Appendix C
Sediment Material Characterization

CENWP-EC-HR 13 May 2015
(*revised* 23 June 2015)

Memorandum for: Portland District, Regulatory Branch, (CENWP-OD-G, White)

Subject: Portland Sediment Evaluation Team (PSET) Level 2 dredged material suitability determination for new work dredging at the Port of Kalama's (Port's) proposed Manufacturing and Marine Export Facility Dock, Columbia River (Mile 72), Kalama, Washington (Regulatory File No. NWP-2014-177).

Reviewers: The PSET includes the U.S. Army Corps of Engineers (Corps), Environmental Protection Agency – Region 10 (EPA), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife (USFWS), Washington Department of Ecology (Ecology), and Oregon Department of Environmental Quality (ODEQ). The reviewers for this project included James McMillan and James Holm (Corps), Tom Hausmann (NMFS), Laura Inouye (Ecology), Pete Anderson (ODEQ), and Bridgette Lohrman (EPA). USFWS did not review the project.

The PSET reviewed BergerABAM's March 27, 2015 "Dredged Material Characterization Report: Kalama Manufacturing and Marine Export Facility Dock" (DMCR). This technical memorandum documents the consensus of the reviewing agencies regarding the suitability of sediments in the project area, for unconfined, aquatic placement. This project was evaluated using the 2009 *Sediment Evaluation Framework for the Pacific Northwest* (SEF) guidance. To determine dredged material suitability for unconfined, aquatic placement, the analytical results were compared to freshwater benthic toxicity screening levels (SLs) published in the 2006 Interim Final SEF.

In their 2 June 2015 email correspondence, BergerABAM requested slight increases in project volume and acreage on behalf of the Port. These proposed project modifications (described below) do not require additional sediment sampling, and the PSET's positive suitability determination stands.

Applicable Authorities Governing the Project: Section 10 of the Rivers and Harbors Act; sections 401 and 404 of the Clean Water Act (CWA); section 7 of the Endangered Species Act; section 305 of the Magnuson-Stevens Act; et al.

Project Description: The project is located on the west (Washington) bank of the Columbia River at river mile (RM) 72. The Port plans to construct a new methanol manufacturing facility and marine export terminal. The proposed terminal would be north of and adjacent to the existing Steelscape LLC plant and the Port's North Port Terminal. As part of the marine terminal infrastructure, a new berth would be constructed.

The proposed depth for the new berth is -48 feet CRD with a 2-foot overdredge allowance; this depth is consistent with the adjacent North Port Terminal and the federal navigation channel. The footprint of the expanded berth will be approximately 18 acres, of which approximately 16 acres (increased from the initially proposed 13.3 acres) will require dredging to achieve the desired berth depth. The existing depths in the new berth area currently range from approximately -38

feet CRD to -50 CRD. The total volume to be dredged is approximately 126,000 cubic yards (cy) of sandy material (increased from the initially proposed 119,000 cy).

Some dredged material may be placed upland at the project site to provide construction fill. Excess material will be placed at existing upland and in-water placement sites. The existing permitted in-water placement locations include (1) flowlane placement to restore sediment at a deep scour hole associated with pile dike 77.53 M, located on the Oregon side of the river; and (2) flow lane placement to restore sediment at a deep scour hole associated with pile dike 75.63 M, located on the Washington side of the river. The dredged material may be used to nourish beaches at the Port's shoreline park (Louis Rasmussen Day-Use Park) at RM 76.

Management Area Ranking: Based on our review of prior sediment quality data adjacent to the project area, a "low" management area ranking is assigned to the project. The need to characterize accumulated sediments in the berth must be evaluated by February 2022.

Sampling and Analysis Description: BergerABAM implemented the 8 December 2014 "Sampling and Analysis Plan Addendum, Kalama Manufacturing and Marine Export Facility Dock Dredging" (SAP) on 18-19 February 2015. The sampling and analysis program narrative appears in Section 2 of the DMCR.

Two dredged material management units (DMMUs) were identified in the SAP (DMMU-1 and DMMU-2); five subsamples were composited within each DMMU for a total of two samples; new surface material (NSM) samples were not collected. Subsample coordinates and depths appear in Table 1 of the DMCR.

Dredge prism composite samples were analyzed for the following parameters:

- Conventional analyses (total organic carbon, total solids, ammonia, sulfides, and grain size) using appropriate EPA and Puget Sound Estuary Partnership methods
- Total metals using EPA Method 200.8/6010B/7471A.
- Semivolatile organic compounds (SVOCs) using EPA Method 8270D.
- Pesticides and polychlorinated biphenyls (PCBs) using EPA Method 8081/8082.
- Porewater tributyltin (TBT) using SW 8270-SIM and Krone, et al., 1989

<u>Deviations from the SAP:</u> Due to the sandy nature of the dredge prism material, BergerABAM was unable to collect core samples with a vibracore sediment sampler; little or no material was recovered over five attempts.

The sampling team coordinated with the PSET Lead (J. McMillan) via telephone on 18 February 2015, requesting that they be allowed to use a power-grab sampler; this change was approved over the phone.

The 10 planned sample stations (V1-V10) were sampled with the power-grab sampler. Due to the change in sampling equipment, NSM samples were not obtained.

Results: Analytical results are summarized in Sections 4 and 5 of the DMCR; sediment chemical data and grain size data appear in Tables 2 and 3, respectively. SEF chemicals of concern were either not detected or were detected at concentrations less than the SEF freshwater SLs in the two

DMMU samples. Reporting limits for undetected parameters were below respective SLs. Grain size was predominantly medium sand; fines content (silt + clay) was less than 6%.

Suitability Determination: To determine dredged material suitability for unconfined, aquatic placement, the analytical results were compared to freshwater benthic toxicity screening levels (SLs) published in the 2006 Interim Final SEF.

Dredge Prism Suitability: Dredge prism material from DMMU-1 and DMMU-2 is suitable for unconfined, aquatic placement. No additional characterization is required until February 2022.

NSM Suitability: Since this area has never been dredged before, the PSET assumes that the NSM is similar in nature to the dredge prism material. Therefore, the NSM is suitable for unconfined, aquatic exposure.

Contact: This memorandum was prepared by James McMillan, and reviewed by the participating PSET agencies, identified above. Questions regarding this memorandum should be directed to James McMillan (Lead – Portland Sediment Evaluation Team) at (503) 808-4376 or e-mail to: james.m.mcmillan@usace.army.mil.

BergerABAM

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27 March 2015

James McMillan, Regulatory Project Manager
U.S. Army Corps of Engineers, Portland District
Portland Sediment Evaluation Team
333 Southwest First Avenue
Portland, OR 97204

Subject: Dredge Material Characterization Report
Kalama Manufacturing and Marine Export Facility Dock Dredging
Kalama, Washington
Corps Permit No. NWP-2014-177

Dear Mr. McMillan,

On behalf of the Port of Kalama, BergerABAM is pleased to submit our report "Dredge Material Characterization Report, Kalama Manufacturing and Marine Export Facility Dock Dredging, Kalama, Washington." The Port of Kalama requests that the attached data be evaluated relative to Sediment Evaluation Framework criteria for in-water placement of dredged materials. This sediment characterization is required to determine the suitability of the dredged material for in-water disposal and/or upland placement.

We appreciate the guidance and assistance that the Portland Sediment Evaluation Team provided throughout this project. Please contact us if you have questions regarding this report.

Sincerely,

Amber Roesler
Senior Environmental Scientist

Sally L. Fisher
Senior Project Manager

Attachment

cc w/attachment: Tabitha Reeder, Port of Kalama
Brian Carrico, BergerABAM

Dredged Material Characterization Report
Kalama Manufacturing and Marine Export Facility Dock Dredging

Prepared for

U.S. Army Corps of Engineers, Portland District
Portland Sediment Evaluation Team
Portland, Oregon

Attention: James McMillan

27 March 2015

Prepared by

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Job No. A15.0032.00

DREDGED MATERIAL CHARACTERIZATION REPORT

Kalama Manufacturing and Marine Export Facility Dock Dredging

U.S. Army Corps of Engineers, Portland District
Portland Sediment Evaluation Team
Portland, Oregon

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ACRONYMS AND ABBREVIATIONS

ARI	Analytical Resources Inc.
COCs	chemicals of concern
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
GPS	global positioning system
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
NSM	new surface material
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
Port	Port of Kalama
PSEP	Puget Sound Estuary Program
PSET	Portland Sediment Evaluation Team
QA/QC	quality assurance/quality control
RM	river mile
SAP	Sampling and Analysis Plan
SEF	Sediment Evaluation Framework
SL	screening level
SVOC	semivolatile organic compounds
TBT	tributyltin
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers

DREDGED MATERIAL CHARACTERIZATION REPORT
KALAMA MANUFACTURING AND MARINE EXPORT FACILITY DOCK DREDGING
KALAMA, WASHINGTON

1.0 INTRODUCTION

This report presents the results of sediment sampling activities for the characterization of Port of Kalama's (Port) potential dredge material at the proposed Kalama Manufacturing and Marine Export Facility Dock (project). The project includes construction of a natural gas to methanol manufacturing plant and associated support facilities.

The project is located north of and adjacent to the existing Steelscape LLC plant and the Port's North Port Terminal at River Mile 72 on the east shore of the Columbia River in Cowlitz County, Washington, as shown on Sheet 1. A new dock will be constructed at the site for methanol loading. The dock will be available for other users for general port activities, and as a lay berth when not being used to load methanol. The project dredging is needed to establish a berth to provide access for vessels to use the facilities from the Columbia River navigation channel.

Periodic maintenance and advance maintenance dredging is conducted at the Port's facilities to remove material deposited in the terminal berths because of continuous sediment transport activities in the Columbia River. The Portland Sediment Evaluation Team (PSET) approved the maintenance dredging Sampling and Analysis Plan (SAP) for the Port's facilities in April 2013. The maintenance dredging permits (PSET file number NWP-1994-462) were renewed in 2013, and PSET issued the updated Suitability Determination (SD) in July 2013.

The Port's approved SAP was amended with a SAP Addendum (SAPA) in December 2014. The SAPA describes the sampling program for the proposed project berth dredge area using the same sampling methods, approach, and criteria developed and discussed in the 2013 SAP. The SAPA was approved by PSET in an e-mail dated 18 December 2014. The SAPA and the PSET approval e-mail are included as Appendix A.

The existing upland placement sites (Port-owned upland placement sites and Ross Island Sand and Gravel) will be used for excess dredged materials or materials that are determined not suitable for in-water placement. The Port's approved in-water placement sites include Oregon and Washington flow lane sites and a beach nourishment site.

The purpose of this characterization is to evaluate sediment quality conditions from the proposed project berth dredge area and to determine if the dredged material is suitable for in-water and/or upland placement. The characterization activities were completed in

accordance with the Sediment Evaluation Framework (SEF) for the Pacific Northwest (U.S. Army Corps of Engineers [USACE], et al., 2009) and the SAPA.

A detailed description of the site, historical sampling data, and proposed project activities are summarized in the SAPA.

2.0 SAMPLING AND ANALYSIS PROGRAM

The objectives of this sediment characterization are to

- Characterize sediment from the existing surface to the proposed authorized depth (and overdredge depth) for the new berth.
- Characterize sediment from the depth representing the surface that will be exposed after dredging ("Z-layer").

2.1 Sampling Activities

Sampling of the proposed dredge material was completed on 18 and 19 February 2015. Sampling activities were conducted in general accordance with the SAPA with the following modifications.

1. Power (surface) grab sampling was used instead of core sampling because of poor sample recovery.[1]
2. Material from the subsurface (DMMU-3 and the new surface material interval) was not collected because of the switch-to-surface power grab sampling technique.
3. Tributyltin (Krone method) was added to the chemical analytical program per PSET's request in the SAPA approval email dated 18 December 2014.

Ten surface grab samples (V1 through V10) were collected using a power grab sampler. Positioning at each sample location was performed using a global positioning system (GPS). The sampling locations are shown on Sheet 2.

A BergerABAM representative monitored the sampling activities. Sediment samples were examined, screened for indications of petroleum-related contamination, and logged immediately after collection.[2] The sample materials were composited and processed at an upland location adjacent to the sampling sites.

A stainless steel trowel was used to remove sediment sample material from the grab sampler. Samples were homogenized in a stainless steel bowl prior to placing into laboratory-supplied sample containers. Samples were placed into a cooler with ice and

[1] The sampling team coordinated with the PSET Lead, James McMillan, by phone on 18 February and received approval for the sampling method modification.

[2] Field screening included sheen testing and odor observations. The field screening results are included in the sample logs.

submitted under chain-of-custody procedures to Analytical Resources Inc. (ARI, Tukwila, Washington) for chemical analytical testing.

Sediment was composited from the grab samples to create two dredged material management unit (DMMU) samples (DMMU-1 and DMMU-2). Archive samples were collected from each sampling location for potential follow-up analysis.

Table 1 summarizes the sample coordinates of each sample location and the DMMU compositing scheme. The sediment sample logs are included as Appendix B.

3.0 PHYSICAL AND CHEMICAL ANALYTICAL PROGRAM

Two composite samples (DMMU-1 and DMMU-2) were submitted to ARI for physical and chemical analyses.

The chemical analytical program generally consisted of chemicals of concern (COCs) identified by the SEF as shown in Table 2.

Analyses were performed in accordance with applicable Environmental Protection Agency (EPA) methodology along with the Sediment Evaluation Framework for the Pacific Northwest, and Puget Sound Estuary Program (PSEP) protocols as appropriate, including

- Conventional analyses (total organic carbon, total solids, ammonia, sulfides, and grain size) using appropriate EPA and PSEP methods.
- Total metals using EPA Method 200.8/6010B/7471A.
- Semivolatile organic compounds (SVOCs) using EPA Method 8270D.
- Pesticides and polychlorinated biphenyls (PCBs) using EPA Method 8081/8082.
- Porewater tributyltin (TBT) using SW 8270-SIM and Krone, et al., 1989.

3.1 Quality Assurance and Quality Control

The laboratory report is attached as Appendix C. Review of the data quality of the chemical analytical results indicates that laboratory goals were achieved based on the results of quality assurance/quality control (QA/QC) parameters, including surrogates, spikes, replicates, and method blanks.

4.0 ANALYTICAL RESULTS

4.1 Grain Size Characteristics

The grain size results from the sediment samples are presented in Table 3. The grain size of the two samples is primarily medium sand.

4.2 Chemical Data

Table 2 presents the chemical analytical results relative to SEF criteria. COCs were not detected at concentrations exceeding SEF criteria in either of the sediment samples.

5.0 SUMMARY

Ten surface grab sediment samples were collected from the proposed Kalama Manufacturing and Marine Export Facility Dock. The sediment samples were composited into two DMMUs (DMMU-1 and DMMU-2). The sediment was sampled and analyzed in general accordance with the SEF and the project SAPA. The sampling methodology was changed from vibracore sampling to power grab sampling with PSET approval because of lack of recovery. Subsurface material, including the "Z layer" samples, were not collected due to the sampling depth limitations of the power grab equipment.

COCs either were not detected or were detected at concentrations less than the SEF screening levels in the two DMMU samples. The data indicates that the dredged material characterized is suitable for in-water placement, upland placement, and/or beneficial use based on the chemical analytical results.

6.0 LIMITATIONS

This report has been prepared for the Port of Kalama for their use in evaluating and documenting the suitability of proposed dredged material for in-water and upland placement.

This study is based on sampling and analyses conducted in accordance with the guidelines of the SEF. It is possible that sediment quality may vary over time and/or at locations that were not sampled.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted environmental science practices for dredge material characterization in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

7.0 BIBLIOGRAPHY

BergerABAM. April 2013. "Sampling and Analysis Plan, Port of Kalama, Kalama, Washington." 5 April 2013.

