Control Plan prepared by PPM is included in Appendix F. PPM's Traffic Control Plan addresses plans for protecting and controlling pedestrian and vehicular traffic during construction operations. The Traffic Control Plan includes:

- Traffic control issues on nearby rights of way
- On-site traffic and pedestrian safety control measures, including coordination of haul routes on the Jorgensen Forge site

- Site access and security measures

5.9 Contractor Quality Control Plan

The PPM CQC Plan is included as Attachment A of Appendix E. The PPM CQC Plan details the methods and procedures that will be taken to assure that all materials and completed construction elements conform to the Contract Documents. The PPM CQC Plan will be used to document inspections, monitoring, surveys, and other actions to be taken by PPM to ensure that the work complies with all Contract requirements. In general, the PPM CQC plan includes the following:

- Personnel, procedures, methods, instructions, records, and forms to be used to control the work and verify that the work conforms to the Contract Documents
- Description of the quality control/quality assurance organization, including an organization chart showing the various quality control team members, along with their designated responsibilities and lines of authority
- Acknowledgement that the quality control staff will conduct inspections for all aspects of the work specified, and shall report to the CQC Manager
- The name, qualifications, duties, responsibilities, and authorities of each person assigned a primary quality control function
- A summary of the delegated responsibilities of the CQC Manager, signed by an authorized official of the firm
- Procedures for scheduling and managing submittals, including those of subcontractors, off-site fabricators, and material suppliers
- Testing methods, schedules, and procedures used to report quality control information to the Project Engineer, including samples of the various reporting forms

5.10 Temporary Facilities and Controls and Environmental Pollution Control Plan

An ECP prepared by PPM is included in Appendix C. The purpose of the ECP is to detail the management of environmental conditions present over the course of the project and methods to ensure proper management of these conditions. The objectives of the ECP include:

- The management structure for control of environmental conditions during the course of the removal action
- Means and methods for implementing environmental controls during demolition, dredging, upland excavation, loading and transport of impacted materials and demolition debris, backfill, and restoration activities
- Facility maintenance and housekeeping
- Facility security
- Air pollution controls
- Noise management
- Protection of groundwater

Included as attachments to the ECP are:

- The SWPPP that addresses stormwater runoff and in-water sediment turbidity controls
- Spill Prevention, Control, and Countermeasures Plans (SPCCs) related to upland and on-water operations
- A Hazardous Materials Management Plan, which addresses the management of all onsite waste streams

5.11 Water Management and Treatment Plan

The following subsections present a summary of the PPM water management and treatment plan and detailed information is provided in Appendix G. In accordance with the BMPs identified in Section 5.1.2, water associated with both dredging and shoreline bank excavation and stockpiling will be contained and managed to prevent the release of sediment/soils and associated contaminants back into the LDW. There will be no direct overflow of water from the sediment haul barges back to the LDW without prior treatment and management as dredging return water. Water that comes in contact with or drains from stockpiled material, the stockpile area, and the debris sizing area will also be contained and managed. The remainder of this section summarizes the water management and treatment procedures for all captured fluids in contact with potential contaminated materials.

5.11.1 Shoreline Bank Excavation and Stockpile Water Management

As part of the site preparation activities, PPM will construct a lined stockpile area on the Facility in accordance with the Contract Documents. The stockpile water treatment system will be designed to meet the discharge requirements to the King County Industrial Waste sanitary sewer system. The treatment train is a pump-and-treat system that relies on passive coagulation. This system has been used on numerous construction sites in the greater Seattle area served by the combined sewer system. A Discharge Authorization Letter will be obtained from King County Industrial Waste prior to discharging any treated water to the sanitary sewer system. It is anticipated that this system will be needed for approximately 2 weeks with work occurring in the dry season.

Water from the upland work areas and/or shoreline bank soils stockpile area will be pumped to an 18,000-gallon weir detention tank for settling. The stockpile area will be built with an importable layer of PVC liner, crushed rock, and ecology blocks. Ecology blocks will be placed around the three sides of the stockpile area. A PVC liner will be placed over the blocks and down onto the footprint of the stockpile area. Crushed rock will then be placed on top of the liner and a berm will be formed against the ecology blocks. The crushed rock will be graded to a slope so as water passively leaves the soil it will flow to the enclosed section of the stockpile area for a 4-inch pump to remove the water and pump it to the treatment system. As the water is pumped to the tank it will pass through a chitosan gel-floc sock. This is a passive means of adding chitosan to promote coagulation and settling of solids. After settling, the clarified water will be passed through a non-resettable flow meter/totalizer and discharge to the designated sanitary sewer structure on the Jorgensen Forge property.

The post-treatment water will be sampled to determine if the concentrations are below the discharge permit requirements. If yes, the water will be discharged into the closest accessible sanitary sewer on the Facility. If no, the water will be transported offsite and disposed at an appropriately permitted disposal facility.

5.11.2 Dredge Water Management and Treatment

The dredge water management and treatment system includes the collection of free water within the sediment haul barge, followed by conveyance to a water treatment barge. The

system has been designed by PPM and their subcontractor, WaterTechtonics. A detailed summary of the water treatment system, operations, and system modification is provided in Appendix G.

The daily volume of water to be processed will be proportional to the volume of sediments dredged due to EPA's required used of a closed bucket (excluding where large debris requires the use of a standard digging bucket). Based on estimated sediment production rates, PPM anticipates that the dredge water production will average approximately 168 gallons per minute (gpm). The dredge water processing system has been designed to handle the maximum anticipated flow of 500 gpm.

In contrast to the Boeing DSOA cleanup, dredge water management and treatment will occur entirely on barges staged in the LDW. The designed dredge water treatment system consists of a primary treatment process followed by a secondary treatment process staged on a Flexi-float barge that is 50 feet by 120 feet (Figure 6). A detailed description of the primary and secondary treatment processes is provided in Appendix G. In summary, the primary treatment process will include settling of larger solids without the addition of amendments. The secondary treatment process will include the injection of chitosan to facilitate additional coagulation of solids. The chitosan acetate product used for this project will be StormKlear Liqui-Floc™ 1% Solution. Ecology has granted StormKlear Liqui-Floc™ 1% solution a General Use Level Designation for removal of turbidity.

After chitosan injection and mixing, the water enters a sand filter for final polishing. The sand filter is responsible for removing the larger and now filterable coagulated soil particles. The sand filter operates on a pressure differential, which will activate a backwash cycle based on a preset value if the differential becomes too high. Backwash will be sent back to the primary treatment detention tanks for settling and retreatment through the entire treatment train. Two sand filter banks will be utilized in the treatment train. These will be plumbed in parallel, so that if one filter needs maintenance the other can be quickly brought online. After sand filtration, the turbidity and pH are measured in the treated effluent. Water that is within the established turbidity and pH set-points will then be discharged to the construction work area within the LDW. If turbidity and/or pH are not within tolerances, the water will be directed back to the primary treatment tanks for retreatment through the

entire treatment train. Treated water meeting the water quality set-points will be pumped through 6-inch-diameter high-density polyethylene pipe into the LDW at the approximate location of dredging. The pipe will discharge from the bow of the dredge barge.

Any dredge dewater that is in contact with sediments/soils containing concentrations of PCBs greater than the TSCA threshold will be passed through two 2,000-pound capacity GAC filters for final polishing prior to discharge to the construction work area within the LDW.

The step-by-step operation and system/operation modification procedures in the event of set-point exceedances are detailed in Appendix G. Critical equipment includes the pumps and sand filter. A spare pump will be kept on the barge, along with a second (spare) sand filter. The spare sand filter will be plumbed during mobilization so that it can be implemented with a change of valving. The lead time for replacement parts should be no longer than 24 hours as most of the small parts are available in WaterTectonics' inventory and when this is the case can be brought from Everett to the site in the same day. WaterTectonics also has a longstanding relationship with their large equipment vendor (tanks/sand filters pumps) so that if additional equipment/replacement is necessary it will be procured quickly.

Due to the anticipated variability of the incoming dredge water, it will be necessary to adjust the water treatment system to provide assurance that water quality objectives can be met. WaterTectonics technicians will provide this service. The technicians will be knowledgeable with the system design and have performed water treatment system management previously. These technicians will continually monitor turbidity levels at various points in the treatment system and adjust the system as required. PPM will utilize one laborer during the day to assist WaterTectonics' technician. At night two laborers will be used to ensure the mechanical portions of the system are operating correctly. The laborers will routinely walk the system checking tank levels, piping connections, valving, etc. to ensure proper operation of the system.