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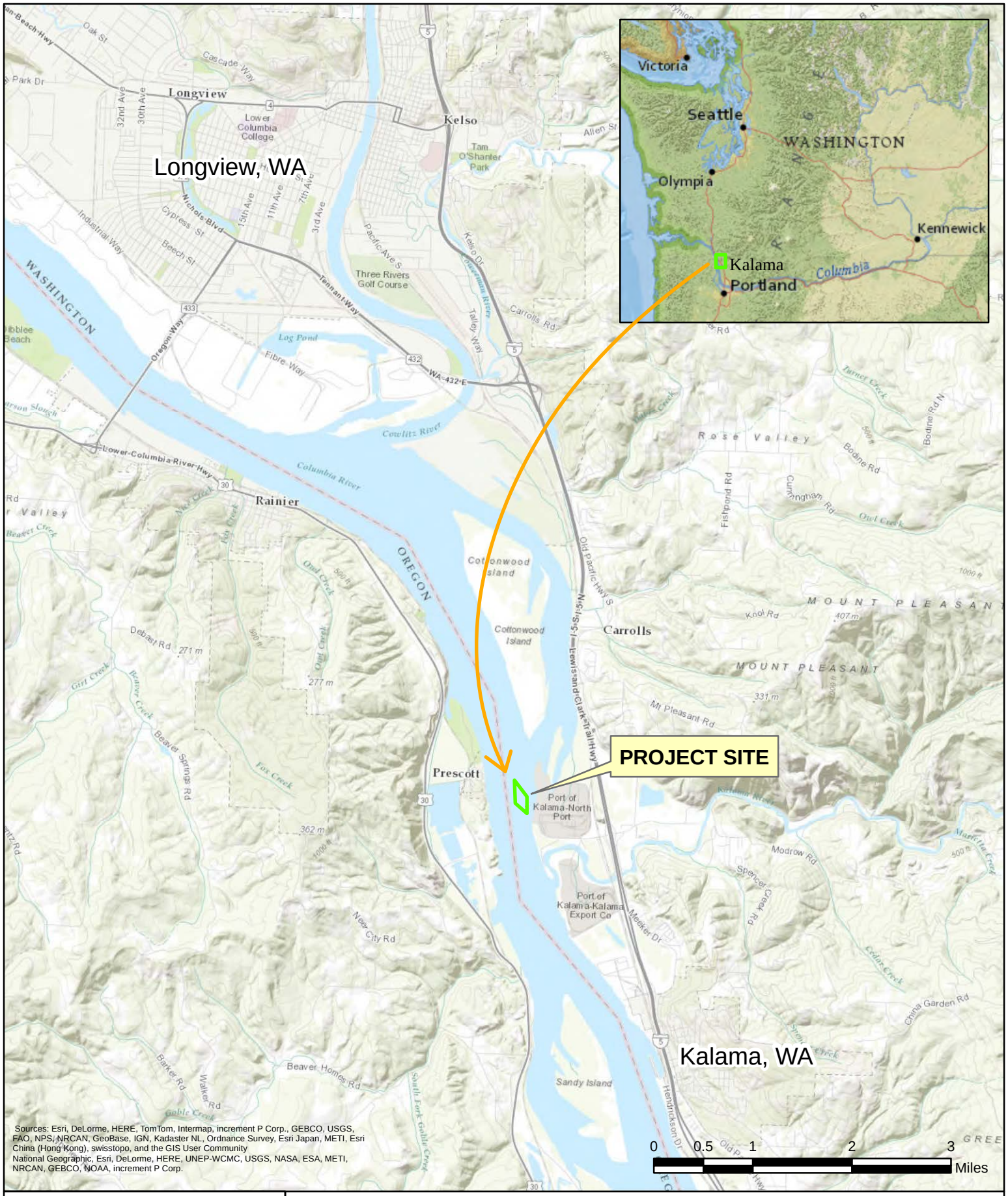
Environmental Quality; Idaho Department of Environmental Quality; National Marine Fisheries Service; and U.S., Fish and Wildlife Service. 2009.

U.S. Army Corps of Engineers. December 2013. "Department of Army Permit NWP-1994-462-1, Port of Kalama."



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PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY DOCK DREDGING SEDIMENT CHARACTERIZATION REPORT

SHEET 1: VICINITY MAP
MARCH 2015

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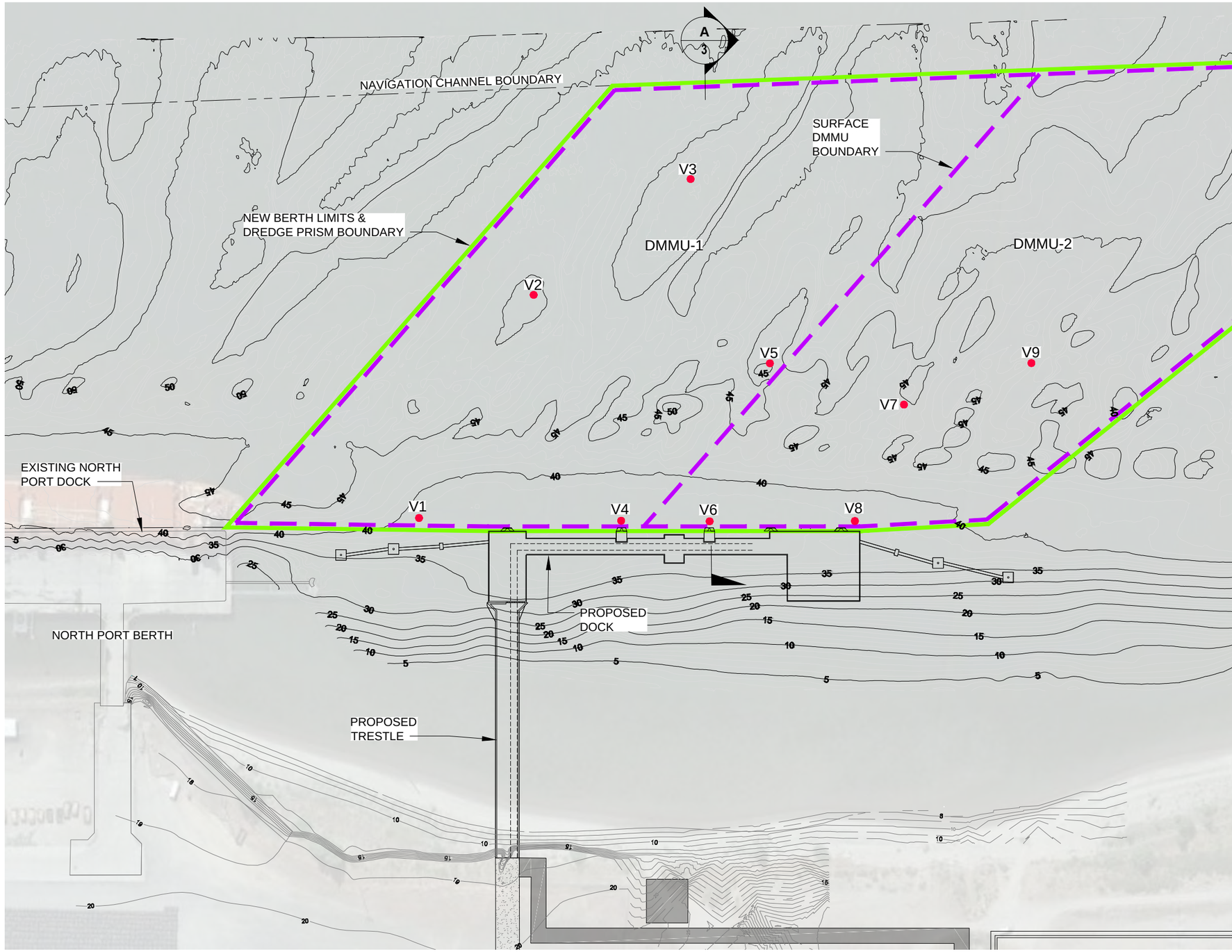

LEGEND

NEW BERTH LIMITS & DREDGE PRISM BOUNDARY

SURFACE DMMU BOUNDARY

V10 APPROXIMATE LOCATION OF POWER GRAB SAMPLE

DMMU-1 SURFACE DREDGED MATERIAL MANAGEMENT UNIT

150 0 150 300

feet

GENERAL NOTES:

1. HYDROGRAPHIC SURVEY DATA COLLECTED BY NORTHWEST HYDRO INC. ON APRIL 21, 2014.
2. HORIZONTAL DATUM: WASHINGTON STATE PLANE SOUTH (WSPS), NAD83, US FEET.
3. VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), FEET
   - CONTOURS ARE IN FEET AND INDICATE ELEVATIONS BELOW CRD.
   - A USACE TIDE GAUGE LOCATED AT THE COTTONWOOD ISLAND LIGHT #41 WAS USED FOR ALL TIDAL CORRECTIONS DURING THE SURVEY.
4. EXISTING BATHYMETRY AS SHOWN BY CONTOURS IS REPRESENTATIVE OF CONDITIONS AT TIME OF SURVEY.
5. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY AND SHALL NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.
6. CLEARANCE DISTANCE BASED UPON A PANAMAX VESSEL BERTHED AT THE NORTH PORT TERMINAL.
7. THE LOCATIONS OF FEATURES SHOWN ARE APPROXIMATE.
8. THIS FIGURE IS FOR INFORMATION PURPOSES AND IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN THE ATTACHED DOCUMENT.

BASE MAP WA DEVELOPED BY COAST & HARBOR ENGINEERING, 2014

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PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY
DOCK DREDGING SEDIMENT CHARACTERIZATION REPORT

SHEET 2- SITE PLAN-DREDGE PRISM AND SAMPLE LOCATIONS
MARCH 2015

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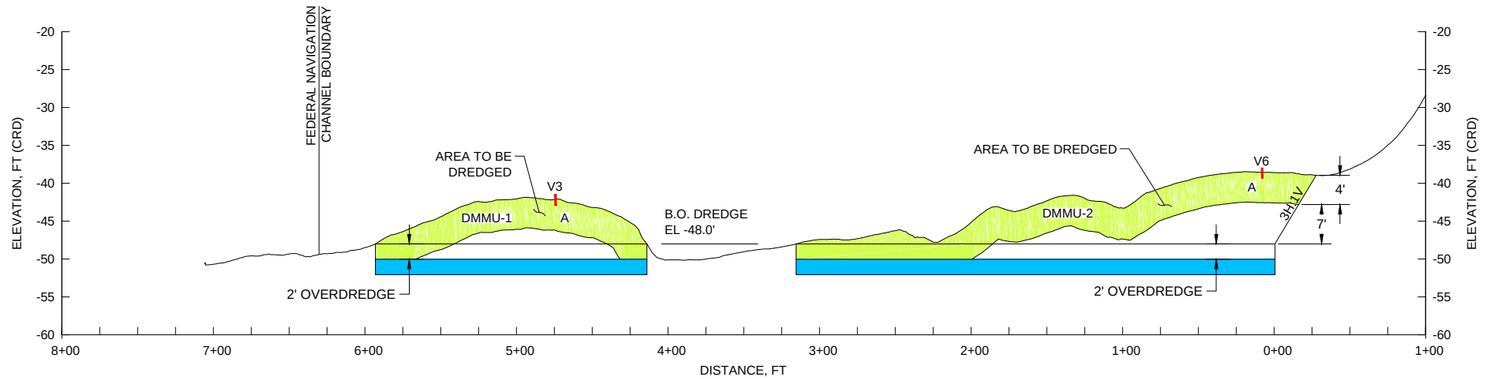

A SECTION 1 2

HORIZ. 0 50 100
VERT. 0 10 20
SCALE IN FEET

LEGEND

	SURFACE MATERIAL (LOW RANKING)
	"Z-LAYER" POST-DREDGE SURFACE MATERIAL
V6	APPROXIMATE POWER GRAB SAMPLE LOCATION
CRD	COLUMBIA RIVER DATUM
DMMU-1	DREDGED MATERIAL MANAGEMENT UNIT
A	SUBUNIT IDENTIFICATION

GENERAL NOTES:

1. DREDGING TO EL. -48' + 2 (OD) SHALL OCCUR IF THE DEPTHS AT THE TIME OF DREDGING ARE SHALLOWER THAN EL. -48.
2. DREDGING DEPTH AND OVER DREDGE SHOWN IS FOR CONCEPTUAL PURPOSES ONLY AND SHALL NOT BE USED FOR PERMITTING, DESIGN, OR CONSTRUCTION PURPOSES.
3. HYDROGRAPHIC SURVEY DATA COLLECTED BY NORTHWEST HYDRO INC. ON APRIL 21, 2014.
4. HORIZONTAL DATUM: WASHINGTON STATE PLANE SOUTH (WSPS), NAD83, US FEET.
5. VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), FEET
   - CONTOURS ARE IN FEET AND INDICATE ELEVATIONS BELOW CRD.
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BASE MAP WAS DEVELOPED BY COAST & HARBOR ENGINEERING, 2014

BergerABAM

PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY
DOCK DREDGING SEDIMENT CHARACTERIZATION REPORT

SHEET 3 - SCHEMATIC DMMU PLAN
MARCH 2015

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Table 1. Summary of Sample Coordinates and Compositing Scheme

Sample ID	Sample Coordinates		Mudline (Feet CRD)	Penetration (feet)	Compositing Scheme/ Sample ID
	Northing	Easting			
V1	268538.7	1036987.7	-39.76	-40.76	DMMU-1
V2	268719	1036691.3	-49.8	-50.8	
V3	268925	1036511.7	-48.26	-49.26	
V4	268829.38	1036994.78	-40.09	-41.09	
V5	269045.21	1036770.8	-46.76	-47.76	
V6	268954.67	1036995.95	-40.55	-41.55	DMMU-2
V7	269236.37	1036826.58	-43.87	-44.87	
V8	269163.27	1036988.66	-40.76	-41.76	
V9	269413.14	1036770.82	-43.48	-44.48	
V10	269901.41	1036418.56	-49.5	-50.5	

Notes:
CRD = Columbia River Datum

Table 2. Summary of Chemical Analytical Results[1] Relative to SEF Criteria[2]

Sample ID	DMMU-1	DMMU-2	2006 Interim Freshwater SL (dry weight)
Conventionals			
Total Solids (%)	78.34	73.09	--
Total Organic Carbon (%)	0.063	0.129	--
Ammonia (mg/kg)	1.44	5.82	--
Total Sulfides (mg/kg)	<1.41	<1.46	--
Metals (mg/kg dry weight)			
Arsenic	3.67 J	3.30 J	20
Cadmium	0	0.08 J	1.1
Chromium	10.9	11.6	95
Copper	15.9	15.1	80
Lead	2.23 J	2.56 J	340
Mercury	0.0025 J	0.0158 J	0.28
Nickel	13	15	60
Silver	0.039 J	0.050 J	2
Zinc	42	44	130
Semivolatile Volatile Organic Compounds (SVOCs)			
LPAHs (µg/kg dry weight)			
Acenaphthene	<19	<19	1,100
Anthracene	<19	<19	1,200
Fluorene	<19	<19	1,000
Naphthalene	<19	<19	500
Phenanthrene	5.7 J	18 J	6,100
2-Methylnaphthalene	<19	<19	470
Total LPAH[3]	53.2	66	6,600
HPAHs (µg/kg dry weight)			
Benzo(a)anthracene	<19	<19	4,300
Benzo(a)pyrene	<19	<19	3,300
Benzo(b+k)fluoranthene	<38	10 J	600
Benzo(g,h,i)perylene	<19	<19	4,000
Chrysene	<19	<19	5,900
Dibenzo(a,h)anthracene	<19	<19	800
Fluoranthene	5.7 J	27	11,000
Indeno(1,2,3-cd)pyrene	<19	<19	4,100
Pyrene	<19	19	8,800
Total HPAHs[4]	81.7	113	31,000
Phthalates (µg/kg)			
Dimethyl phthalate	<19	<19	46
Di-n-octyl phthalate	<19	<19	26
Bis (2-ethylhexyl) phthalate	<48	<48	220

Sample ID	DMMU-1	DMMU-2	2006 Interim Freshwater SL (dry weight)
Butyl benzyl phthalate	<19	<19	260
Miscellaneous Compounds (µg/kg dry weight)			
Dibenzofuran	<19	<19	400
Pesticides (µg/kg dry weight)			
Aldrin	<0.49	<0.49	9.5
Total Chlordane	<0.98	<0.98	2.8
DDD	<0.98	<0.98	16
DDE	<0.98	<0.98	9
DDT	<0.98	<0.98	12
Dieldrin	<0.98	<0.98	1.9
Heptachlor	<0.49	<0.49	1.5
Lindane	<0.49	<0.49	--
PCBs (mg/kg OC)			
Arochlor 1016	<19	<19	--
Arochlor 1221	<19	<19	--
Arochlor 1232	<19	<19	--
Arochlor 1242	<19	<19	--
Arochlor 1248	<19	<19	--
Arochlor 1254	<19	<19	--
Arochlor 1260	<19	<19	--
Total PCBs	<19	<19	60
Organometallic Compounds			
Tributyltin (dry weight µg/kg ion)	<3.7	<3.7	75

Notes:

[1] Chemical analysis performed by Analytical Resources Inc. (ARI), Tukwila, Washington. Laboratory reports are presented in Appendix C.