5.12 Facility Restoration

PPM will perform Facility restoration activities to return the Facility to preconstruction conditions after the decontamination of equipment is complete as described in Section 5.12. Site restoration activities include removal and cleanup of the following temporary facilities and controls:

- Excavated soil and associated debris and shoreline containment material stockpile areas including ecology blocks, sand bags, plastic liners and sheeting, and wattles
- Temporary truck lining scaffold and platform setup
- Temporary security fencing
- Temporary office trailers and facilities, water access, haul roads, and equipment storage and maintenance areas
- Upland water treatment system equipment, storage tanks, and associated piping
- Temporary erosion and sediment control and SPCC equipment and in-water containment boom

PPM will install permanent fencing as shown on Construction Drawings (Sheet C-6 of Appendix G of the BODR; Anchor QEA 2013a), and then demobilize upland and in-water dredging and barge water treatment system equipment from the Facility. PPM will follow the checklist for completion of project closeout requirements as outlined in the Construction Specifications (Appendix H of the BODR; Anchor QEA 2013a). Final project record documents will be approved by the Project Engineer prior to Notice of Completion, issued when all work is complete.

6 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL

The CQA program to be implemented during the removal action is described in Section 5 of the CQAP (Appendix D of the BODR; Anchor QEA 2013a). This section provides an overview of the CQA activities and how these activities will be coordinated with the PPM CQC Plan (Section 5.9). Section 3 and Figure 3 present a list of individuals and their roles in the CQA program.

6.1 Submittal Management

All final construction documentation will be stamped, as appropriate, by licensed professionals. If, during the course of construction, modification of the final stamped and approved design is required, modifications will be documented in writing and stamped by a licensed engineer. Undocumented modifications of the design or other deviations from the approved design will not be permitted. Construction surveys, including as-built surveys, will be documented on drawings using the same datum, unit, and scale as design drawings. Record drawings will allow for a direct visual assessment of the quality and completeness of construction. Section 013300 of the Construction Specifications (Appendix H of the BODR; Anchor QEA 2013a) identifies the required Contractor submittal procedures.

The records described in this section will be maintained in the project files. Monitoring data will be provided electronically to EPA in the Removal Action Completion Report (RACR).

6.2 Weekly Progress Meetings

Weekly progress meetings will be coordinated with the Construction Management Team and EPA including pre-notification of time and place of meetings. Conference call access will be provided as needed and requested, and meeting minutes will be prepared and made available to attendees. Section 013100 of the Construction Specifications (Appendix H of the BODR; Anchor QEA 2013a) identifies the required attendees and standard agenda for weekly meetings.

6.3 Inspection, Sampling, and Verification Activities

6.3.1 Overview

PPM will implement the CQC Plan as described in Section 5.9. Additional quality assurance activities will be conducted by EMJ and their construction management representatives as described in the following sections and in the CQAP (Appendix D of the BODR; Anchor QEA 2013a).

6.3.2 Verification Survey

PPM will conduct survey activities as detailed in the Survey Plan presented in Section 5.6 and Appendix K, and in accordance with the Contract Documents (Appendix H of the BODR; Anchor QEA 2013a). In addition to the survey activities conducted by PPM, separate post-dredging bathymetric surveys will be coordinated by the Project Engineer using a multi-beam fathometer. In areas that a survey vessel is unable to access, pole soundings or land-based conventional upland survey methods will be employed to supplement the data collection. Survey lines will be set at a 25-foot grid spacing perpendicular and parallel to the dredge cut, where practical. Pole sounding measurements will be taken at a maximum interval of 10 feet along each transect or at a noted break in grade. A RTK GPS will be used to determine the horizontal position of each shallow water survey measurement taken. The Project Engineer will also process the survey data obtained to verify the target elevations have been achieved.

6.4 Documentation and Reporting

During construction activities, various documents will be generated as required by the Construction Specifications (Appendix H of the BODR; Anchor QEA 2013a), CQAP (Appendix D of the BODR; Anchor QEA 2013a), and CQC Plan (Section 5.9 and Attachment A of Appendix E). These documents and reporting requirements are presented in the following sections.

6.4.1 Contractor's Daily Quality Control Report

PPM and Waste Management will be required to provide a variety of documentation to the CQAO, including testing results of materials received, weigh tickets for shipments of

materials removed, survey results, and documentation of pay items completed. PPM and Waste Management will also submit a Daily Quality Control Report to the CQAO, as specified in the CQAP (Appendix D of the BODR; Anchor QEA 2013a). These Daily Quality Control Reports will be distributed by the Project Engineer on a weekly basis as part of the Weekly Summary Report prepared by the CQAO in cooperation with PPM and Waste Management.

6.4.2 Construction Quality Assurance Officer's Daily Report

The CQAO will maintain a daily field log to record observations, measurements, inspections completed, data received, communications with other members of the Project Team, any water quality exceedances, additional environmental controls that were implemented, problems encountered, and resolutions. The daily field log will be supported by submittals received from the Contractor, such as survey results and weigh tickets, chain of custody forms for water quality monitoring samples collected, laboratory data received, inspection reports, and written communication from members of the Project Team. Water quality results will also be separately recorded and reported as defined in the WQMP (Appendix E of the BODR; Anchor 2013a). The CQAO will submit weekly progress reports to EPA as described in Section 6.2.3 of the CQAP (Appendix D of the BODR; Anchor QEA 2013a).

6.4.3 Water Quality Monitoring Reports

Daily, weekly, and final reporting of water quality monitoring results will be required for this project. Data will be collected and recorded in the field on the Water Quality Monitoring Form as described in the WQMP (Appendix E of the BODR; Anchor 2013a). At the end of each field day, the field forms will be scanned and e-mailed to the CQAO. Unless an exceedance of a water quality parameter occurs (which would trigger the contingency response actions described in Section 6 of the WQMP), daily field results will not be transmitted to EPA unless specifically requested.

The results from each week's water quality monitoring activities will be compiled into a summary table with a comparison to water quality compliance criteria. The weekly summaries will be provided to EPA by the Project Engineer within 2 business days of the work (i.e., generally by the close of business on Tuesday of the following week). The weekly

summary tables and compliance evaluations will be performed by designated office support staff under the direction of the Water Quality Field Leader. All reporting will include both regularly scheduled monitoring and any additional monitoring results that may have been triggered by exceedances of water quality criteria.

After all construction has been completed, the water quality monitoring data for the entire construction project will be provided to the EPA by the Project Engineer in a Water Quality Monitoring Report (WQMR) as an appendix to the RACR. The content of the WQMR is specified in the WQMP (Appendix E of the BODR; Anchor 2013a).

6.4.4 Hydrographic and Topographic Survey Reports

PPM will conduct survey activities and submit daily survey progress reports as detailed in the Survey Plan (Section 5.6 and Appendix K).

6.4.5 Sediment Verification Sampling

Post-dredge sediment z-layer samples and post shoreline excavation bank z-layer samples will be collected prior to backfill and shoreline containment placement, respectively, to document the exposed sediment and soil chemical concentrations at the design removal elevations. Additionally, pre- and post-construction perimeter surface sediment samples will be collected to evaluate whether there are significant increases in concentrations of COCs in surface sediments adjacent to the RAB relative to pre-remediation concentrations as a result of construction activities. The sediment verification sampling requirements are detailed in the CQAP (Appendix D of the BODR; Anchor QEA 2013a) and in the Field Sampling Plan (Appendix C of the BODR; Anchor QEA 2013a). Detailed field and laboratory quality assurance and quality control criteria, including method specifications, detection limits, accuracy, and precision requirements are included in the Quality Assurance Project Plan (Appendix D of the BODR; Anchor QEA 2013a).

6.4.6 Borrow Site Characterization Reports

Prior to any on-site placement of import materials, the Contractor shall submit a Borrow Site Characterization Report to the CQAO and EPA. The characterization report will include identification of the source (including a map documenting the origin of the material), site

inspection, and material sample and characterization (physical and chemical testing, as specified) to ensure that the import material will uniformly meet the chemical and physical specifications of its intended use.

6.5 Field Change Documentation

The Construction Management Team will meet weekly with PPM, Waste Management, and EPA to review the CQAO Weekly Summary Report and to keep the EPA informed of continuing events as the removal action proceeds. Any work not in accordance with the Contract Documents and this RAWP will be communicated to EPA. In some cases the corrective actions will involve the Contractor correcting the work to comply with the Contract Documents. In other cases, changes to the design may be necessary and therefore require a change order with the Contractor.