[2] SEF = Sediment Evaluation Framework; SL = Screening Level.

[3] Total low molecular weight polynuclear aromatic hydrocarbons (LPAHs) = The sum of Acenaphthalene, Acenaphthene, Anthracene, Fluorene, Napthalene and Phenanthrene. 1/2 the reporting limit is used for any non-detected analytes in the summation.

[4] Total high molecular weight polyaromatic hydrocarbons (HPAHs) = The sum of Benzo(a)anthracene, Benzo(a) pyrene, Total Benzofluoranthenes, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-c,d)pyrene and pyrene. 1/2 the reporting limit is used for any non-detected analytes in the summation.

J = Estimated concentration when the value is less than ARI's established reporting limits.

< = Chemical not detected above reported level.

-- = Not available or not applicable.

Table 3. Grain Size Data

Grain Size in %	Sample ID	
	DMMU-1	DMMU-2
Gravel	1.0%	0.7%
Sand	94.8%	94.8%
Silt	3.2%	2.9%
Clay	1.9%	2.8%

Appendix A
SAPA and PSET Approval E-mail

Roesler, Amber

From: McMillan, James M NWP <James.M.McMillan@usace.army.mil>
Sent: Thursday, December 18, 2014 3:24 PM
To: White, Melody J NWP
Cc: England, Victoria; Inouye, Laura (ECY); Freedman, Jonathan; Lohrman, Bridgette; ANDERSON Peter; Holm, James A NWP; Jim.Turner@noaa.gov; Jeremy_Buck@fws.gov; Stokke, Jessica B NWP
Subject: PSET REVIEW: NWP-2014-177 PoKalama Methanol Terminal (UNCLASSIFIED)

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Orange Category, Green Category

Classification: UNCLASSIFIED
Caveats: NONE

Melody:

The Portland Sediment Evaluation Team (PSET) has reviewed the December 8, 2014 "Draft Sampling and Analysis Plan Addendum, Kalama Manufacturing and Marine Export Facility Dock Dredging" (SAP), prepared by BergerABAM for the Port of Kalama (Port). With two minor modifications, we concur with the Port's SAP; the Port may proceed with sediment sampling.

PROJECT DESCRIPTION: The project is located on the west (Washington) bank of the Columbia River at river mile 72. The Port plans to construct a new methanol manufacturing facility and marine export terminal. The proposed terminal would be north of and adjacent to the existing Steelscape LLC plant and the Port's North Port Terminal. As part of the marine terminal infrastructure, a new berth would be constructed. The proposed depth for the new berth is -48 feet CRD with a 2-foot overdredge allowance; this depth is consistent with the adjacent North Port Terminal and the federal navigation channel. The footprint of the expanded berth will be approximately 18 acres, of which approximately 13.3 acres will require dredging to achieve the desired berth depth. The existing depths in the new berth area currently range from approximately -38 feet CRD to -50 CRD. The total volume to be dredged is approximately 119 thousand cubic yards (Kcy) of sandy material.

MANAGEMENT AREA RANK: Based on our review of prior sediment quality data adjacent to the project area, the PSET concurs with BergerABAM's recommended "low" management area ranking for the project.

SAMPLING APPROACH: The Port's sampling design is summarized in Table 1 of the SAP. The Port will attempt to collect 10 cores across 3 dredged material management units -- 2 surface units (DMMUs 1 [30 Kcy] and 2 [37 Kcy]) and one subsurface unit (DMMU 3 [52 Kcy]). Dredge prism samples will be collected from the mudline to -50 feet CRD; the Port will also attempt to collect new surface material (NSM) samples from -50 to -52 feet CRD. Subsamples collected within each DMMU will be composited; the sampling team will attempt to archive subsample material. The list of planned sediment analyses appear in Table 2 of the SAP.

PSET CONCURRENCE: The PSET concurs with the December 8, 2014 SAP prepared by BergerABAM with the following modifications:
1. The Port must analyze the composite samples for bulk tributyltin (Krone method).
2. Since core recovery has been an issue in prior sampling events next to the project area, the Port should ensure that a grab sampler (PONAR, Ekman, power grab, or similar) is available during the sampling event. If the volume of material

that is collected in core samples is less than what would be collected in a grab sample, then the Port may elect to use the grab sampler. If the sampling team cannot obtain material from DMMU 3 and/or the NSM interval, then coordination with the PSET Lead (James McMillan) is required. Modifications to the planned sampling stations must also be coordinated with the PSET Lead. The PSET Lead can be reached at the number below or by calling/texting to 503.915.7521.

3. Prior to collecting sediment samples, the Port's sampling team must schedule a pre-sampling conference call with the PSET Lead.

Please let me know if you have questions regarding this SAP approval. A copy has been furnished to Victoria England (BergerABAM).

Regards,
James

James M. McMillan
Lead - Portland Sediment Evaluation Team U.S. Army Corps of Engineers CENWP-EC-HR (Sediment Quality)
333 SW First Avenue, P.O. Box 2946
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tel: 503.808.4376

Classification: UNCLASSIFIED
Caveats: NONE

BergerABAM

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8 December 2014

Regulatory Project Manager
U.S. Army Corps of Engineers
333 Southwest First Avenue
Portland, OR 97208

Subject: Draft Sampling and Analysis Plan Addendum, Kalama Manufacturing and Marine Export Facility Dock Dredging
Water Quality Certification Order # 10084
USACE Permit No. NWP-1994-462

A Sampling and Analysis Plan Addendum (SAPA) for sediment sampling associated with proposed dredging for a berth to accommodate the Port of Kalama proposed marine export facility dock is attached. This SAPA is an addendum to the Sampling and Analysis Plan (SAP) that the Portland Sediment Evaluation Team (PSET) previously developed and approved for maintenance dredging at the Port of Kalama (PSET file No. NWP-1994-462). This SAPA contains information specific to the new berth project. General sampling methods, protocols, and procedures are described in detail in the SAP, included as an attachment to this document. This sediment characterization is required to determine the suitability of the dredged material for in-water disposal and/or upland placement.

This SAPA is submitted on behalf of the Port of Kalama for review and approval by the Portland Sediment Evaluation Team. Please contact us if you have any questions or require additional information.

Sincerely,

Victoria R. England, LG
Senior Environmental Scientist

VRE:SLF:keh
Attachment

Cc: Tabitha Reeder, Port of Kalama
Brian Carrico, BergerABAM

Draft Sampling and Analysis Plan Addendum
Proposed Kalama Manufacturing and Marine Export Facility Dock Dredging
Port of Kalama, USA

For the U.S. Army Corps of Engineers on Behalf of the Port of Kalama, USA

8 December 2014

Prepared by:

Victoria R. England, LG
Senior Environmental Scientist

Sally L. Fisher
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BergerABAM
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Job No. A15.0032.00

DRAFT SAMPLING AND ANALYSIS PLAN ADDENDUM
PORT OF KALAMA
PROPOSED KALAMA MANUFACTURING AND MARINE EXPORT FACILITY DOCK DREDGING

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LIST OF ATTACHMENTS

Attachment I **2013 Revised Sampling and Analysis Plan, Port of Kalama**
Attachment II **2013 Portland Project Review Group Sediment Characterization Report Review Memo**

ACRONYMS AND ABBREVIATIONS

ASTM	American Standards for Testing and Materials
CRD	Columbia River Datum
CFR	Code of Federal Regulations
COCs	chemicals of concern
DCA	dichloroethane
DDT	dichlorodiphenyltrichloroethane
DMMP	Dredged Material Management Program
DNS	Determination of Non-significance
DRET	dredging elutriate testing
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
ESA	Endangered Species Act
ESLs	environmental screening levels
EPA	Environmental Protection Agency
GPS	global positioning system
HPA	Hydraulic Project Approval
HPAH	high molecular weight polyaromatic hydrocarbons
JARPA	Joint Aquatic Resources Permit Application
LCRMA	Lower Columbia River Management Area
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
mls	milliliters
MTCA	Model Toxics Control Act
NAD	North American Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
NRC	Northern Resources Consulting Inc.
NSM	new surface management
NWIW	Northwest Innovations Works
OHWM	ordinary high water mark
OSWER	Office of Solid Waste and Emergency Response
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PCE	tetrachloroethylene
PRG	Portland Project Review Group
PSEP	Puget Sound Estuary Program
PSET	Portland Sediment Evaluation Team
QA/QC	quality assurance/quality control
RISG	Ross Island Sand and Gravel
RM	River Mile
SAP	Sampling and Analysis Plan
SD	Suitability Determination
SEF	Sediment Evaluation Framework
SEPA	State Environmental Protection Act

SL	Screening Level
SL1	Screening Level One
SL2	Screening Level Two
SMS	Sediment Management Standards
SPCC	Spill Prevention, Countermeasure, and Control
SQuiRT	Screening Quick Reference tables
SVOCs	semi-volatile organic compounds
TBT	tributyltin
TCE	trichloroethylene
TEL	thresholds effects level
TOC	total organic carbon
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VCP	Voluntary Cleanup Program
VOC	volatile organic compound
WDFW	Washington Department of Fish and Wildlife
WQC	Water Quality Certification

DRAFT SAMPLING AND ANALYSIS PLAN ADDENDUM
KALAMA MANUFACTURING AND MARINE EXPORT FACILITY DOCK DREDGING
PORT OF KALAMA, USA

1.0 INTRODUCTION

The Port of Kalama (Port) is located between River Miles 72 and 77 (RMs 72 and 77) on the west shore of the Columbia River in Cowlitz County, Washington. The proposed Kalama Manufacturing and Marine Export Facility (project) includes the construction of natural gas to methanol manufacturing plant and support facilities. The plant will be located north of and adjacent to the existing Steelscape LLC plant and the Port's North Port Terminal as shown on Sheet 1. A new dock will be constructed at the site for methanol loading. The dock will be available for other users, for general port activities, and as a lay berth when not being used to load methanol. The project dredging is needed to establish a berth to provide access for vessels to use the facilities from the Columba River navigation channel.

Periodic maintenance and advance maintenance dredging is conducted at each of the Port facilities to remove material deposited in the terminal berths and the public marina because of ongoing sediment transport activities in the Columbia River. The Portland Sediment Evaluation Team (PSET) approved the maintenance dredging Sampling and Analysis Plan (SAP) in April 2013. The maintenance dredging permits (PSET file number NWP-1994-462) were renewed in 2013, and PSET issued the updated Suitability Determination (SD) in July 2013 (Attachment II).

This SAP Addendum (SAPA) is an addendum to the previously approved maintenance dredging SAP. The previously completed SAP addressed maintenance dredging for four Port terminals, including the North Port terminal that is adjacent to the proposed Kalama Manufacturing and Marine Export Facility project site. This SAPA describes a sampling program with the same sampling methods, approach, and criteria as were developed and discussed in the previously completed SAP. The previously completed SAP is included as Attachment I to this SAPA.

The purpose of this SAPA is to provide the methods for characterizing the proposed project berth dredge area to provide access from the federal navigation channel and accommodate the new dock. Characterization of proposed dredged material for the new berth will be performed in accordance with guidance from the U.S. Army Corps of Engineers' (USACE's) PSET and its interim final guidelines, Regional Sediment Evaluation Framework (RSEF; USACE et al., September 2009), for the Lower Columbia River Management Area.

The sediment quality data will be used to determine if the dredged material is suitable for in-water and/or upland placement.

2.0 PROJECT DESCRIPTION

The proposed project will be located north of and adjacent to the existing North Port Terminal as shown on Sheet 1. A new loading dock will be constructed as part of the proposed export facility. The proposed new dock will generally consist of an L-shaped trestle/platform structure located approximately 450 feet from the shoreline, as shown on Sheet 2. Mooring dolphins connected by walkways will extend from the north and south ends of the structure. The berth for the new methanol dock will align with and abut the berth of the North Port dock, and extend to the Columbia River navigation channel. The face of the new structure will align with the face of the North Port dock to minimize dredging, ease ship berthing, and provide increased access to deep water.

2.1 Proposed Dredging

The North Port berth is currently permitted for an authorized depth of -48 feet Columbia River datum (CRD) with a 2-foot overdredge allowance. The proposed depth for the new berth is also -48 feet CRD with a 2-foot overdredge allowance. The existing depths in the new berth area currently range from approximately -38 feet CRD to -50 CRD.

The berth will extend from the edge of the Columbia River Navigation Channel to the berthing line at the face of the proposed dock. The south end of the dredge prism will abut the north end of the North Port dredge prism. The north end of the new berth will extend northward from the dock at an angle to accommodate vessel arrivals and departures.

The footprint of the expanded berth will be approximately 18 acres, of which approximately 13.3 acres will require dredging to achieve the desired berth depth. Water depths in the proposed berth area are predominately -50 feet CRD, with some areas as shallow as -38 feet CRD. The total volume to be dredged is approximately 119,000 cubic yards (cy).

The Port is also proposing annual maintenance dredging at the site that will be completed periodically as needed following construction, depending on accumulation conditions. Coast and Harbor Engineers completed a sedimentation study for the site. The average volume of maintenance material to be dredged on an annual basis is estimated to be 27,000 cy.

Dredging operations may be conducted using mechanical (clamshell) or hydraulic dredging methods, depending on various factors, including volume, distance to permitted placement sites, contractor preference and/or the need for material for future upland projects at the Port.

Dredged material will be placed upland at the project site to provide material for construction or other uses—or will be placed at existing upland and in-water disposal sites—if the material is suitable for in-water disposal, based on the results of this characterization. The existing permitted in-water placement locations include (1) flow

lane placement to restore sediment at a deep scour hole associated with pile dike 77.53 M, located on the Oregon side of the river; and (2) flow lane placement to restore sediment at a deep scour hole associated with pile dike 75.63 M, located on the Washington side of the river. The dredged material may also be used as beach nourishment at the Port's shoreline park (Louis Rasmussen Day-Use Park) at RM 76. This activity generally consists of placing dredged material at the location of an actively eroding beach and below the Corps ordinary high water mark (OHWM, 12.0 CRD) via hydraulic dredge pipeline. Additional placement sites may be identified and permitted for dredged material placement in the future.