In the event that a change or changed condition is encountered by the Contactor as defined in the Contract Documents, or if CQA inspections reveal out-of-specification conditions requiring a change in the design or construction process, EMJ's representatives will review the condition to assess what revision to the design may be required to maintain consistency with the intent of the Contract Documents. When immediate direction is required, written direction may be issued by the Project Engineer to the Contractor after consulting with EMJ to recommend the needed revision(s) to the design and obtaining EPA approval.

Any changes to EPA-approved documents shall be reviewed and approved by EPA prior to implementation. The EPA review will determine whether the change is consistent with cleanup objectives and is protective of human health and the environment. In addition, EPA review will ensure that the change conforms to performance standards, ARARs, and requirements of the SOW. Any changes will be included in the CQAO Weekly Summary Reports.

6.6 Post-Construction Documentation

Within 90 days of EPA confirmation that the removal action requirements have been fulfilled (excluding long-term post-construction monitoring requirements), EMJ will submit a draft RACR. The draft RACR will contain the following information:

- Introduction
  - Site location
  - Environmental setting
  - Relevant operational history
  - Summary of previous investigations and actions
- Removal action background
  - Basis for the removal action (i.e., the AOC)
  - Context within overall LDW Superfund Site
  - RAOs
  - Summary of design basis
  - Summary of deviations from the design, if any
- Construction activities
  - Description of dredging activities
  - Description of shoreline bank reconfiguration
  - Description of backfill and armor placement
  - Description of transport, offloading, and off-site disposal
  - Description of construction monitoring activities
  - Description of completion and demobilization, including equipment decontamination
- Chronology of events
  - Description of the timing of construction activities, identifying milestones with reference to a tabular summary of a more detailed construction timeline
- Performance standards and CQC
  - Description of performance objectives and verification activities performed to confirm the removal action was implemented in accordance with the Construction Specifications and Drawings
  - Description of actual construction performance relative to performance objectives, including a summary of the results of CQA measurements and analyses
  - Description of contingency actions implemented, if any were necessary
  - Description of EPA oversight activities

  - Summary of z-layer sampling and perimeter monitoring results
  - (Note: quality assurance for water quality monitoring analytical data will be included in the final WQMR)

- Final inspection and certifications
  - Description of final inspections, including the scope of inspections and noting any deficiencies identified and corrective actions implemented
  - Summary of health and safety monitoring during the implementation of the removal action with notation of deviations or incidents, if applicable
  - Identification of any institutional or engineering controls that are implemented to maintain the integrity of the removal action, including identification of parties responsible for maintaining and enforcing controls
  - If applicable, summary of close out requirements for off-site offloading facility
- Operation and maintenance activities
  - Description of post-construction monitoring and maintenance requirements
  - Description of contingency measures that would be implemented if post-construction monitoring indicates such measures are warranted
- Summary of project costs
  - Identification of the actual final costs incurred to comply with the provisions of the AOC
  - Identification of costs previously estimated for implementation of the removal action and an update of the cost estimate for post-construction monitoring and maintenance costs
- Observations and lessons learned
  - Identification of problems encountered, if any, in implementing the removal action and corrective actions
  - Identification of successes in implementing the removal action
  - Analysis of lessons learned that may be applied to future activities

- Removal action contact information
  - Identification of individuals (contact names, addresses, and phone numbers) for design and remediation contractors, EPA oversight contractors, and key personnel at EMJ, EPA, and other agencies

The RACR will also include copies of as-built drawings, summaries of waste disposal and analytical results, the final WQMR, and the certification statement required by the AOC.

If applicable, EMJ will submit a final RACR within 60 day of receipt of EPA comments on the draft RACR.

7 LONG-TERM INSTITUTIONAL CONTROLS

The Action Memo for the removal action includes institutional controls as part of the proposed action (EPA 2011). The EE/CA indicated that the complete removal of impacted sediments would be preferable, in small part due to the fact that complete removal would lead to reduced area requiring long-term maintenance or institutional controls (Anchor QEA 2011). Institutional controls generally consist of activities, documents, information devices, physical restrictions, or legal restrictions that ensure the protectiveness of the remedy and minimize, limit, or prevent human exposures to site COCs. They do not include active remediation actions. The Action Memo indicates that the removal action institutional controls should consist only of the LDW-wide fish consumption advisory (EPA 2011). EPA is currently evaluating whether additional institutional controls should be implemented to further protect the community and stakeholders and is coordinating directly with EMJ on this issue.

This section presents the plan for implementing the specific institutional control identified by EPA for the Facility. Documentation of implementation of the institutional control will be submitted after removal action construction.

7.1 Purpose and Objectives of Institutional Controls for RAB

The proposed removal action does not include placement of engineered caps, and dredging is intended to remove the full extent of PCB contamination from the sediment. Therefore, the area requiring coverage by institutional controls is minimized. The shoreline containment reconfiguration involves placement of material that should be protected from future disturbance without first notifying appropriate regulatory authorities. EPA indicated that the waterway-wide institutional controls may be applicable and that the scope of those controls is currently being evaluated.

Land use within the RAB primarily consists of commercial and recreational navigation, sport fishing, and tribal fishing. The backfill areas would not be required to be protected from small-vessel anchorage, fishing, or clamming activities associated with these potential uses. Commercial navigation would occur directly west of the channelward extents of the RAB

and future navigational dredging may extend some distance into the channelward portion of the RAB. Industrial land use would continue on adjacent upland parcels.

Therefore, the seafood consumption advisories issued by the Washington State Department of Health are likely to be maintained and potentially expanded as an institutional control for the entire LDW, including the RAB. Consumption advisories would not be necessary for the removal action alone, because clean material will be used as backfill following dredging, and the seafood consumption advisories apply to many organisms that range over a much larger area.

The necessary institutional controls could be fully implemented within approximately 1 year of construction completion. Engineering controls, BMPs, and other measures to ensure compliance with ARARs would control short-term risks during implementation.

8 PROJECT SCHEDULE

A general description of the project schedule for each of the work elements is included in Section 5. A comprehensive detailed schedule for each work element is included in Appendix L. The current schedule is subject to change based on encountered field conditions and the Contractor's optimization of the various work elements during performance of the work. At a minimum, schedule updates will be communicated to EPA during the weekly progress meetings.

9 REFERENCES

Anchor QEA (Anchor QEA, LLC), 2011. *Final Engineering Evaluation/Cost Analysis – Jorgensen Forge Facility, 8531 East Marginal Way South, Seattle, Washingto*n. Prepared for the U.S. Environmental Protection Agency. March 2011.

Anchor QEA, 2013a. *Basis of Design Report – Jorgensen Forge Early Action Area.* Prepared for the U.S. Environmental Protection Agency. August 2013.

Anchor QEA, 2013b. Memorandum with Subject: Jorgensen Forge Amended Agreed Order (No. DE 4127) Interim Action Work Plan. Prepared for the Washington State Department of Ecology. June 4, 2013.

Anchor QEA, 2014. Memorandum with Subject: Jorgensen Forge Early Action Area Removal Action, Addendum to the Final Basis of Design Report. Administrative Order on Consent, EPA Docket No. CERCLA 10-2013-0032.

B&T Engineering, 2014. Jorgensen Forge Outfall Site Containment Barrier Wall Design. Prepared for the Jorgensen Forge Corporation and The Boeing Company. January 21.

EMJ (Earle M. Jorgensen), Jorgensen Forge Corporation, and The Boeing Company, 2007. *Memorandum of Understanding: Coordination at the Boeing and EMJ/Jorgensen Transition Zone Boundary Sediment Cleanup Areas; Lower Duwamish Waterway (MOU).* September 2007.

EPA (U.S. Environmental Protection Agency), 2008a. *First Amendment, Administrative Order on Consent, Jorgensen Forge Facility, Tukwila, Washington, Comprehensive Environmental Response, Compensation and Liability Act, as Amended, U.S. EPA Docket No. CERCLA 10-2003-0111.*

EPA, 2008b. Letter with Subject: Target Remedial Sediment Boundary, Vertical Point of Compliance and Target Sediment Cleanup Level, Administrative Order on Consent, Jorgensen Forge Facility, Tukwila, Washington, Comprehensive Environmental Response, Compensation and Liability Act, as amended, EPA Docket No. CERCLA 10-2003-0111. Prepared for Mr. Peter Jewett of Farallon Consulting, LLC, and Mr. William Johnson of Earle M. Jorgensen Company. August 8, 2008.

EPA, 2010. Letter with subject: Comments on Draft Engineering Evaluation/Cost Analysis, Jorgensen Forge Facility, March 2009 Comprehensive Environmental Response,

Compensation, and Liability Act Administrative Order on Consent, U.S. EPA Docket No. CERCLA 10-2003-0111. Prepared for Mr. Peter Jewett of Farallon Consulting, LLC, and Mr. Gil Leon of Earle M. Jorgensen Company. April 30, 2010.

EPA, 2011. *Action Memorandum for a Non-Time-Critical Removal Action at the Jorgensen Forge Early Action Area of the Lower Duwamish Waterway Superfund Site in Seattle, Washington*. Seattle, Washington.

Sound Earth Strategies, 2013. *Data Report of Soil Quality Angle Boring Results – Second Modification for the Administrative Order on Consent for Removal Action, Jorgensen Forge Outfall Site, Phase 4A/Shoreline Containment Barrier*. Prepared for U.S. Environmental Protection Agency. December 20, 2013.

FIGURES

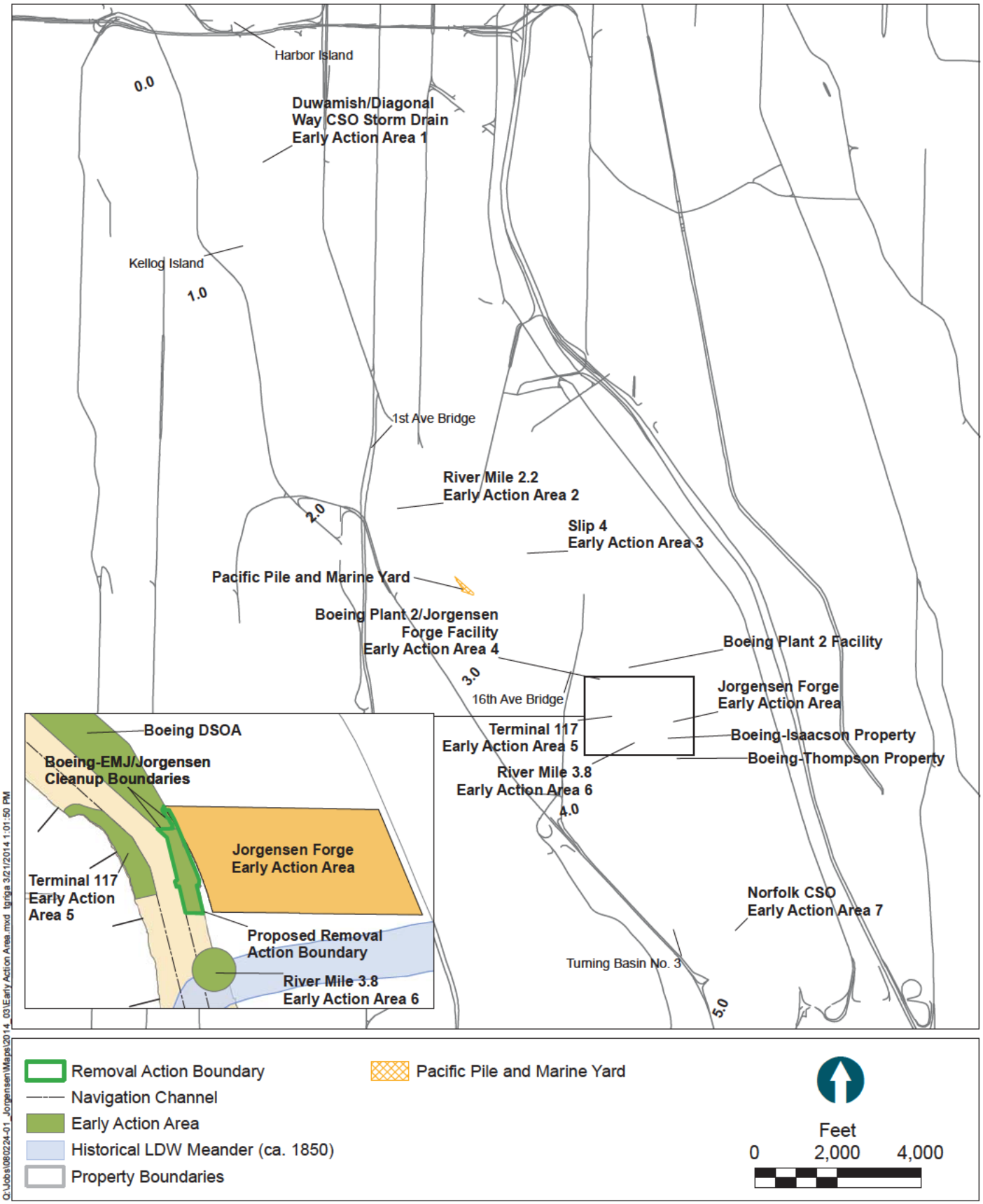
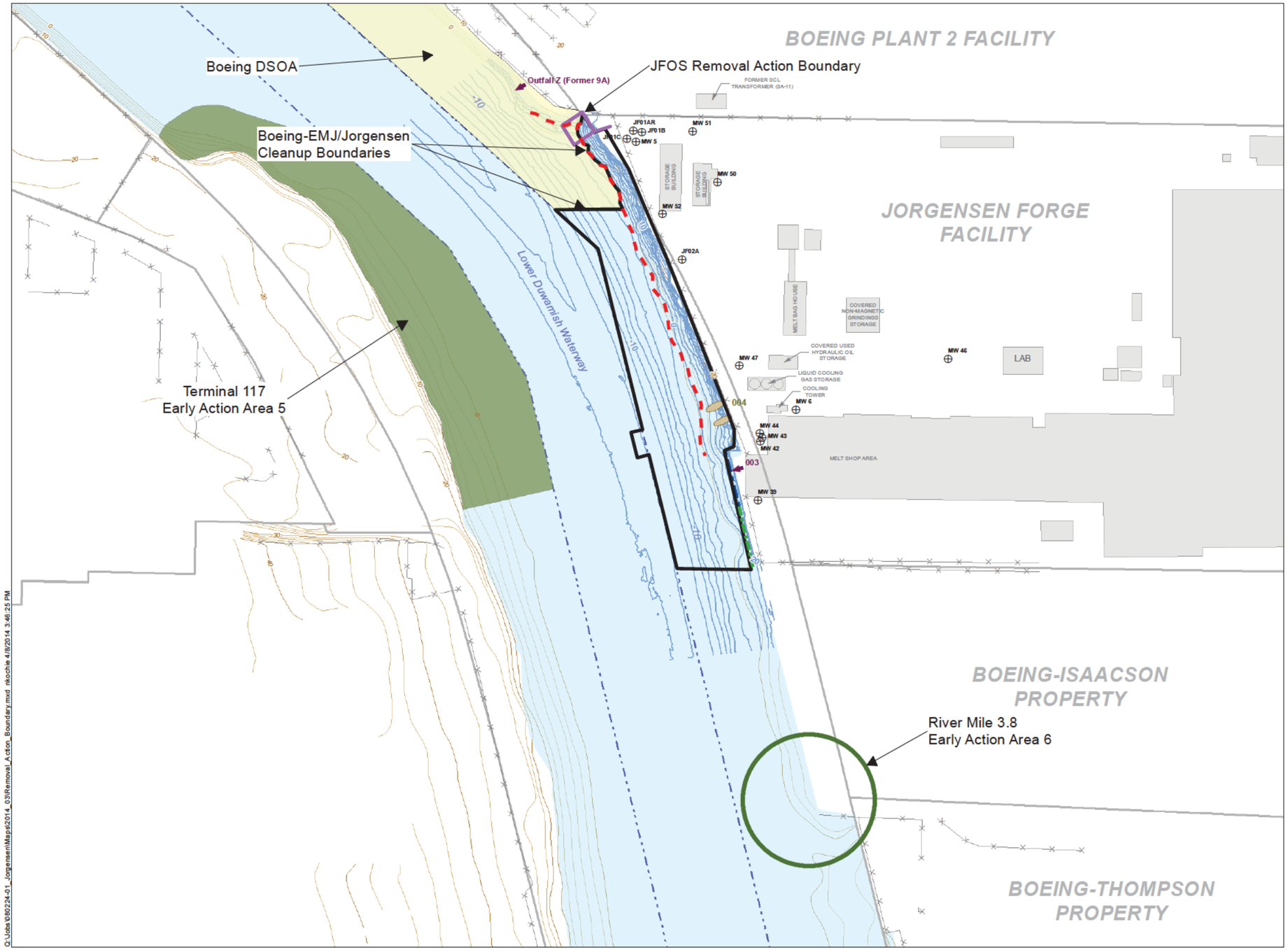