The currently authorized in-water work window for dredging at the North Port Terminal is 1 August through 31 December (NWP-1994-462).

2.2 Sediment Quality Evaluation

Previous sediment quality evaluation by PSET has determined that materials dredged from the adjacent North Port berth are suitable for in-water placement, upland placement, and/or beneficial use based on the July 2013 PSET SD described in Portland Project Review Group Sediment Characterization Report Review Memo (Attachment II). The SD also states that the sediment at the North Port berth passes Washington State Department of Ecology's (Ecology) anti-degradation criteria. The current SD for in-water placement of dredged material from the North Port berth will expire in 2020.

The Port is proposing to characterize the sediment that is located in the new export facility berth area adjacent to the previously characterized North Port berth. We anticipate similar results for characterization of the proposed dredged material to those found at the North Port berth. The North Port berth was characterized using a low ranking, and we propose the same low ranking for the NWIW dredged prism material. The characterization will be coordinated with PSET and will be completed in accordance with current Sediment Evaluation Framework (SEF) protocols.

3.0 PROJECT BACKGROUND

3.1 Site Use and History

The Port terminal areas are zoned by Cowlitz County for "industrial" use. The Port has been fully operational since the 1920s. The existing terminals are used to handle raw commodities and finished products over the industrial docks at each of the terminals for shipping along the Columbia River. Periodic maintenance dredging has been completed to remove accumulated material at each of the terminals' berthing areas.

3.2 Historical Sediment Quality Data

Existing sediment quality data from the project area or near the Port is summarized below. Additional details are available in Attachments I and II.

3.2.1 2013 Sediment Characterization

Two surface grab samples were collected to characterize dredged material for maintenance dredging at the adjacent North Port berth during the 2013 characterization sampling for maintenance dredging at the Port's existing facilities. PSET approved the material for in-water disposal, upland disposal and/or beneficial use, as stated previously. (PSET, July 2013).

3.3 Conceptual Site Model

The following sections describe potential contaminant sources at the Port. The potential exposure pathways associated with dredging and placement of dredged material on upland and in-water placement sites are considered temporary and short term. Potential exposure pathways from dredged sediment include the following.

- ***Hydraulic/clam shell dredging resuspension:*** Potential direct contact exposure through the water column to animals and critical habitat
- ***Newly exposed post-dredge surface:*** Potential direct contact exposure to animals and critical habitat
- ***Dewatering water generated during placement on upland:*** Direct contact exposure to birds and mammals
- ***Dredged material upland placement:*** Direct contact exposure to people, birds, and animals
- ***Dredged material in-water placement:*** Direct contact through the water column to animals and aquatic habitat

3.3.1 Potential Sources of Contamination

The material to be dredged is generally sand transported to the berth areas from upriver. The Port is not aware of any new upriver contaminant sources that will affect sediment quality, and it is assumed that the existing sediment quality at the project site is similar to the conditions indicated by the 2013 sediment sampling results.

Potential sources of sediment contamination were evaluated in detail in the 2013 SAP (Attachment I). This evaluation included consideration of industrial facilities in the vicinity, Port and tenant operations, and sites located upriver of the project site. The evaluation indicated that site operations using best management practices at Port and other industrial facilities (e.g., Spill Prevention, Countermeasure and Control plans and spill kits) and existing site sediment conditions based on Ecology site file reviews have a low potential to impact sediment conditions at the project site. The results of our evaluation in the SAP indicated that potential contaminant sources identified are unlikely to impact the project site.

4.0 OBJECTIVES AND APPROACH

4.1 Objectives

The objectives of this SAPA are to present procedures and methods that will be used to

- Characterize sediment from the existing surface to the proposed authorized depth (and overdredge depth) for the new berth.
- Characterize sediment from the depth representing the surface that will be exposed after dredging ("Z-layer").

4.2 Approach Considerations

4.2.1 General Approach

The general approach described below is based on the methods and procedures described in the 2013 SAP and was used during the previous sediment characterization of the Port's berths. The sampling and analysis approach is described below.

- The dredged material at the adjacent North Port berth has a low ranking based on the Port's previous completed studies and the PSET's determination. This SAPA assumes that the proposed dredged material at the project site will also have a low ranking, since it is likely to be similar material to that found at North Port.
- Dewatering water from dredged material placed at upland placement sites will be managed in accordance with the permit (NWP-1994-462) requirements for maintenance dredging at the Port's other terminals.
- The currently authorized depth at the North Port site is -48 + 2 feet CRD. The proposed depth for the new berth is also -48 feet CRD with a 2-foot overdredge allowance.
- The project site has not been previously dredged.
- The Port will characterize sediments in the areas proposed to be dredged using vibracore sampling (see Table 1 below). The sampling and analysis will be performed in early 2015, following submittal and approval of an appropriate SAPA to the PSET.

4.2.2 Sampling Approach

Cores will be collected using a vibracore sampler to characterize the sediment for dredging. Samples will be collected for analysis from the proposed dredge material. Z samples will be collected, if possible, representing the new surface material (Z-layer) from each core location. Post-dredge surface sample characterization may be necessary if the Z-layer elevation samples cannot be collected prior to dredging.

The proposed sediment sampling locations were identified in order to sample areas with a range of sediment accumulation, including those areas showing the most accumulation. The proposed sediment sampling locations shown on Sheet 2 were determined based on the 2014 bathymetry.

There was some difficulty in collecting core samples at the Kalama Export terminal during the 2013 characterization sampling. The difficulty collecting core samples at the site resulted from the relative density of the channel conditions that may represent the native mudline horizon. Difficulties sampling may be encountered at the project site if native mudline conditions at the site are similar to those found at the Kalama Export terminal. Sample locations may need to be adjusted if sample collection is difficult at the project site. Sample locations may need to be added if the Z-layer sample elevation cannot be reached at a proposed location. Sampling attempts will be made in areas with less accumulation in order to increase the likelihood of collecting Z-layer samples in the event of failure to reach the Z-layer at individual vibracore locations. Any changes to the proposed sampling locations will be made in coordination with the PSET agencies.

5.0 SAMPLE COLLECTION AND HANDLING PROCEDURES

5.1 General Sampling Scheme

The sampling and analyses frequency for SEF characterization for this project has been determined in accordance with the proposed approach discussed above.

5.2 Compositing Scheme

5.2.1 General

Samples will be collected from the subunits in each boring and composited to represent Dredged Material Management Units (DMMUs). Details of the compositing scheme, including depth, subunits, and DMMU volumes, are shown on Table 1.

5.2.2 Surface and Subsurface Units

Subunit samples will be composited to represent DMMU samples as summarized in Table 1. Subunit samples will also be archived for potential future analysis.

Table 1. Port of Kalama Manufacturing and Marine Export Facility Dock Proposed Sampling

DMMU ID	Core Station ID	DMMU Subunit ID	Sample Depth (ft below mudline)	Assumed Sample Elevation	Z-layer Elevation	Z-Layer Sample ID	Ranking	Frequency Requirement Based on Ranking	Approximate Total DMMU Volume (cy)
DMMU-1	V1	V1A	0-4	-40 to -44	-50	--	Low	1 subsample/8,000 cy 1 DMMU/48,000 cy (surface)	30,000
	V2	V2A	0-4	-43 to -47		--			
	V3	V3A	0-4	-43 to -47		--			
	V4	V4A	0-4	-39 to -43		--			
	V5	V5A	0-4	-43 to -47		--			
DMMU-2	V6	V6A	0-4	-39 to -43		--			37,000
	V7	V7A	0-4	-42 to -46		--			
	V8	V8A	0-4	-40 to -44		--			
	V9	V9A	0-4	-43 to -47		--			
	V10	V10A	0-4	-43 to -47		--			
DMMU-3	V1	V1B	4-10	-44 to -50	-50	Z1	Low	1 subsample/8,000 cy 1 DMMU/72,000 cy (subsurface)	52,000
	V2	V2B	4 -7	-47 to -50		Z2			
	V3	V3B	4 -7	-47 to -50		Z3			
	V4	V4B (archive)	4 -11	-43 to -50		Z4			
	V5	V5B	4 -7	-47 to -50		Z5			
	V6	V6B	4 -11	-43 to -50		Z6			
	V7	V7B (archive)	4 - 8	-46 to -50		Z7			
	V8	V8B	4-10	-44 to -50		Z8			
	V9	V9B	4 -7	-47 to -50		Z9			
	V10	V10B	4 -7	-47 to -50		Z10			
								Approximate Total Dredge Volume (cy)	**119,000**

Note: Dredged Material Management Unit (DMMU) Volume and sampling frequency were determined based upon guidance from the SEF and Dredged Material Management Program User Manual DMMU and Sample Volume Requirements for low ranked sites. A portion of all subunit samples will be archived. Subunit samples V4B and V7B will only be archived and will not be composited as part of DMMU-3 based on sampling frequency requirements.

.

5.3 Sample Collection and Handling Procedures

Samples will be collected using a vibracore operated from a vessel outfitted for that purpose. Depth of core penetration into the subsurface will be compared to the length of the core recovered during sampling. The amount of recovery will be recorded, and the cores will be capped with aluminum foil and core barrel caps on each end of the core pending sample extrusion.

Target depth for vibracore sampling is estimated within this SAPA. The actual target depth for each core will be calculated in the field based on elevation of mudline determined by tide level and lead line depth to mudline measurements. There will be no recovery correction for core samples.

The sampling scheme will be adjusted in the field and coordinated with the PSET, as needed, and recorded on the field logs. Real-time corrections will be completed based on depth of water column and National Oceanic and Atmosphere Association/U.S. Coast Guard tidal gauge data. The tide elevations will be confirmed during setup at each vibracore location sampling station.

The sampling collection, and handling methods and procedures will be completed in accordance to the 2013 SAP. The following methods that are not included here are described in detail in the SAP (Attachment I).

- Sampling Equipment Decontamination
- Sample Handling
- Sulfide Subsampling
- Positioning
- Sample Transport and Chain of Custody Procedures

5.4 Field Sampling Schedule

Sampling is anticipated to occur in early 2015.

6.0 LABORATORY PHYSICAL AND CHEMICAL SEDIMENT ANALYSIS

6.1 Chemical Analytical Program

The analytical program for this project has been developed primarily to evaluate the potential presence of COCs in the project area that may impact surrounding sediment, the water column, fish, and wildlife. Chemical analyses of the samples will consist of sediment conventionals and the 58 SEF COCs as shown in Table 2 below.

Table 2. Bulk Sediment Screening Levels of Chemicals of Concern

Chemical	Chemical Abstract Service Registry No.	2006 Interim Freshwater SL (dry weight)
STANDARD CHEMICALS OF CONCERN		
Conventionals		
Total Solids (%)	--	--
Total Organic Carbon (%)	--	--
Total Sulfides (mg/kg)	--	--
Ammonia (mg/kg)	--	--
Grain Size (%)	--	--
Metals (mg/kg)		
Antimony	7440-36-0	--
Arsenic	7440-38-2	20
Cadmium	7440-43-9	1.1
Chromium	7440-47-3	95
Copper	7440-50-8	80
Lead	7439-92-1	340
Mercury	7439-97-6	0.28
Nickel	7440-02-0	60
Silver	7440-22-4	2.0
Zinc	7440-66-6	130
Polynuclear Aromatic Hydrocarbons (PAHs) (μg/kg)		
Total Lower Molecular Weight _PAHs (LPAH)	---	6,600
Naphthalene	91-20-3	500
Acenaphthylene	208-96-8	470
Acenaphthene	83-32-9	1,100
Fluorene	86-73-7	1,000
Phenanthrene	85-01-8	6,100
Anthracene	120-12-7	1,200
2-Methylnaphthalene	91-57-6	470
Total HPAH	---	31,000
Fluoranthene	206-44-0	11,000
Pyrene	129-00-0	8,800
Benz(a)anthracene	56-55-3	4,300
Chrysene	218-01-9	5,900
Benzofluoranthenes (b+k)	205-08-9	600
	207-08-9	--
Benzo(a)pyrene	50-32-8	3,300
Indeno(1,2,3-c,d)pyrene	193-39-5	4,100
Dibenzo(a,h)anthracene	53-70-3	800
Benzo(g,h,i)perylene	191-24-2	4,000

Chemical	Chemical Abstract Service Registry No.	2006 Interim Freshwater
		SL (dry weight)
Chlorinated Hydrocarbons (μg/kg)		
1,4-Dichlorobenzene	106-46-7	--
1,2-Dichlorobenzene	95-50-1	--
1,2,4-Trichlorobenzene	120-82-1	--
Hexachlorobenzene	118-74-1	--
Phthalates (μg/kg)		
Dimethyl phthalate	131-11-3	46
Diethyl phthalate	84-66-2	--
Di-n-butyl phthalate	84-74-2	--
Butyl benzyl phthalate	85-68-7	260
Bis(2-ethylhexyl) phthalate	117-81-7	220
Di-n-octyl phthalate	117-84-0	26
Phenols (μg/kg)		
Phenol	108-95-2	--
2-Methylphenol	95-48-7	--
4-Methylphenol	106-44-5	--
2,4-Dimethylphenol	105-67-9	--
Pentachlorophenol	87-86-5	--
Miscellaneous Extractables (μg/kg)		
Benzyl alcohol	100-51-6	--
Benzoic acid	65-85-0	--
Dibenzofuran	132-64-9	400
Hexachlorobutadiene	87-68-3	--
N-Nitrosodiphenylamine	86-30-6	--
Pesticides (μg/kg)		
p,p'-DDE	72-54-8	9
p,p'-DDD	72-55-9	16
p,p'-DDT	50-29-3	12
Aldrin	309-00-2	9.5
Total Chlordane	12789-03-6	2.8
Dieldrin	60-57-1	1.9
Heptachlor	76-44-8	1.5
gamma-BHC (Lindane)	58-89-9	--
Total PCBs	---	60

6.2 Laboratory Analytical Protocols

Analytic protocols, including sample holding times and method detection limits, will be in accordance with SEF protocols and requirements. Laboratory testing procedures will be conducted in accordance with the SEF Recommended Protocols. The procedures and protocols for laboratory analysis are discussed in the 2013 SAP, Attachment I, including

- Chain-of-Custody Methods
- Limits of Detection Goals
- Quality Assurance/ Quality Control (QA/QC) Methods (Appendix D of Attachment I)
- Laboratory Report Requirements

7.0 REPORTING

7.1 Quality Assurance Report

The project quality assurance representative will prepare a quality assurance report based upon activities involved with the field sampling and review of the laboratory analytical data. The laboratory QA/QC reports will be included. The quality assurance report will identify any field and laboratory activities that deviated from the approved sampling plan and the referenced protocols, and will make a statement regarding the overall validity of the data collected. The QA/QC report will be incorporated into the final report.

7.2 Final Report

BergerABAM will prepare a written report documenting all activities associated with collection, transportation of samples, and chemical analysis. The chemical analytical report will be included as an appendix. At a minimum, the following will be included in the final report.

- Sample locations reported in latitude and longitude to the nearest tenth of a second.
- Plan view of the project area showing the sampling locations.
- Type of sampling equipment and a description of the protocols used during sampling and testing, including explanation of any deviations from the SAP.
- Logs of the vibracore samples showing descriptions of each sample.
- Final quality assurance report.
- Chemical analytical results relative to SEF criteria. If results are a non-detect (ND), the method detection limit (MDL) or method reporting limit (MRL) must be reported in the table.

8.0 REFERENCES

BergerABAM, April 2013. "Sampling and Analysis Plan, Port of Kalama, USA, USACE Permit No. NWP-1994-462." 5 April 2013.