Figure 1
Jorgensen Forge Early Action Area
Removal Action Work Plan
Jorgensen Forge Early Action Area



LEGEND

- Groundwater Monitoring Well
- Active Outfall
- Toe of Existing Riprap
- Existing Sheetpile Wall
- Existing Concrete Panel Wall
- Fences
- Federal Navigation Channel
- Debris Pile
- Property Boundaries
- Boeing DSOA
- Terminal 117 Early Action Area 5 Boundary
- JFOS Removal Action Boundary
- Removal Action Boundary

NOTES:

1. Bathymetric survey by eTrac dated February 8, 2012. Additional bank survey by AEC Consultants, Inc. dated February 21, 2012. Bathymetric and bank survey merged with upland survey by PLS, Inc. dated January 24, 2012.

2. Outfall locations field identified on May 14, 2003.

3. The toe of riprap slope was surveyed during a low tide on August 28, 2008.

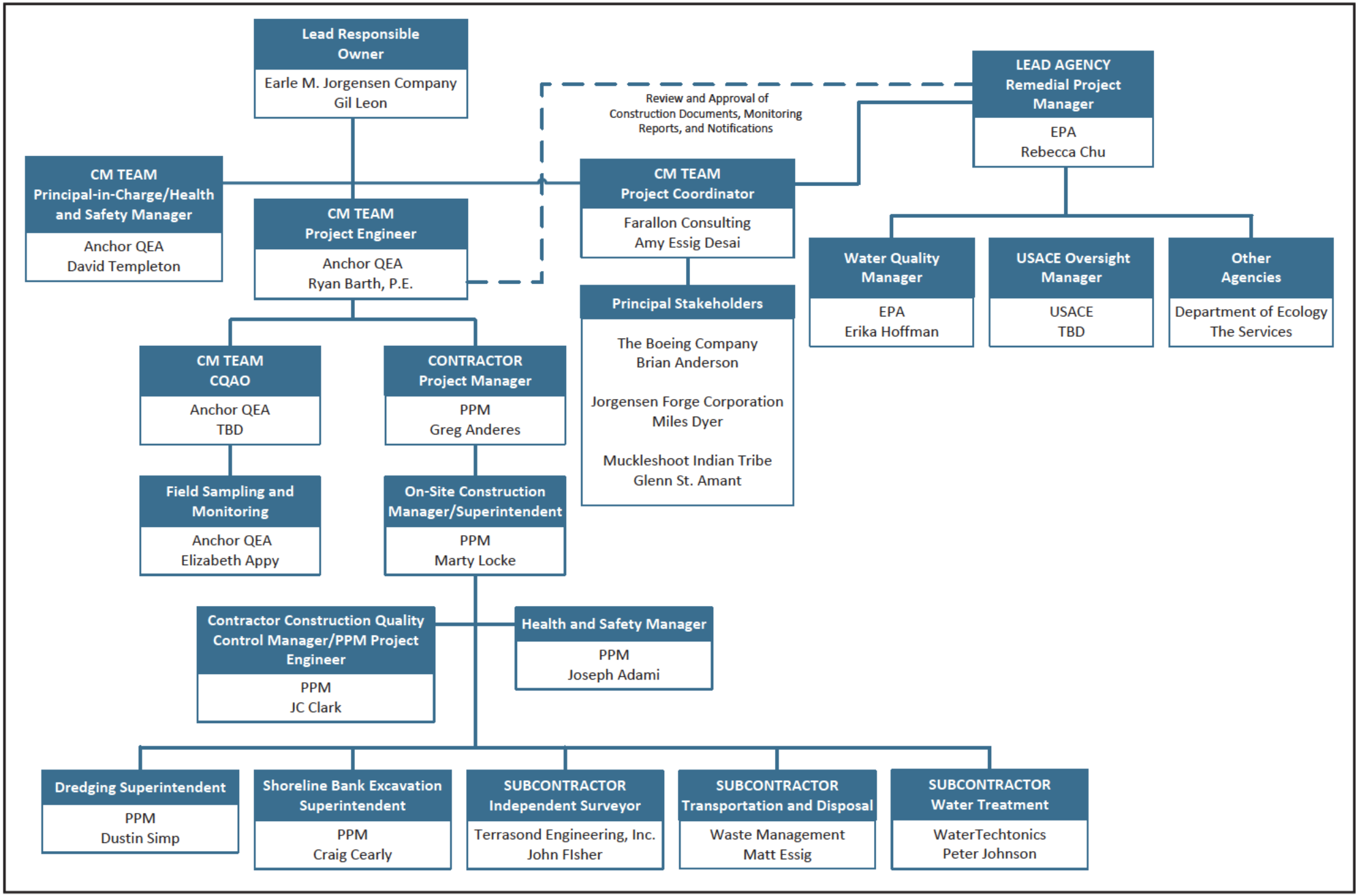
4. The Boeing-EMJ/Jorgensen cleanup boundaries are identified in the Memorandum of Understanding between Boeing and EMJ/Jorgensen Forge, dated August 2007 (EMJ et al. 2007).

Feet

0 80 160 240 320

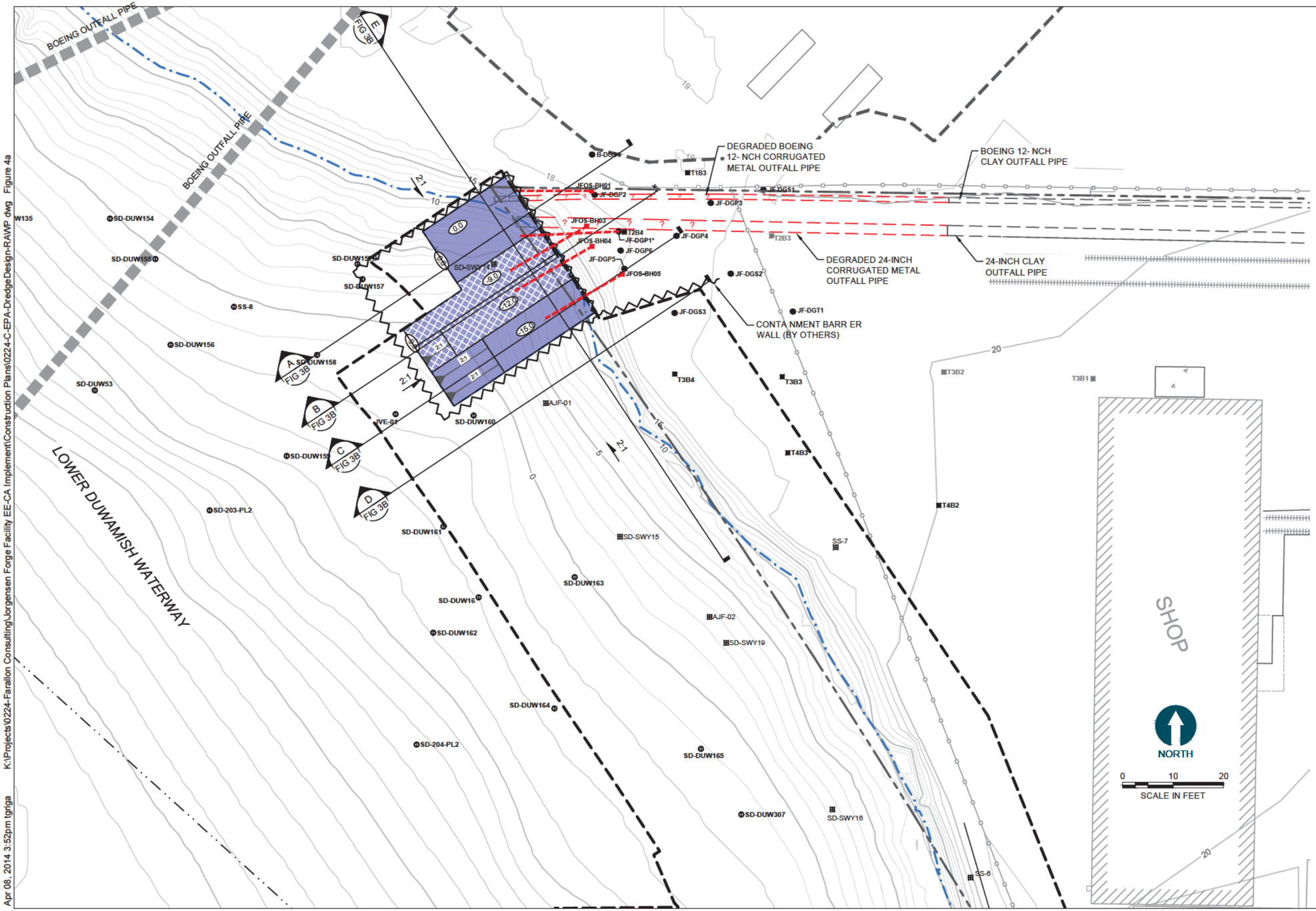
Q:\Jobs\080224-01_Jorgensen\Maps\2014_03\Removal_Action_Boundary.mxd nicochie 4/8/2014 3:46:25 PM

Figure 2
Removal Action Boundary
Removal Action Work Plan
Jorgensen Forge Early Action Area



ANCHOR QEA

Figure 3
Project Team Organizational Chart
Removal Action Work Plan
Jorgensen Forge Early Action Area



LEGEND:

- EXISTING GRADE
- EXISTING MHHW (+11.1 MLLW)
- CONTAINMENT BARRIER WALL (BY OTHERS)
- EXISTING CONTOUR - PLS/ETRAC SURVEY (1 FT INTERVAL)
- PROPOSED DREDGE/EXCAVATION CONTOUR (1 FT INTERVAL)
- ANGLED GEOPROBE
- EXISTING BOEING SHEET PILE WALL
- REQUIRED SCHEDULE A REMOVAL LIMITS - NON TSCA
- REQUIRED SCHEDULE A REMOVAL LIMITS - TSCA
- EAA DREDGE/EXCAVATION LIMITS
- REQUIRED DREDGE ELEVATION (FT MLLW)
- TOP OF SIDESLOPE
- FINAL GRADE
- DREDGE COORDINATE
- DREDGE BOUNDARY (DENOTES CHANGE IN ELEVATION)
- SLOPE ARROW

NOTES:

1. West of the containment barrier wall, the total PCBs RvAL for the Jorgensen Forge EAA removal action is equivalent to the SMS SQS of 12 mg/kg-OC. OC normalization was not completed for samples with TOC concentrations less than 0 5 percent or greater than 4 percent (Michelsen, T.C., Bragdon-Cook, K. 1993). In these cases, the total PCBs RvAL is equivalent to the LAET of 0.13 mg/kg dry weight (PTI 1998). The containment barrier wall will be installed by The Boeing Company and Jorgensen Forge Corporation pursuant to Second Modification to the JFOS Administrative Order on Consent for Removal Action with EPA. Any associated necessary removal action by the Boeing Company and Jorgensen Forge Corporation upland of the containment barrier will be determined by EPA pursuant to a future modified JFOS Order.
2. The containment barrier wall was installed by The Boeing Company and Jorgensen Forge Corporation pursuant to Second Modification to the Administrative Order on Consent for Removal Action with EPA.

ABBREVIATIONS:

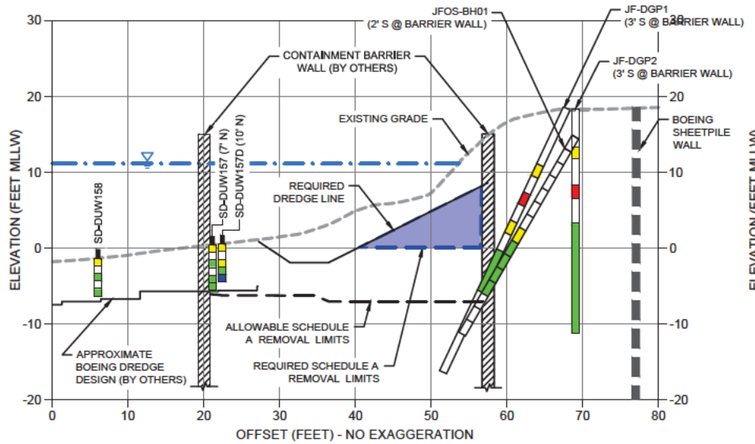
mg/kg	milligrams per kilogram
MLLW	mean lower low water
MHHW	mean higher high water
PCB	polychlorinated biphenyl
TSCA	Toxic Substances Control Act
RvAL	Removal Action Level
EAA	Early Action Area
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
OC	organic carbon
TOC	total organic carbon
LAET	Lowest Apparent Effects Threshold
JFOS	Jorgensen Forge Outfall Site pursuant to Administrative Order on Consent for Removal Action between EPA, The Boeing Company, and Jorgensen Forge Corporation

HORIZONTAL DATUM: Washington State Plane North, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Apr 08, 2014 3:52pm tgriga K:\Projects\0224-Farallon Consulting\Jorgensen Forge Facility EE-CA Implement\Construction Plans\0224-C-EPA-DredgeDesign-RAWP.dwg Figure 4a

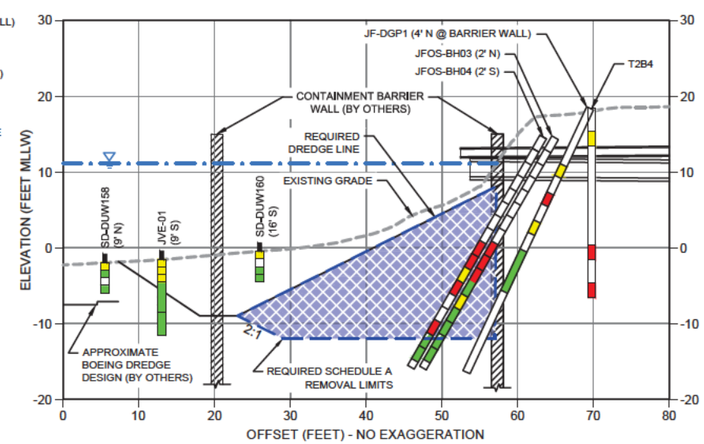
ANCHOR QEA

Figure 4a
JFOS Impacted Material Area Revised Dredge Prism and Containment Barrier Wall Alignment
Removal Action Work Plan
Jorgensen Forge Early Action Area



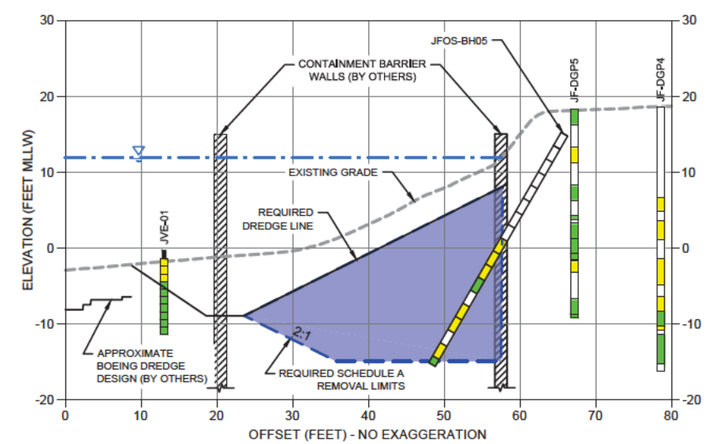
A FIG 3a DREDGE/EXCAVATION SECTION
SCALE: 1" = 10'

0 10 20
SCALE N FEET



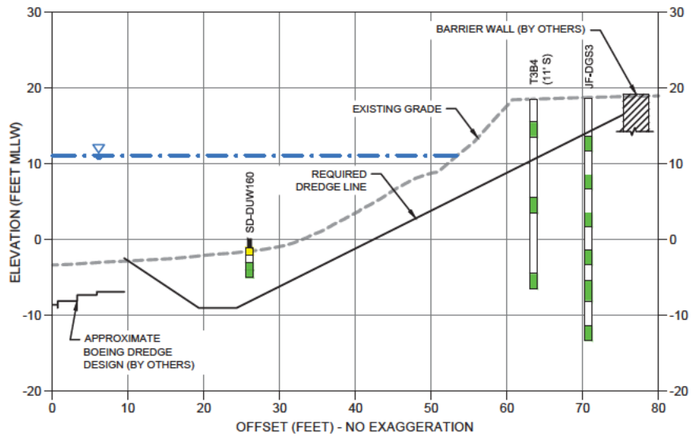
B FIG 3a DREDGE/EXCAVATION SECTION
SCALE: 1" = 10'