BergerABAM, June 2013. "Dredge Material Characterization Report, Port of Kalama Maintenance Dredging, USACE Permit No. NWP-1994-462." 4 June 2013.

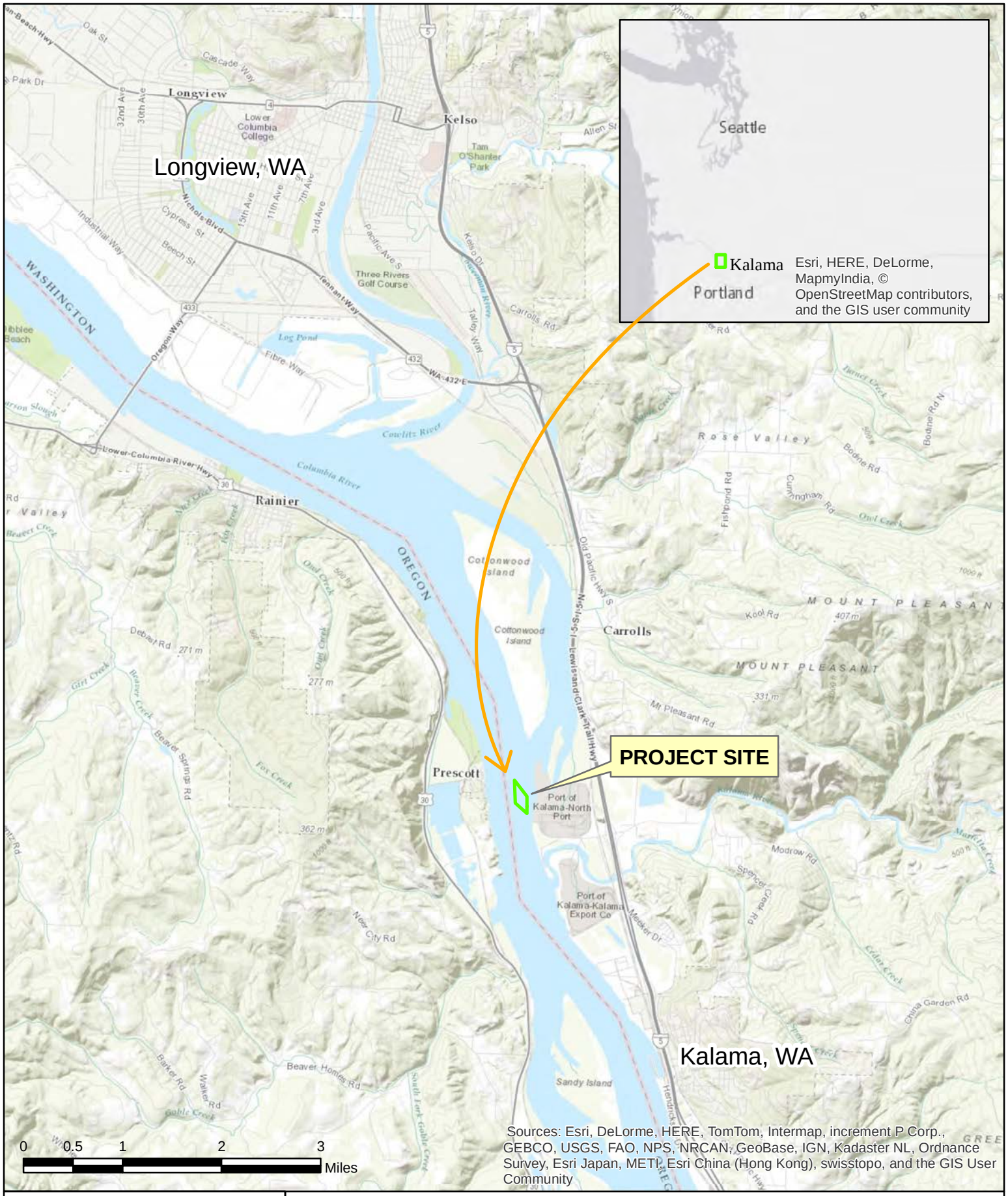
U.S. Army Corps of Engineers. December 2013. "Department of Army Permit NWP-1994-462-1, Port of Kalama."

Washington State Department of Ecology. July 2013. Port of Kalama Maintenance Dredging Suitability Determination. July 11, 2013.

Washington State Department of Ecology. December 2012. Environmental Information Management (EIM) database.

Washington State Department of Ecology. December 2012. Facility/Site Index.

Figures



BergerABAM

PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY DOCK DREDGING SAMPLING AND ANALYSIS PLAN ADDENDUM

SHEET 1: VICINITY MAP
DECEMBER 2014

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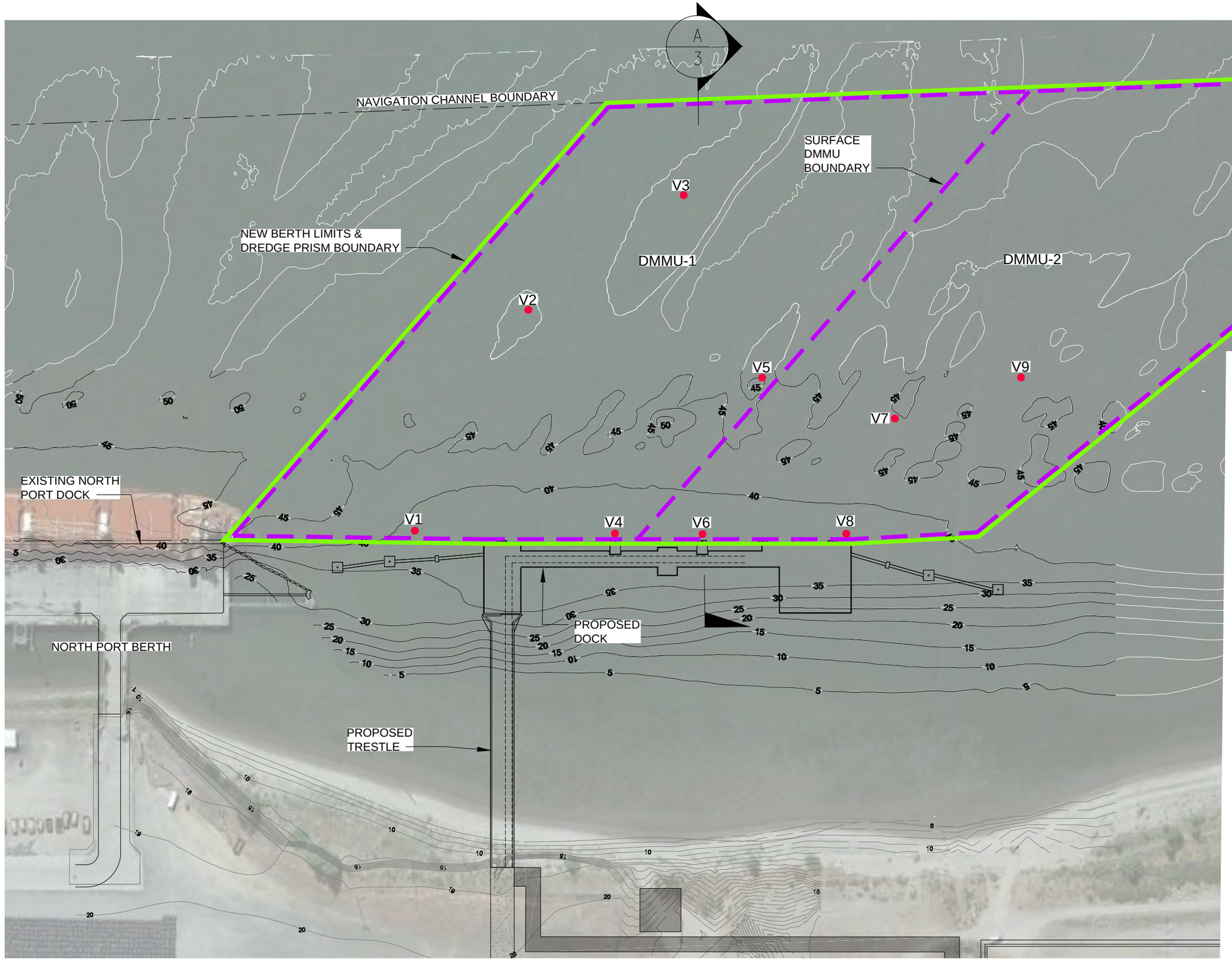


LEGEND

- NEW BERTH LIMITS & DREDGE PRISM BOUNDARY
- SURFACE DMMU BOUNDARY
- V10 — APPROXIMATE LOCATION OF VIBRACORE
- DMMU-1 — SURFACE DREDGED MATERIAL MANAGEMENT UNIT

150 0 150 300
feet

GENERAL NOTES:

1. HYDROGRAPHIC SURVEY DATA COLLECTED BY NORTHWEST HYDRO INC. ON APRIL 21, 2014.
2. HORIZONTAL DATUM: WASHINGTON STATE PLANE SOUTH (WSPS), NAD83, US FEET.
3. VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), FEET
   - CONTOURS ARE IN FEET AND INDICATE ELEVATIONS BELOW CRD.
   - A USACE TIDE GAUGE LOCATED AT THE COTTONWOOD ISLAND LIGHT #41 WAS USED FOR ALL TIDAL CORRECTIONS DURING THE SURVEY.
4. EXISTING BATHYMETRY AS SHOWN BY CONTOURS IS REPRESENTATIVE OF CONDITIONS AT TIME OF SURVEY.
5. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY AND SHALL NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.
6. CLEARANCE DISTANCE BASED UPON A PANAMAX VESSEL BERTHED AT THE NORTH PORT TERMINAL.
7. THE LOCATIONS OF FEATURES SHOWN ARE APPROXIMATE.
8. THIS FIGURE IS FOR INFORMATION PURPOSES AND IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN THE ATTACHED DOCUMENT.

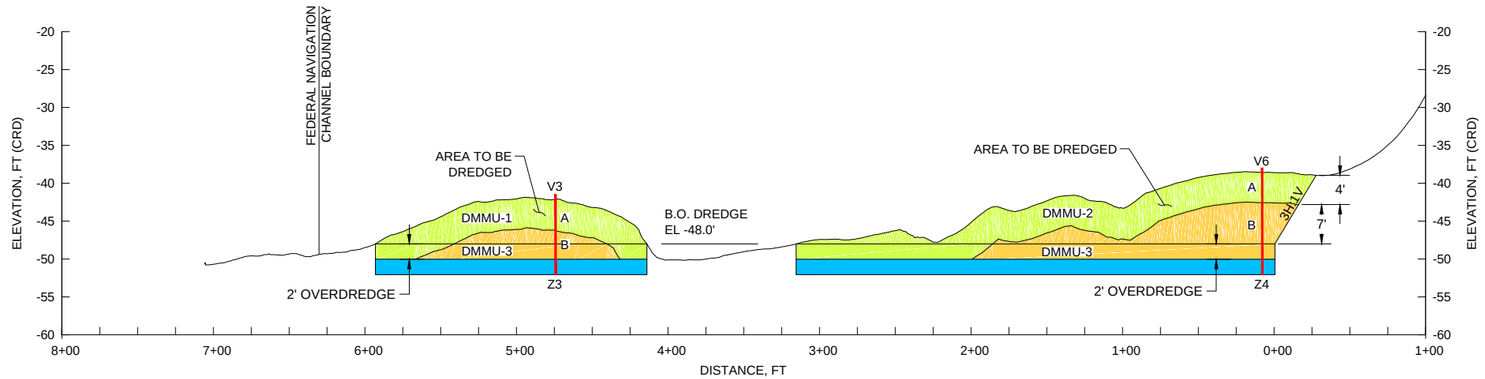
BASE MAP WA DEVELOPED BY COAST & HARBOR ENGINEERING, 2014

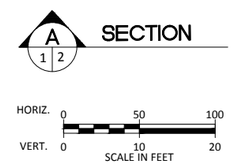
BergerABAM

PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY
DOCK DREDGING SAMPLING AND ANALYSIS PLAN ADDENDUM

SHEET 2- SITE PLAN-DREDGE PRISM AND VIBRACORE LOCATIONS
DECEMBER 2014

Last Saved by: Cesar.delrosario on: Dec 5, 2014 3:30 PM File: Q:\Vancouver\2015\A15.0032\01\NaturalResources\Graphics\SAP\AIFig-3 Marine Terminal R1.dwg





LEGEND

	SURFACE MATERIAL (LOW RANKING)
	SUBSURFACE MATERIAL (LOW RANKING)
	"Z-LAYER" POST-DREDGE SURFACE MATERIAL
V6	APPROXIMATE VIBRACORE LOCATION
CRD	COLUMBIA RIVER DATUM
DMMU-1	DREDGED MATERIAL MANAGEMENT UNIT
A	SUBUNIT IDENTIFICATION
Z4	APPROXIMATE POST-DREDGE SURFACE SAMPLE LOCATION

GENERAL NOTES:

1. DREDGING TO EL. -48' + 2 (OD) SHALL OCCUR IF THE DEPTHS AT THE TIME OF DREDGING ARE SHALLOWER THAN EL. -48.
2. DREDGING DEPTH AND OVER DREDGE SHOWN IS FOR CONCEPTUAL PURPOSES ONLY AND SHALL NOT BE USED FOR PERMITTING, DESIGN, OR CONSTRUCTION PURPOSES.
3. HYDROGRAPHIC SURVEY DATA COLLECTED BY NORTHWEST HYDRO INC. ON APRIL 21, 2014.
4. HORIZONTAL DATUM: WASHINGTON STATE PLANE SOUTH (WSPS), NAD83, US FEET.
5. VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), FEET
   - CONTOURS ARE IN FEET AND INDICATE ELEVATIONS BELOW CRD.
   - A USACE TIDE GAUGE LOCATED AT THE COTTONWOOD ISLAND LIGHT #41 WAS USED FOR ALL TIDAL CORRECTIONS DURING THE SURVEY.
6. EXISTING BATHYMETRY AS SHOWN BY CONTOURS IS REPRESENTATIVE OF CONDITIONS AT TIME OF SURVEY.
7. THE LOCATIONS OF FEATURES SHOWN ARE APPROXIMATE.
8. THIS FIGURE IS FOR INFORMATION PURPOSES AND IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN THE ATTACHED DOCUMENT.