0 10 20
SCALE IN FEET



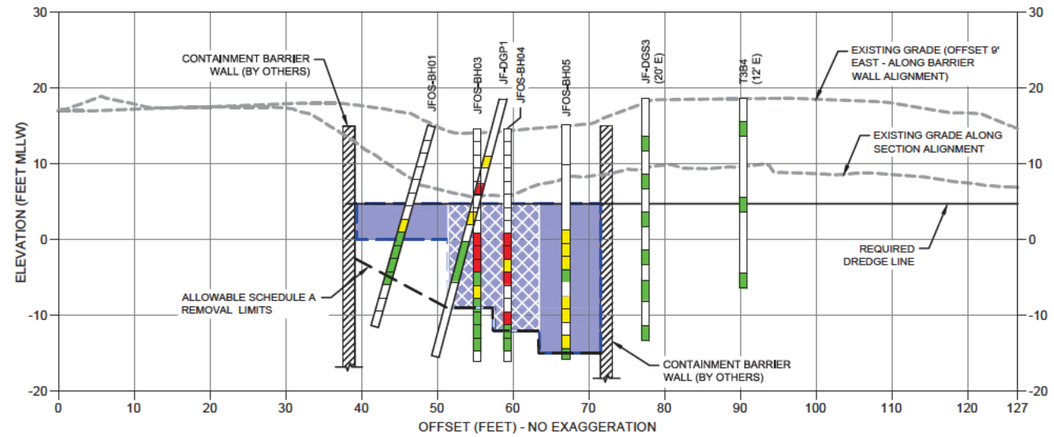
C FIG 3a DREDGE/EXCAVATION SECTION
SCALE: 1" = 10'

0 10 20
SCALE IN FEET



D FIG 3a DREDGE/EXCAVATION SECTION
SCALE: 1" = 10'

0 10 20
SCALE N FEET



E FIG 3a DREDGE/EXCAVATION SECTION
SCALE: 1" = 10'

0 10 20
SCALE IN FEET

LEGEND:

- EXIST NG GRADE
- EXIST NG MHHW (+11.1 MLLW)
- CONTA NMENT BARR ER WALL (BY OTHERS)
- EXISTING BOEING SHEET P LE WALL
- REQUIRED SCHEDULE A REMOVAL LIMITS - NON TSCA
- REQUIRED SCHEDULE A REMOVAL LIMITS - TSCA

TOTAL PCB CONCENTRATIONS EAST OF WALL (mg/kg)
- < 1
- 1 <= 50
- > 50
- Not sampled

TOTAL PCB CONCENTRATIONS WEST OF WALL (mg/kg)
- < 1 > RvAL
- < = 50
- > 50
- Non-detected concentration > RvAL
- Not sampled

NOTES:
1. West of the containment barrier wall, the total PCBs RvAL for the Jorgensen Forge EAA removal action is equivalent to the SMS SQS of 12 mg/kg-OC. OC normalization was not completed for samples with TOC concentrations less than 0.5 percent or greater than 4 percent (Michelsen, T.C., Bragdon-Cook, K. 1993). In these cases, the total PCBs RvAL is equivalent to the LAET of 0.13 mg/kg dry weight (PTI 1998). The containment barrier wall will be installed by The Boeing Company and Jorgensen Forge Corporation pursuant to Second Modification to the JFOS Administrative Order on Consent for Removal Action with EPA. Any associated necessary removal action by the Boeing Company and Jorgensen Forge Corporation upland of the containment barrier will be determined by EPA pursuant to a future modified JFOS Order.

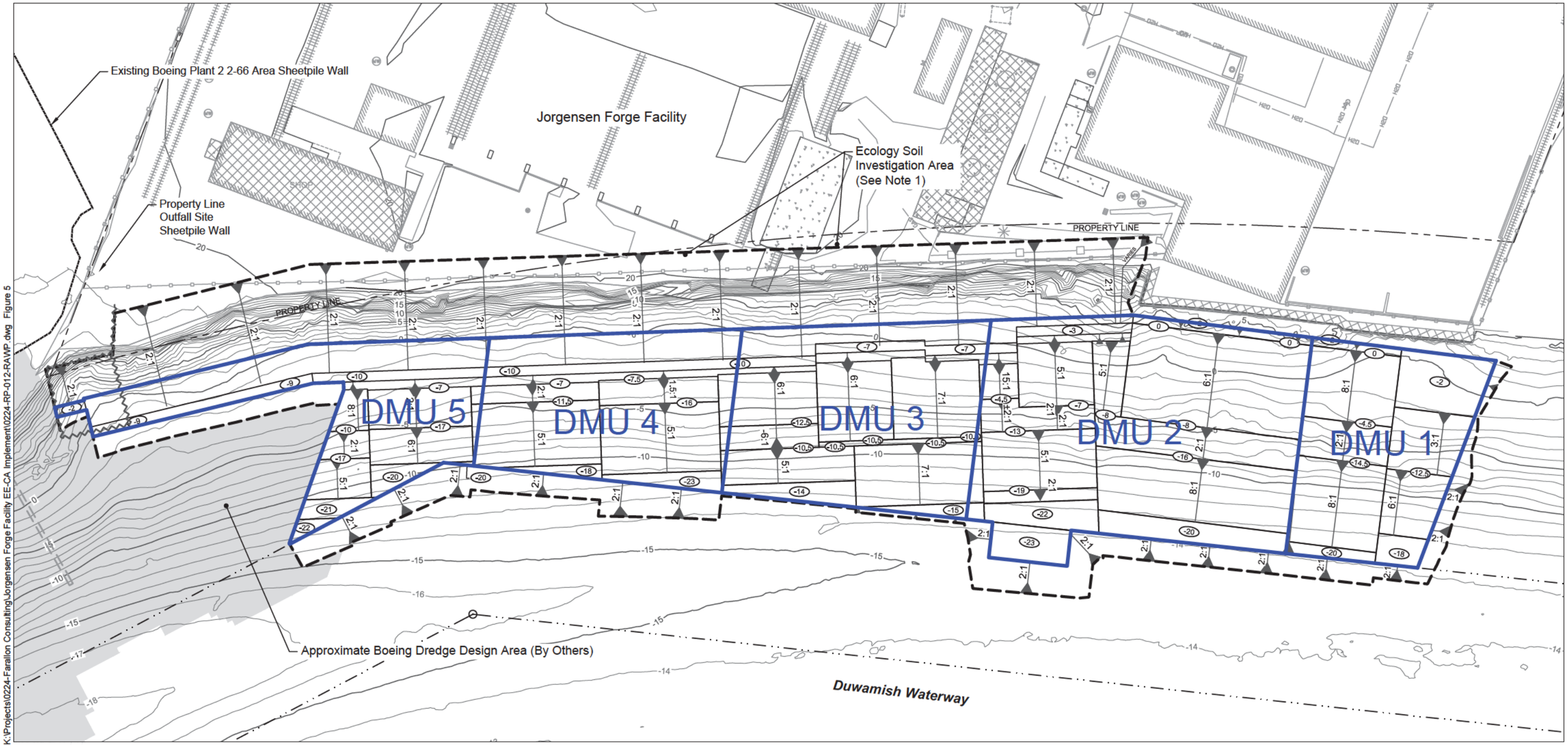
ABBREVIATIONS:

mg/kg	milligrams per kilogram
MLLW	mean lower low water
MHHW	mean higher high water
PCB	polychlorinated biphenyl
TSCA	Toxic Substances Control Act
RvAL	Removal Action Level
EAA	Early Action Area
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
OC	organic carbon
TOC	total organic carbon
LAET	Lowest Apparent Effects Threshold
JFOS	Jorgensen Forge Outfall Site pursuant to Administrative Order on Consent between EPA, The Boeing Company, and Jorgensen Forge Corporation

K:\Projects\0224-Farallon Consulting\Jorgensen Forge Facility EE-CA Implement\Construction Plans\0224-C-EPA-DredgeDesign-RAWP dwg Figure 4b
Apr 08, 2014 3:52pm tgriga

ANCHOR QEA

Figure 4b
JFOS Impacted Material Area Cross-Sections
Removal Action Work Plan
Jorgensen Forge Early Action Area



K:\Projects\0224-Farallon Consulting\Jorgensen Forge Facility EE-CA Implement\0224-RP-012-RAWP.dwg Figure 5

Mar 21, 2014 1:29pm tgriga

HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).
NOTES:

1. Jorgensen Forge is removing additional soil and backfilling along the top of bank area surrounding soil borings SB-3 and SB-4 to remove relatively elevated concentrations of polychlorinated biphenyls. This work is not being performed under the EPA scope of work but rather as an Independent Action under the existing Ecology Agreed Order (No. DE 4127) at the facility.