BASE MAP WAS DEVELOPED BY COAST & HARBOR ENGINEERING, 2014

BergerABAM

PORT OF KALAMA - MANUFACTURING AND MARINE EXPORT FACILITY
DOCK DREDGING SAMPLING AND ANALYSIS PLAN ADDENDUM

SHEET 3 - SCHEMATIC DMMU PLAN
DECEMBER 2014

Last Saved by: Cesar delrosario on: Dec 5, 2014 3:30 PM File: Q:\Vancouver\2015\A15.003\201\NaturalResources\Graphics\SAP\Fig-3 Marine Terminal R1.dwg

Attachment I
2013 Revised Sampling and Analysis Plan, Port of Kalama

Attachment II
2013 Portland Project Review Group Sediment Characterization Report Review Memo

Appendix B
Sediment Logs

BergerABAM

Grab Sample: ***V-1***

Date:	2/18/2015
Time:	1616
Weather:	Overcast, 55° F
Field Personnel:	Cesar del Rosario, Carissa Barrett
Vessel Operator:	Research Support Services
Sampling method:	Power grab sampler (12" depth)
Dredge Design Elevation (feet):	-50 (-48 + 2 feet allowable overdredge)

Northing:	268538.70
Easting:	1036987.70
Water depth (feet, depth to mudline):	49
Tide stage (feet relative to CRD):	9.24
Calculated mudline elevation[1] (feet):	-39.76
Recovery length (inches):	12
Penetration depth below mudline (feet):	1
Penetration Elevation (feet):	-40.76

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SM	Dark brown/gray silty sand (moist, stiff, no odor), no sheen, organic debris	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-2***

Date:	2/18/2015	Northing:	268719.00
Time:	1545	Easting:	1036691.30
Weather:	Cloudy, 56° F	Water depth (feet, depth to mudline):	59.5
Field Personnel:	Cesar del Rosario, Carissa Barrett	Tide stage (feet relative to CRD):	9.7
Vessel Operator:	Research Support Services	Calculated mudline elevation[1] (feet):	-49.8
Sampling method:	Power grab sampler (12" depth)	Recovery length (inches):	12
Dredge Design Elevation (feet):	-50 (-48 + 2 feet allowable overdredge)	Penetration depth below mudline (feet):	1
		Penetration Elevation (feet):	-50.8

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark brown coarse sand with trace silt (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-3***

Northing: 268925.00

Date: 2/18/2015

Easting: 1036511.70

Time: 1600

Water depth (feet, depth to mudline): 57.7

Weather: Overcast, 55° F

Tide stage (feet relative to CRD): 9.44

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -48.26

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -49.26

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark brown coarse sand with trace silt (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-4***

Northing: 268829.38

Date: 2/18/2015

Easting: 1036994.78

Time: 1634

Water depth (feet, depth to mudline): 49.2

Weather: Overcast, 55° F

Tide stage (feet relative to CRD): 9.11

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -40.09

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -41.09

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SM	Brown silty sand (wet, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-5***

Northing: 269045.21

Date: 2/18/2015

Easting: 1036770.80

Time: 1651

Water depth (feet, depth to mudline): 53.5

Weather: Overcast, 55° F

Tide stage (feet relative to CRD): 6.74

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -46.76

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -47.76

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark gray medium-coase sand with trace silt (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-6***

Northing: 268954.67

Date: 2/19/2015

Easting: 1036995.95

Time: 900

Water depth (feet, depth to mudline): 47.2

Weather: Cloudy, 46° F

Tide stage (feet relative to CRD): 6.65

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -40.55

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -41.55

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark brown sand with silt and organic matter including leaves and roots (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-7***

Date:	2/19/2015	Northing:	269236.37
Time:	916	Easting:	1036826.58
Weather:	Cloudy, 48° F	Water depth (feet, depth to mudline):	50.4
Field Personnel:	Cesar del Rosario, Carissa Barrett	Tide stage (feet relative to CRD):	6.53
Vessel Operator:	Research Support Services	Calculated mudline elevation[1] (feet):	-43.87
Sampling method:	Power grab sampler (12" depth)	Recovery length (inches):	12
Dredge Design Elevation (feet):	-50 (-48 + 2 feet allowable overdredge)	Penetration depth below mudline (feet):	1
		Penetration Elevation (feet):	-44.87

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark gray sand with silt (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-8***

Date: 2/19/2015	Northing: 269163.27
Time: 932	Easting: 1036988.66
Weather: Cloudy, 48° F	Water depth (feet, depth to mudline): 47.2
Field Personnel: Cesar del Rosario, Carissa Barrett	Tide stage (feet relative to CRD): 6.44
Vessel Operator: Research Support Services	Calculated mudline elevation[1] (feet): -40.76
Sampling method: Power grab sampler (12" depth)	Recovery length (inches): 12
Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)	Penetration depth below mudline (feet): 1
	Penetration Elevation (feet): -41.76

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SM	Brown silty sand with trace clay and occasional clams and organic matter including leaves and roots (moist, medium-stiff, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-9***

Northing: 269413.14

Date: 2/19/2015

Easting: 1036770.82

Time: 946

Water depth (feet, depth to mudline): 49.8

Weather: Cloudy, 48° F

Tide stage (feet relative to CRD): 6.32

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -43.48

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -44.48

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark gray sand with silt (wet, soft, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

BergerABAM

Grab Sample: ***V-10***

Northing: 269901.41

Date: 2/19/2015

Easting: 1036418.56

Time: 1005

Water depth (feet, depth to mudline): 55.7

Weather: Cloudy, 48° F

Tide stage (feet relative to CRD): 6.2

Field Personnel: Cesar del Rosario, Carissa Barrett

Calculated mudline elevation[1] (feet): -49.5

Vessel Operator: Research Support Services

Recovery length (inches): 12

Sampling method: Power grab sampler (12" depth)

Penetration depth below mudline (feet): 1

Dredge Design Elevation (feet): -50 (-48 + 2 feet allowable overdredge)

Penetration Elevation (feet): -50.5

Recovered (inches)	Interval	Material Description color, soil type (density, odor/no odor), additional features, sheen/no sheen	Remarks
0			
2	SP	Dark gray sand with trace silt (moist, soft, no odor), no sheen	
4			
6			
8			
10			
12			
14			
16			
18			
20			

Notes:

[1]Mudline elevation was calculated by measuring the depth of water column at the sampling location using a lead line and adjusting for the tide stage at the time of sampling using Nobeltec Tides & Currents chart (NOAA tidal station ID: 9439040, Astoria, OR).

Northing and easting are based on the North American Datum of 1983 (NAD83) State Plane Coordinate System, Washington South

Legend

Dredge Prism

SM = Silty sand

SP = Sand with trace silt

CRD = Columbia River Datum

Appendix D
Mitigation Plan

BergerABAM

MITIGATION PLAN

Kalama Manufacturing and Marine Export Facility

Prepared for
Port of Kalama

August 2015

Mitigation Plan

Kalama Manufacturing and Marine Export Facility

Prepared on behalf of:

Port of Kalama
Contact: Tabitha Reeder
380 West Marine Drive
Kalama, Washington 98625
360-673-2325

August 2015

Prepared by

BergerABAM
210 E 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A15.0032.00

MITIGATION PLAN

KALAMA MANUFACTURING AND MARINE EXPORT FACILITY

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Appendix A – Figures

EXECUTIVE SUMMARY

Northwest Innovation Works LLC (NWIW) and the Port of Kalama (Port) propose to design and construct the Kalama Manufacturing and Marine Export Facility to manufacture and export methanol on approximately 100 acres on the Columbia River at the Port's North Port site located at 222 West Kalama River Road in unincorporated Cowlitz County, Washington (Sheet 1, Appendix A). The purpose of the proposed project is to develop the facilities necessary to manufacture methanol and ship it cost efficiently by water to global markets.

The proposed project consists of a methanol production facility; accessory support and infrastructure facilities; and a new marine terminal on the Columbia River. The proposed project also includes compensatory mitigation activities. The new marine terminal will require the installation of pilings and new overwater structures waterward of the ordinary high water mark (OHWM) of the Columbia River. Dredging and dredge material placement also will be required to establish the new berth.

This plan summarizes the habitat impacts that could result from the proposed project and the mitigation measures that have been incorporated into the project to compensate for them. While the project has been designed to minimize and avoid impacts to aquatic habitats to the extent possible, some activities will result in unavoidable habitat impacts. Unavoidable aquatic habitat impacts associated with the project will be limited to new permanent benthic habitat impacts associated with new pile footprints and new overwater shading of shallow water habitat associated with the approach trestle.

In total, the proposed terminal will require the installation of approximately 320, 24-inch concrete piles; 12, 12-inch steel pipe piles; and 4, 18-inch steel pipe piles. This will represent a total of approximately 1,079 square feet of new benthic impact associated with new pile footprints. The proposed new marine terminal also will result in a total of approximately 44,943 square feet of new solid overwater overage.

The terminal has been designed such that (with the exception of the access trestle) the platforms, dolphins, and structures associated with the terminal are located in water deeper than 20 feet below OHWM (11.6 feet CRD). This minimizes the effects to aquatic habitats by locating most of the dock terminal in deep water and minimizing structure in and over shallow water habitats. Of the total new aquatic habitat impact, approximately 34,018 square feet of overwater coverage, and approximately 906 square feet of new benthic impact associated with new pile footprints, will be located in water deeper than 20 feet below OHWM.

Approximately 10,925 square feet of new overwater coverage associated with the access trestle, and a total of approximately 173 square feet of new benthic impact associated with new pile footprints for the access trestle, will occur in and over shallow water habitat (water shallower than 20 feet below OHWM). Vehicle accessibility and safety dictate the design and configuration of the access trestle. It has been designed to be of the minimum width necessary to perform the access function. Due to structural and load considerations, the trestle is by necessity a solid structure, and cannot be grated.

The project also will require an expansion of the existing North Port berth to accommodate vessel arrivals and departures at the new terminal. The footprint of the expanded berth will be approximately 18 acres, of which approximately 16.2 acres will require dredging during first-year dredging to achieve the required berth depth. Water depths in the proposed berth area are predominately -50 feet CRD with some areas as shallow as -38 feet CRD. The total volume to be dredged the first year is approximately 126,000 cubic yards. Dredging is not expected to result in habitat impacts greater than those resulting from natural recurring hydraulic action. The shape, composition, and configuration of benthic topography are in a state of relatively constant change in this reach of the Columbia River, due to natural processes. Sand waves naturally form and propagate along the channel and the adjacent river bottom, with the estimated volume of sand in a single large sand wave in a range of between 100,000-200,000 cy (Coast and Harbor 2015). For this reason, no compensatory mitigation is proposed for temporary effects to benthic habitats associated with berth dredging or dredge material placement.

Construction activities have the potential to reduce the function and quantity of nearshore freshwater aquatic habitat locally; to offset these impacts, the Applicant has incorporated specific compensatory mitigation activities as part of the proposed action.

In selecting the proposed mitigation activities and locations, the following documents were used as references:

- Compensatory Mitigation for Losses of Aquatic Resources Final Rule (33 CFR Parts 332) (USACE 2008).
- Wetland Mitigation in Washington State – Part 1 Agency Policies and Guidance and Part 2: Developing Mitigation Plans (Version 1). (Washington State Department of Ecology 2006)
- Selecting Mitigation Sites Using a Watershed Approach (Washington State Department of Ecology 2009)

These mitigation activities have been proposed to offset the unavoidable aquatic habitat function at the site.

- Removal of approximately 320, 12- to 14-inch diameter treated timber piles associated with two deteriorated timber pile structures in the freshwater tidal backwater channel adjacent to the project site. This will restore approximately 251 square feet of benthic habitat, improve fish access, and improve hydraulics and sediment transport within approximately 13 acres of backwater habitat that provides refugia for outmigrating and wintering juvenile salmonids.

- Install a total of 8, approximately 20 x 20-foot engineered log jams (ELJs) along the shoreline of the Columbia River adjacent to the site. This will increase aquatic habitat complexity with interstitial spaces that will allow juvenile and adult salmonids to evade predation. The ELJs will also provide refuge and foraging opportunities for both juvenile and adult salmon, particularly for small outmigrant fish moving downstream during the spring and early summer peak of outmigration activity.

- Restore approximately 1.41 acres of riparian habitat adjacent to the Columbia River at the site. Invasive species including Himalayan blackberry (*Rubus armeniacus*) will be removed, and native trees and shrubs will be installed to restore a more highly functioning riparian condition. This will improve aquatic habitat function at the site by providing a natural source of leaf litter and woody debris and insect and invertebrate fauna, and stabilize banks naturally to minimize erosion. Terrestrial riparian condition and habitat function also will be improved by the removal of invasive species and an increased dominance of native vegetation, which will provide a food source for the native birds and small mammals that use the site.

- Restore approximately 0.58 acre of wetland buffer adjacent to the recreation access improvements at the north end of the project site. Invasive species will be removed, and native trees will be installed to enhance the existing wetland buffer condition. The proposed plantings will replace native vegetation that is impacted as a result of the project, and the proposed invasive species management will improve the habitat conditions within the buffer, and minimize the spread of aggressive species that could otherwise affect the quality of the adjacent wetland. These mitigation actions will offset the relatively minor extent of unavoidable impacts to wetland buffers associated with the project, and the project will result in no net loss of wetland or wetland buffer function.

The proposed mitigation activities will be conducted either prior to, or concurrently with, the initiation of work associated with this project to avoid any temporary loss of function. The net result is that the effects of the proposed project to water quality and nearshore habitat suitability will be fully offset by the proposed mitigation activities.

1.0 INTRODUCTION

Northwest Innovation Works LLC (NWIW) and the Port of Kalama (Port) propose to design and construct the Kalama Manufacturing and Marine Export Facility to manufacture and export methanol on approximately 100 acres on the Columbia River at the Port's North Port site located at 222 West Kalama River Road in unincorporated Cowlitz County, Washington (Figure 1 and Figure 2 in Appendix A). The purpose of the proposed project is to construct the facilities necessary to manufacture methanol and ship it cost efficiently by water to global markets.

The proposed project will consist of a methanol production facility; accessory support, and infrastructure facilities; and a new marine terminal on the Columbia River. The proposed project also includes compensatory habitat mitigation activities. Finished product will be transferred by pipeline from the storage area to a new deep draft marine terminal to be constructed by the Port on the Columbia River. The new marine terminal will require the installation of pilings and new overwater structures waterward of the ordinary high water mark (OHWM) of the Columbia River. Dredging and dredge material placement will also be required to establish the new berth.

While the project has been designed to minimize and avoid impacts to aquatic and terrestrial habitats to the extent possible, some activities will result in unavoidable habitat impacts. Unavoidable aquatic habitat impacts associated with the project are limited to the loss of benthic habitat from new pile footprints, and new overwater shading of shallow water habitat associated with the approach trestle. These modifications, without mitigation, could affect the suitability of aquatic habitat function within the action area by increasing the quantity of nearshore, overwater shading, and by reducing the quantity and quality of benthic habitats.

The Applicant has, therefore, incorporated mitigation activities as part of the proposed action. Mitigation activities associated with the proposed project include pile removal, installation of engineered log jams (ELJs), and riparian restoration and wetland buffer enhancement. The specific mitigation activities proposed have been developed in close coordination with staff from the US Army Corps of Engineers (USACE), Washington Department of Fish and Wildlife (WDFW), National Marine Fisheries Service (NMFS), and US Fish and Wildlife Service (USFWS).

2.0 LOCATION, HISTORY, AND BASELINE CONDITIONS

2.1 Location and Ownership

The project will be conducted on the Port's North Port Marine Industrial Park site, which is located at 222 West Kalama River Road in unincorporated Cowlitz County, Washington (see Figure 1). The North Port site is located at approximately River Mile (RM) 72 along the east bank of the Columbia River, and is designated for heavy industrial use by Cowlitz County. The project site is approximately 100 acres in size and is located in portions of Section 31, Township 7 North, Range 1 West and Sections 25 and 36, Township 7 North, Range 2 West Willamette Meridian.

The project site consists of portions of tax parcels 63302, 63304, 63305, 60822, 60831, 63301, and WH2516001, and is within the Lower Columbia/Clatskanie Hydrologic Unit Code (HUC # 17080003), in Water Resource Inventory Area (WRIA) 27.

The project site is bounded on the west by the Columbia River; to the east by Tradewinds Road, the Air Liquide industrial facility, and the Port's industrial wastewater treatment plant; to the north by Port property primarily used for open space, recreation, and mitigation; and to the south by the existing Steelscape manufacturing facility. The site and vicinity are identified on Figure 1.

2.2 Purpose and Need

The objective of the proposed project is to construct and operate a manufacturing facility to produce methanol from natural gas using technology that produces less air pollution and greenhouse gas (GHG) emissions than methanol production using coal. This "greener" methanol will be exported to global markets by oceangoing vessel.

Global demand for methanol is high for use as a feedstock for olefin, a component in the manufacturing of many everyday items. Recent forecasts predict an increase in worldwide demand for methanol from 60 million metric tonnes (MMT) in 2013 to 190 MMT in 2023 2014). Currently coal is widely used for methanol production.

The project will provide economic benefit to the region, create jobs, improve access to recreational resources and thus meets the Port's mission, and produce methanol using a technology that will produce less air pollution and greenhouse gas (GHG) emissions than methanol production using coal. The project will therefore meet the Port's mission to "induce capital investment in an environmentally responsible manner to create jobs and to enhance public recreational opportunities".

2.3 Environmental Baseline Conditions of Impact Site and Mitigation Sites

2.3.1 Terrestrial Habitats

The terrestrial portion of the project will be constructed on a heavily disturbed upland area that has been slated for industrial development for years. Terrestrial habitat within the upland portion of the site consists almost entirely of dredge sands in various stages of revegetation.

At the eastern portion of the site, there is an area of herbaceous vegetation where groundcover is approximately 95-100 percent with a mix of moss, grasses, forbs, and scattered Scotch broom. There are no areas of bare sand in this portion of the site, and herbaceous vegetation is dense. This portion of the site may provide some marginal foraging opportunities for avian or small mammal species.

The south central portion of the site consists of dredge material (sand) that is under active Port use and management. Because the sand in this area is maintained as structural fill and moved frequently, it is essentially devoid of vegetation at all times of the year. This portion of the site provides very little habitat function for any terrestrial or avian species.

The southwest section of the site is only slightly more diverse in structure. Vegetated areas here are dense with moss, grasses, and herbaceous vegetation, and there are several roads and parking areas. A few small and isolated areas could possess soil and vegetation conditions that could provide marginal foraging opportunities for avian or small mammal species, but habitat suitability is limited.

The northern portion of the site is located on an area of dredge material that was placed as part of the USACE Columbia River Navigation Channel project. Deposition of dredged material began here in approximately 1978, with the most recent placement occurring in 2008 (US Army Corps of Engineers 2014). Most of this portion of the site is sparsely vegetated with low-growing herbaceous vegetation and a mix of perennial and annual grasses. This portion of the site also includes areas that are relatively densely vegetated with low growing vegetation and/or scotch broom, and other areas that are largely unvegetated. This portion of the site is unfenced, and is accessible to the public and to terrestrial and avian wildlife species. This portion of the site likely provides potentially suitable habitat for terrestrial mammals such as coyotes, rabbits, and small rodents that are accustomed to industrialized and populated environments. Portions of this northern portion of the site also provide suitable habitat for a number of avian species, including streaked horned lark (see section 0).

However, both the US Army Corps of Engineers and USFWS have determined that the site will no longer be suitable as habitat for streaked horned lark by 2016 (US Army Corps of Engineers 2014; US Fish & Wildlife Service 2014).Common plant species on the vegetated portions of the site include a mix of annual grasses (annual bluegrass [*Poa annua*] and annual bromes [*Bromus* spp.]), perennial grasses (colonial bentgrass [*Agrostis capillaris*], velvetgrass [*Holcus lanatus*], and red fescue [*Festuca rubra*]), and weedy herbaceous species (rabbit's foot clover [*Trifolium arvense*], common mullein [*Verbascum thapsis*], Queen Anne's lace [Daucus carota], hairy cat's ear [*Hypochaeris radicata*], ox-eye daisy [*Leucanthemum vulgare*], Canada thistle [*Cirsium arvense*], bull thistle [*Cirsium vulgare*], St. John's-wort [*Hypericum perforatum*], chickweed [*Stellaria media*], yellow glandweed [*Parentucellia viscosa*], sheep sorrel [*Rumex acetosella*], and narrowleaf plantain [*Plantago lanceolata*]).

Mosses also represent a significant portion of the ground cover across the site, especially in portions of the site that have not been recently disturbed.

Few woody species are present on the site. Scotch broom (*Cytisus scoparius*) is the most common woody species. A narrow band of black cottonwood (*Populus balsamifera*) trees and saplings has established in the riparian area between the portion of the site that will be developed and the OHWM. In total, approximately 66 black cottonwood trees have established within the riparian buffer. These trees are primarily small saplings between 1 and 8 inches diameter at breast height (dbh), but there are a few larger diameter trees between approximately 8 and 20 inches dbh. Many of these trees are multi-stemmed. A few small black cottonwood saplings have also begun to establish on the upland portions of the site.

Eight species previously documented on various portions of the site are identified as noxious weeds by the Washington State Noxious Weed Control Board: Scotch broom, Queen Anne's lace, hairy cat's ear, ox-eye daisy, Canada thistle, bull thistle, St. John's-wort, common groundsel (*Senecio vulgaris*), and reed canarygrass (*Phalaris arundinacea*).

2.3.2 Aquatic Habitats

The aquatic portion of the project will be conducted within a freshwater fluvial section of the Columbia River at RM 72 and approximately 1 RM downstream from the mouth of the Kalama River. This reach of the Columbia River is used by several populations of anadromous salmonids, steelhead, and bull trout as a migratory route between upstream spawning areas and the Pacific Ocean.

While this reach of the Columbia River is located upstream of the furthest extent of saltwater intrusion, it is within a tidally influenced portion of the river. Tidally induced changes in water level on the Columbia River are observed as far upstream as Bonneville Dam (RM 146) during low river flow. River flow reversals are not observed in this reach of the river, however, and the site is upstream of the upstream extent of saltwater intrusion. Reversal of river flow has been measured only as far upstream as Oak Point (RM 53), and the intrusion of saltwater generally does not extend further than 23 miles inland (near Harrington Point) at the minimum regulated monthly flow. When lower daily flows occur, salt intrusion can extend past Pillar Rock (approximately RM 28) (Lower Columbia Fish Recovery Board 2010).

Aquatic habitats within the Columbia River at the project site include intertidal sandy beaches, subtidal demersal (river bottom) habitat, and water column habitat. There is a shallowly sloping beach below the OHWM at the site, which extends out from the shoreline a distance of approximately 250 feet. Average water depths in this shallow area likely average between 5 and 15 feet. Beyond this distance, the shoreline drops off rapidly to water depths in excess of 35 feet. Substrate within both subtidal and intertidal benthic environments consists largely of silts and medium-to-coarse alluvial sands. Channel substrate is very similar throughout the Lower Columbia River and consists primarily of sand with some silt, especially in nearshore shallow water areas. There is no submerged aquatic vegetation in this reach of the river, most likely due to the dynamic nature of the system and the high water velocities. In general, the aquatic habitat of the Columbia River at the site provides habitat for a variety of benthic, epibenthic, and water column organisms. The shape, composition, and configuration of benthic topography are in a state of relatively constant change in this reach of the Columbia River, due to natural processes. Sand waves naturally form and propagate along the channel and the adjacent river bottom, with the estimated volume of sand in a single large sand wave in a range of between 100,000-200,000 cy (Coast and Harbor 2015). The benthic surface of the river bottom in this location is subject to near-continual disturbance from the turbulent high-energy conditions that are the normal condition in this reach of the river.

The backwater habitat north and west of the project site provides relatively higher functioning aquatic habitat, particularly as a backwater refugia for juvenile salmonids. Small fish, amphibians, and a variety of invertebrates are all likely to be present in this portion of the site vicinity. In addition, the riparian vegetation bordering this backwater channel provides terrestrial invertebrate, large woody debris, and leaf litter inputs.

3.0 MITIGATION PLAN

3.1 Mitigation Sequencing

The project has been designed to avoid and minimize impacts to aquatic resources to the greatest extent practicable. The size and configuration of the structures have been kept to the minimum necessary to support their needed functions. In addition, the terminal has been designed such that (with the exception of the access trestle) the platforms, dolphins, and structures associated with the terminal will be located in water deeper than 20 feet below OHWM (11.6 feet CRD). This will minimize the effects to aquatic habitats by minimizing structure in and over shallow water habitats and placing the vessels away from shallow water, reducing impacts such as scour caused by vessels operating props and thrusters. The proposed berth extension would also be conducted in deep water, and would not affect any shallow water habitat,

The Columbia River is a constitutionally designated area of commerce and the dock will be located in an existing harbor area and adjacent to the federal navigation channel. Ship traffic associated with the project will result in a minor increase in vessel traffic will be within historical levels. In addition, walkways will be grated to minimize shading and stormwater will be collected and infiltrated upland reducing the potential for pollutants to reach surface waters. Furthermore, the access trestle abutments have been designed and configured to eliminate the need for shoreline armoring along the riverbank.

The dock design uses pre-cast concrete piles, rather than steel pipe piles, as structural support piles, which minimizes the potential for acoustic effects associated with impact pile driving. The steel piles for walkway supports and fender systems will be installed with a vibratory hammer, and are not expected to require impact proofing. If impact proofing is required, a bubble curtain will be employed. Stormwater from the dock will be collected and conveyed to upland treatment and an infiltration swale. The stormwater system will also accommodate stormwater from the existing North Port dock which is currently infiltrated in an upland swale that will be removed for this development.

The upland portion of the facility has been designed to avoid adjacent off-site wetlands, and would be constructed on a site that has little substantial vegetation, has been slated for industrial development for years, and has been used as a dredge material placement site.

Several projects were previously proposed for the site, and nearly all of them would have resulted in greater habitat impacts than the current proposal. Several potential

projects would have required the construction of a rail loop track that in turn would have required filling a portion of the high quality forested backwater wetland area to the north of the project site. The site is well suited to use as an export facility, and this proposed project has been developed within the envelope of previously developed areas at the site, and will not result in any impacts to the forested backwater wetland to the north.

3.2 Project Impacts

While habitat and species impacts have been minimized to the extent practicable, certain aspects of the project have the potential to result in unavoidable impacts to aquatic and/or terrestrial habitat. The following section describes the unavoidable impacts associated with the project.

3.2.1 Aquatic Impacts

This section describes the unavoidable impacts to aquatic habitat associated with the project. A detailed analysis of project aquatic impacts is provided in Table 1.

3.2.1.1 New Overwater Structure

The project will result in a total of approximately 44,943 square feet of new un-grated overwater coverage associated with the construction of the new terminal. As stated previously, the terminal has been designed such that the majority of this structure is located in water deeper than 20 feet below OHWM, to minimize impacts to sensitive shallow water habitat, where the effects of overwater shading are more pronounced. Of the total new aquatic habitat impact, approximately 10,925 square feet of overwater coverage will be located in water shallower than 20 feet below OHWM.

Overwater coverage in shallow water and nearshore habitat can affect primary productivity and, by providing habitat for predatory fish species, can affect aquatic habitat suitability.

The project also will result in approximately 1,588 square feet of new grated overwater coverage associated with a walkway to the proposed mooring dolphins. However, the grating, and the position of these walkways over deep water, will avoid impacts to primary productivity or other aquatic habitat function.

3.2.1.2 Benthic Habitat Impacts

In total, the proposed terminal will require the installation of approximately 320, 24-inch concrete piles; 12, 12-inch steel pipe piles; and 4, 18-inch steel pipe piles.[1] This will

[1] Since pile layout is conceptual, a 10 percent contingency has been added for the estimated number of concrete piles. This will accommodate potential revisions to the pile layout and configuration as the structural design is finalized.

represent a total of approximately 1,079 square feet of new benthic impact associated with new pile footprints and a permanent impact to benthic habitat.

The project also will result in temporary impacts to approximately 16.2 acres of benthic habitat as a result of initial dredging of the expanded berth. Dredging and material placement activities have the potential to result in short-term impacts to benthic organisms and their habitat, but these temporary impacts are not expected to affect habitat suitability. Dredging will occur only in deep water habitat (existing depths in the area to be dredged currently range from approximately -38 feet CRD to -50 CRD), and dredging will not affect primary productivity. The USFWS Biological Opinion for the Lower Columbia River Channel Improvement Project indicates that benthic habitats recolonize from dredging activities rapidly (US Fish and Wildlife Service 2002). In addition, natural hydraulic processes routinely disturb benthic habitats in the river. Benthic substrates are most significantly disturbed and redistributed as sand waves form and reform during high flow events, particularly during spring freshets that occur in the river between May and July. The estimated volume of sand in a single large sand wave can be in the range of between 100,000-200,000 cy (Coast and Harbor 2015). Aquatic species that use this reach of the river are accustomed to these recurring benthic habitat disturbances. No compensatory mitigation is proposed for temporary effects to benthic habitats associated with berth dredging.

Table 1. Aquatic Impacts Summary

Shoreline Location Description	Area of Over-Water Coverage		Number of Piles			Area of Pile Footprint (sf)
	Solid (sf)	Grated (sf)	24-inch Concrete	12-inch Steel	18-inch Steel	
Shallow Water (USACE OHWM elevation [11.6 CRD] to 20 feet below USACE OHWM)						
Access Trestle	10,925	N/A	52	-	-	173
Subtotal	10,925	N/A	52	-	-	173
Deep Water (deeper than 20 feet below USACE OHWM)						
Access Trestle	1,450	N/A	9	-	-	30
Transition Platform	5,400	N/A	41	-	-	136
Berth Trestle	13,470	N/A	58	-	-	192
Turning Platform	11,648	N/A	68	-	-	225
Fender System	N/A	N/A	-	12	-	11
Breasting Dolphins (2)	450	N/A	14	-	-	46
Mooring Dolphins (4)	800	N/A	48	-	-	159
Grated walkways	N/A	1,588	-	-	4	7
Subtotal	34,018	1,588	290	12	4	806
10% Contingency for Concrete Piles*	N/A	N/A	30	N/A	N/A	100
Total In-/Over- Water	44,943	1,588	320	12	4	1,079

*pile layout is conceptual. A 10 percent contingency has been included (for concrete piles) for purposes of permitting review.

3.2.2 Terrestrial Habitat Impacts

This section describes the unavoidable impacts to terrestrial habitats associated with the project.

3.2.2.1 Riparian Habitat Area Impacts

Cowlitz County has established riparian habitat areas (RHAs) adjacent to certain rivers and streams, and regulates these RHAs as critical areas under the County's critical areas ordinance (Cowlitz County Code [CCC] 19.15).

RHAs are established for habitats that include terrestrial and aquatic ecosystems that influence or benefit each other and are located adjacent to rivers or perennial or intermittent streams (Section 19.15.130.E.3). The Columbia River is classified as a Type S Water of the State, and the ordinance provides it with a 150-foot RHA buffer (measured from the OHWM). Within this RHA are an inner and outer zone, each 75 feet in width.

The ordinance, however, also states: "where an existing natural or manmade barrier isolates a riparian area, that area is not within any 100-year floodplain, and a qualified professional demonstrates that the isolated area does not provide shade, fine or large woody material, nutrients, organic and inorganic debris, terrestrial insects, or habitat for riparian-associated wildlife, the standard RHA widths may not apply at the discretion of the Director."

The entirety of the site is located where dredge material has been placed through previously permitted activities. A public access road isolates the site from the wetlands and riparian habitats to its north. Similarly, the toe of the dredge material along the shoreline isolates the site from the Columbia River and shoreline habitat. However, a portion of the project will be conducted on portions of this former dredge material placement area that are below the 100-year floodplain. For this reason, these portions of the site that are below the 100-year floodplain and also within 150 feet of the OHWM will still be subject to RHAs. In portions of the site where historic dredge material placement has elevated the site above the 100-year floodplain, the RHA and shoreline buffers do not extend onto the site beyond the existing toe of the dredge placement prism and public access road (Figure 6).

In total, the project will result in direct permanent impacts to approximately 33,627 square feet (0.77 acre) of RHA buffer. This includes approximately 2,425 sf (0.06 acre) associated with the construction of the dock trestle, approximately 27,874 sf (0.64 acre) associated with the construction of the improved recreational access, and approximately 3,328 sf (0.08 acre) associated with an infiltration pond at the north end of the site.