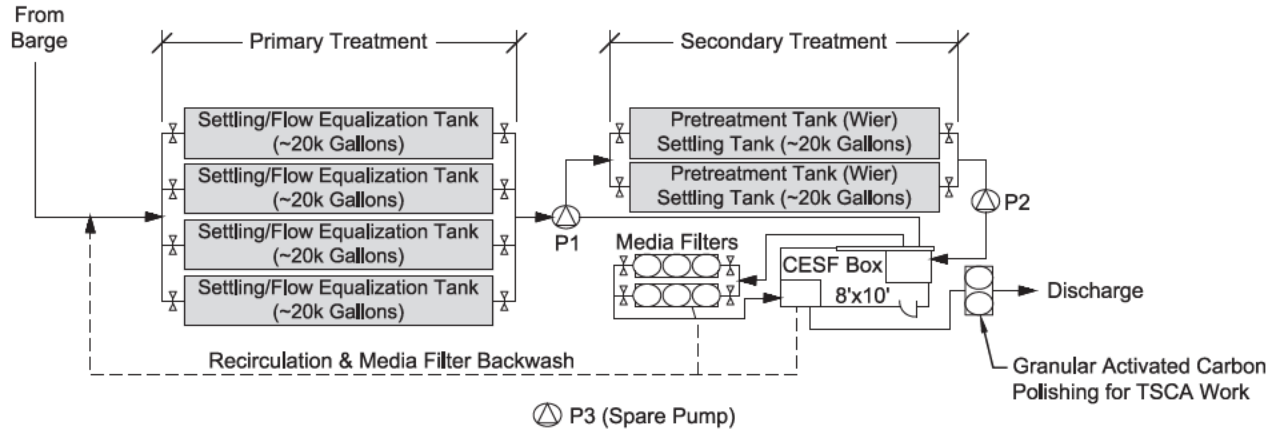
LEGEND:

- Navigation Channel
- Existing Bathymetry (1 ft interval)
- Existing Fence Line
- -13 / -17.5: Required Dredge Elevation (ft MLLW); Top of Side Slope; Final Grade; Dredge Boundary
- Dredge/Excavation Limits
- Slope Arrow
- Structures to Preserve and Protect Adjacent to Dredge/Excavation Limits
- Dredge Management Unit (DMU)

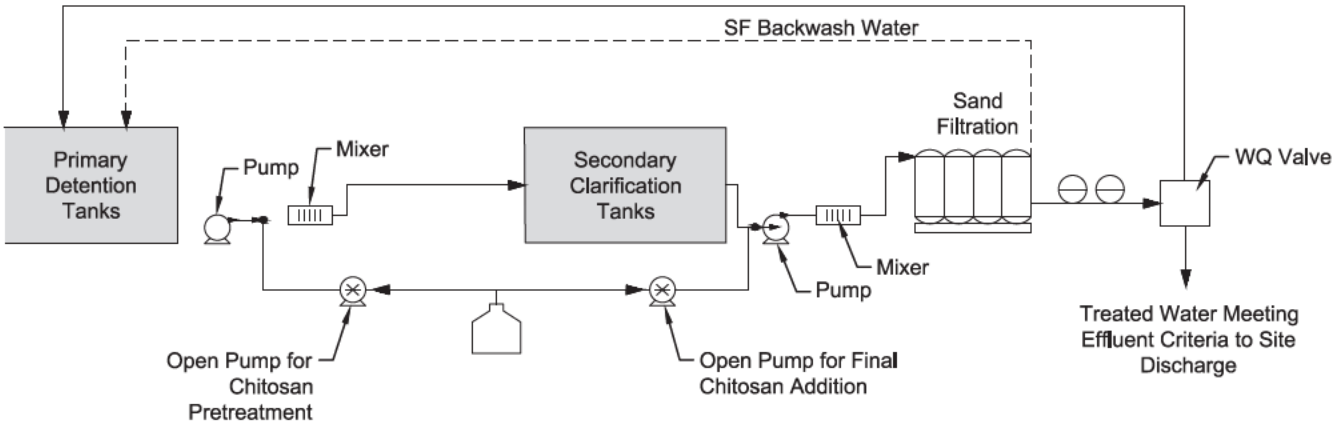
0 50
Scale in Feet

ANCHOR QEA

Figure 5
Dredge Plan
Removal Action Work Plan
Jorgensen Forge Early Action Area



Conceptual Layout for Chitosan-Enhanced Sand Filtration System



Dredge Water Treatment Process Flow Diagram

SOURCE: Pacific Pile & Marine

Not to Scale

Mar 21, 2014 2:25pm tgriga K:\Projects\0224-Farallon Consulting\Jorgensen Forge Facility EE-CA Implement\0224-RP-010-RAWP.dwg Figure 6

Figure 6
Dredge Water Removal Plant Layout and Process Flow Diagram
Removal Action Work Plan
Jorgensen Forge Early Action Area

ANCHOR QEA

(b)(4) copyright

NOTES:

1. Spill Apron is constructed of steel and is 16'w x23' long with 12" high sides. The apron is angled to the barge and containment area to capture any fallen pieces of material from the excavator bucket during transfer from the barge.

2. Spill Apron Containment Area will be 50'x100' long. It will be constructed with a one-high ecology block wall around all four sides. A 20mil PVC liner will cover the entire containment area and will be draped and fastened over the wall. A layer of crushed rock will be placed over the PVC liner to protect it from wear and tear. Steel road plates will be placed on top of the crushed rock to facilitate cleaning operations.

3. Truck Loading Containment Area will be 20'x100'. It will be constructed of a 6" gravel berm around all four sides. A 20mil PVC liner will be placed over the gravel berm. Crushed rock will be placed over the liner to protect it from truck traffic. Steel road plates will be placed on top of the crushed rock to facilitate truck movements and cleaning operations.

4. A 20'x100' section of geotextile fabric will be placed down to remove any fine sediments from truck wheels. The fabric will be placed daily or as needed to ensure the fabric is functioning properly.

5. Two sets of steel rumble pads will be utilized to remove any sediment from truck wheels before the trucks proceed onto the geotextile fabric.

6. An above ground temporary wheel wash system will be installed at the exit of facility for a final wheel cleaning.

0 80
Scale in Feet

Apr 04, 2014 11:11am tgriga K:\Projects\0224-Farallon Consulting\Jorgensen Forge Facility EE-CA Implement\0224-RP-011-RAWP.dwg Figure 7

ANCHOR QEA

Figure 7
Pacific Pile & Marine TTD Facility Plan
Removal Action Work Plan
Jorgensen Forge Early Action Area

APPENDIX A-1
ANCHOR QEA CHASP
(FORMERLY APPENDIX K OF THE BODR)

APPENDIX A-2
PACIFIC PILE & MARINE CHASP

APPENDIX B
FINAL MEMORANDUM: CLEAN WATER ACT §401 SUBSTANTIVE WATER QUALITY REQUIREMENTS FOR THE JORGENSEN FORGE EARLY ACTION AREA REMOVAL ACTION

APPENDIX C
TEMPORARY FACILITIES AND CONTROLS AND ENVIRONMENTAL POLLUTION CONTROL PLAN

APPENDIX D
DEMOLITION PLAN

APPENDIX E
DREDGE/EXCAVATION, HAUL BARGE TRANSPORT, AND DEWATER PLAN

APPENDIX F
TRAFFIC CONTROL PLAN

APPENDIX G
WATER MANAGEMENT AND TREATMENT PLAN

APPENDIX H
TRANSLOAD, TRANSPORT, AND DISPOSAL WORK PLAN

APPENDIX I
VESSEL MANAGEMENT PLAN

APPENDIX J
BACKFILL PLAN

APPENDIX K
SURVEY PLAN

APPENDIX L
PLANNING LEVEL COMPREHENSIVE PROJECT SCHEDULE