3.2.2.2 Potentially Suitable Streaked Horned Lark Habitat Impacts

Streaked horned lark (*Eremophila strigata var. strigata*) is listed as a threatened species under the Endangered Species Act (ESA). Streaked horned lark are known to utilize

sparsely vegetated sandy habitats adjacent to the Columbia River and has been documented on portions of the project site.

Most of the site is not suitable nesting habitat for streaked horned lark. At the eastern portion of the site, there is an area of herbaceous vegetation where groundcover is approximately 95-100 percent, with a mix of moss, grasses, and forbs and scattered Scotch broom. There are no areas of bare sand, and the vegetation is too dense in this location to provide suitable nesting habitat for streaked horned lark. The south central portion of the site consists of dredge material (sand) that is under active Port use and management. Because the sand in this area is maintained as structural fill and moved frequently, it is essentially devoid of vegetation and is not suitable nesting habitat for streaked horned lark. The southwest section of the site is only slightly more diverse—while the vegetated areas are dense with moss, grasses, and herbaceous vegetation, there are several roads and parking areas in the southwest section. A few small and isolated areas could possess soil and vegetation conditions that could provide streaked horned lark habitat, but habitat suitability is limited here.

The portions of the project site that are currently potentially suitable for streaked horned lark nesting are located in the northern section of the site, on an area of dredge material that was placed as part of the USACE Columbia River Navigation Channel project. Deposition of dredged material began at this portion of the site in approximately 1978, with the most recent placement occurring in 2008 (US Army Corps of Engineers 2014).

The USACE recently conducted a Section 7 ESA consultation for dredging associated with the maintenance of the Columbia River navigation channel. In its biological assessment as part of this consultation, the USACE used normalized difference vegetation index (NDVI) data to analyze the extent of suitable nesting habitat throughout the lower river. This recently developed methodology has been employed by the Center for Natural Lands Management for the USFWS throughout the lower Columbia River (Anderson 2013 *in* US Army Corps of Engineers 2014).

According to this analysis, when site preparation and the placement of dredged materials removes or buries all vegetation in the placement footprint, habitat in the placement footprint is then considered yet-to-be suitable because the area is devoid of all vegetation (>90 percent bare sand). If left undisturbed, these areas are assumed to transition into suitable streaked horned lark nesting habitat conditions after sufficient time has elapsed for vegetation to become established following placement. Once areas have developed into suitable habitat, it is further assumed they will remain suitable for a given number of years, based on the amount of time it takes for vegetation to grow and exceed 50 percent cover (US Army Corps of Engineers 2014). According to the analysis, the USACE expects the North Port site to remain as suitable habitat for larks only through the end of the 2015 nesting season, after which time it will be "unsuitable" habitat due to vegetation succession (US Army Corps of Engineers 2014). This was confirmed by the USFWS in its biological opinion (US Fish and Wildlife Service 2014). Because the site has already progressed through the steps of developing into and out of

a suitable habitat condition, the site has already functioned in the mosaic approach that the USFWS advocates. Further, when existing habitat on the site becomes non-habitat, it is assumed that birds will disperse to favorable nesting conditions on nearby Howard Island or Sandy Island, where suitable habitat will be available in 2016 and 2017 (US Army Corps of Engineers 2014, US Fish and Wildlife Service 2014). The USACE is removing vegetation at Howard Island (which is 0.5 mile directly downstream of the project site, so this area will be suitable for the larks in 2016. Lower Deer Island (within 3.5 miles) is also being cleared and will be suitable. This island is next to Sandy Island, approximately 3 miles south of the Project site that was designated critical habitat by USFWS (US Fish and Wildlife Service 2013). These islands, including Sandy Island, will provide sufficient suitable habitat in the area. This assumption is a key component to the "network" approach to provide habitat available to streaked horned larks discussed in the USACE's *Biological Assessment for the Continued Operations and Maintenance Dredging Program for the Columbia River Federal Navigation Channel* (US Army Corps of Engineers 2014), and associated USFWS biological opinion (US Fish and Wildlife Service 2014).

The USFWS stated a concern during early project discussions that the project would result in the removal of the site from the USACE dredge material placement network, thereby eliminating the potential for the site to become suitable habitat at some point in the future. However, the North Port site would inevitably be removed from the network while the site was unsuitable, regardless of this project, and it is not in a location that is well suited for use as a USACE placement site for channel maintenance; as a result, the USACE does not have a foreseeable need to place material at the North Port site and anticipated that the site would fall out of the network. As of February 27, 2015, the site had been removed from the USACE dredge material placement network (personal communication from Tabitha Reeder, email from Joseph Dasso, US Army Corps of Engineers, dated February 27, 2015).

The Port has an existing project cooperation agreement with the USACE to provide upland placement capacity for the USACE channel maintenance program when additional capacity is requested. Such a site is likely to be better suited to the USACE's dredging and placement needs, and therefore more likely to receive regular placement of material. The net result is that there will be no net loss of suitable lark habitat as a result of removing the North Port site from the network of USACE dredge placement sites. Removing this site from the network will not result in a reduction in available habitat for the streaked horned lark because the site will no longer provide suitable habitat after 2015, and the USACE dredging program has already resulted in a net increase in available streaked horned lark habitat using the current agreement methodology, as described above.

As the USFWS concluded in its biological opinion on the USACE program for dredging associated with the maintenance of the Columbia River Navigation Channel, the USACE project:

> *…will maintain a shifting mosaic of suitable habitat for the streaked horned lark along the lower Columbia River. This pattern is likely consistent with the natural processes and habitat patterns that supported the streaked horned lark before the Columbia River was dammed or dredged. This intentional use of dredge material placement as a means of creating and maintaining target amounts of suitable habitat for the streaked horned lark, together with the presumed reduction in the level of direct lethal and sublethal effects as a result of "mindful" placement of dredged material is likely to maintain, and may even increase, the population of larks in the action area.* (US Fish and Wildlife Service 2014)

Furthermore, the USFWS states that the 5-year operations plan will maintain adequate habitat area to support at least the current population of the streaked horned lark on sites in the USACE network. The USACE biological assessment states:

> *[f]ollowing placement activities in 2015, the acreage of suitable habitat available increases in 2016, 2017, and 2018 across the Network. Dredged material placement and/or habitat succession results in an increase of 24 acres (+10%) of suitable nesting habitat during the 2016 breeding season as compared to 2015, for a total of 265 acres available in 2016. Dredged material placement and/or habitat succession results in an increase of 209 acres (+79%) of suitable habitat during the 2017 breeding season, as compared to 2016, for a total of 474 acres in 2017. Dredged material placement and/or habitat succession results in an increase of 169 acres (+36%) of suitable habitat during the 2018 breeding season, for a total of 643 acres of suitable habitat available across the Network in 2018.* (US Army Corps of Engineers 2014)

For these reasons, no compensatory mitigation is proposed to offset impacts to this unsuitable habitat. The project will not affect any suitable lark nesting habitat or designated critical habitat, and will not result in a net removal of lark habitat from the USACE network. The project has incorporated several best management practices (BMPs) to avoid direct impacts to streaked horned larks that could potentially be nesting at the site during site preparation and construction. The Applicant proposes to conduct initial site preparation activities (clearing and grading) within potentially suitable streaked horned lark nesting habitat outside of the nesting season, consistent with the site preparation impact minimization measures described in the USACE's *Biological Assessment for the Continued Operations and Maintenance Dredging Program for the Columbia River Federal Navigation Channel* (US Army Corps of Engineers 2014) and the associated USFWS biological opinion (US Fish and Wildlife Service 2014).

3.3 Mitigation Strategy

Without supplemental mitigation, project activities could affect the suitability of aquatic habitat function within the action area by increasing the quantity of nearshore overwater shading and by reducing the quantity and quality of benthic habitats. The Applicant therefore has incorporated mitigation activities as part of the proposed action. The Applicant proposes three categories of activity: 1) pile removal; 2) ELJ installation; and 3) riparian habitat restoration and wetland buffer enhancement.

3.3.1 Pile Removal

The Applicant will remove portions of two rows of existing timber piles now located in the freshwater intertidal backwater channel portion of the project site on Port property. One of these timber pile structures (the interior structure) is a USACE-owned pile dike. USACE indicated that these piles are likely untreated (personal communication between Tabitha Reeder, Port of Kalama, and Jessica Stokke, USACE on August 18, 2015). The downstream structure is a former trestle, and these piles may be treated with creosote. Piles are estimated to range between 12 and 14 inches in diameter at the mudline. A total of approximately 320 piles will be removed from the two structures (Figure 12).

The removal of these piles will restore a minimum of 251 square feet of benthic habitat, within an area approximately 0.73 acre in size. These pile structures, in their current configuration, affect the movement of water and sediment into and out of approximately 13 acres of this backwater area. The removal of the piles will facilitate sediment transport and seasonal flushing of this backwater area. The backwater wetland is currently accreting sediment, and removal of the piles will both improve water quality and also help to maintain this area as an off-channel refuge for juvenile salmonids in the long term.

The interior pile structure would only be partially removed, per a recommendation by WDFW, to allow for some of the untreated piles to remain as vertical structure, while still providing for the sediment transport and associated water quality and habitat improvement benefits. Pile removals will provide both in-kind mitigation for benthic habitat impacts associated with new piling, as well as out-of-kind habitat mitigation in the form of sediment transport and water quality habitat improvement.

3.3.2 Engineered Log Jam Installation

In addition to the proposed pile removals, the Applicant will install eight ELJs along the nearshore habitat along the Columbia River shoreline adjacent to the site. ELJs are a restoration and mitigation method that helps build high quality fish habitat, develops scour pools, and provides complex cover (Cramer 2012).

Each ELJ will measure approximately 20 x 20 feet and be composed of large-diameter untreated logs, logs with rootwads attached, small wood debris, and boulders. Logs generally will have a minimum diameter of 12 inches and be 20 feet long. They will be anchored to untreated wood piles driven a minimum of 20 feet into the stream bed and will be fastened to the piles by drilling holes in the wood and inserting 1-inch through-bolts for attaching chains to secure the wood to the piles. The logs that comprise the structure will be further bolted together to create a complex crib structure with 2- to 3-inch interstitial spaces. These spaces may be filled with smaller wood debris and/or boulders to enhance structural complexity and capture free-floating wood from the Columbia River.

These large wood structures will increase complex in-stream and overhead cover with interstitial spaces that will allow juvenile and adult salmonids to evade predation by

marine mammals, birds, and fish. Each ELJ will be a minimum of approximately 400 square feet in size, and the six structures will represent a total of 3,200 square feet of new large woody material, installed along approximately 800 linear feet of Columbia River shoreline. The log jams will provide refuge and foraging opportunities for outmigrating juvenile salmonids. ELJs will provide high quality out of kind mitigation for impacts associated with new overwater cover as well as additional mitigation for benthic impacts of proposed pile footprints.

ELJs are a commonly employed restoration technique on the Lower Columbia River and elsewhere to improve nearshore aquatic habitat function and complexity. A recently permitted project for a new spud barge approximately 8 miles upstream of the project site installed 4 similar ELJ structures as compensatory mitigation. The four structures were installed to offset approximately 160,000 sf of new overwater coverage (a ratio of one structure to 40,000 sf of new overwater coverage). The 8 ELJs proposed for this project will offset overwater coverage at a ratio of one structure to approximately 5,618 sf of overwater coverage.

3.3.3 Riparian Restoration and Wetland Buffer Enhancement

To further enhance riparian and shoreline habitat at the project site, the Applicant also proposes to conduct riparian enhancement and invasive species management within an area approximately 1.41 acres in size along the Columbia River shoreline at the site. Similarly, the Applicant proposes to enhance approximately 0.58 acres of wetland buffer at the north end of the site to offset unavoidable wetland buffer impacts. The riparian and wetland buffer habitats will be enhanced by removing invasive species and installing native trees and shrubs that are common to this reach of the Columbia River shoreline and adjacent wetlands. These improvements, in conjunction with the proposed ELJs, will also serve to naturally stabilize the bank and protect the adjacent beach form erosion. The restoration site will be monitored and maintained for 5 years to document proper site establishment.

Native plantings proposed for the riparian restoration and wetland buffer enhancement sites include black cottonwood and a mix of native willow species including Columbia River willow (*Salix fluviatilis*), Pacific willow (*Salix lasiandra*), and Sitka willow (*Salix sitchensis*). These species are common to the sandy riparian habitats in this reach of the river and adjacent wetland buffer habitats. Plants will be installed as cuttings (6-foot whips) or bare-root stock to promote the establishment of deep root systems, as a means of combatting dry summer conditions and potential herbivory by native wildlife species including beaver, which are active in this reach of the river.

Table 2 below identifies the planting plan for the riparian restoration and wetland buffer enhancements. The portion of the riparian enhancement site further from the dock (Plant Community A) will be planted with both trees and shrubs, whereas the portion of the site closest to the dock (Plant Community B) will be planted only with shrubs for security, visibility, and safety.

Table 2. Planting Plan

Species	Plant Form	Min. Height at Planting	Recommended Spacing	Required Number
Plant Community A				
Black cottonwood (*Populus balsamifera*	Bare root or 3/4-inch diameter live stake	36 inches	10 feet on center	350
Columbia River willow (*Salix fluviatillis*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	250
Pacific willow (*Salix lasiandra*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	250
Sitka willow (*Salix sitchensis*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	250
			Subtotal	1,100
Plant Community B				
Columbia River willow (*Salix fluviatillis*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	500
Pacific willow (*Salix lasiandra*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	500
Sitka willow (*Salix sitchensis*)	Bare root or 3/4-inch diameter live stake	36 inches	5 feet on center	500
			Subtotal	1,500
Plant Community C				
Black cottonwood (*Populus balsamifera)*	Bare root or 3/4-inch diameter live stake	36 inches	10 feet on center	150
			Subtotal	150
			Total	2,750

Invasive species management at the sites would target locally common and aggressive invasive weed species, primarily Scotch broom and Himalayan blackberry. Weeds would be controlled by annual manual removal (hand pulling, cutting, and/or mowing). Appropriate herbicide treatments may also be applied if determined necessary by the Applicant. The invasive species management strategy would be an informal and evolving program, with the intent of limiting the spread of invasive species at the sites. The details of the management program, including target species, frequency of removal activities, and specific treatments, would likely change and evolve over time as the sites are managed. The invasive species management that is proposed would limit the spread of these aggressive species, allowing native species assemblages to develop and thrive at the sites, thereby enhancing the existing riparian and wetland buffer environments.

The proposed riparian restoration would result in both terrestrial and aquatic habitat improvements by providing a biologically productive riparian habitat that would serve as a source of insect and invertebrate fauna, leaf litter, detritus, and woody debris to the aquatic system. The riparian enhancements would also provide natural streambank stability, minimizing bank erosion and sedimentation. The establishment of native vegetation would improve habitat suitability for native birds and other terrestrial species that rely on these riparian habitats.

Riparian restoration activities will provide both in-kind mitigation (for riparian buffer impacts) as well as out-of-kind habitat enhancements to nearshore aquatic habitat (for new overwater structure and benthic habitat impacts).

The proposed wetland buffer plantings and invasive species management will enhance the condition of the wetland buffer to offset wetland buffer impacts associated with the proposed recreation access improvements. The proposed plantings will replace native vegetation that is impacted as a result of the project, and will help establish a forest canopy where none currently exists. The proposed invasive species management will improve the habitat conditions within the buffer, and minimize the spread of aggressive species that could otherwise affect the quality of the adjacent wetland. The wetland buffer enhancements will provide direct on-site in-kind mitigation for wetland buffer impacts associated with the proposed recreation access improvements.

4.0 SITE SELECTION FACTORS AND JUSTIFICATION

In selecting the proposed mitigation activities and locations, the following documents were used as references.

- Compensatory Mitigation for Losses of Aquatic Resources Final Rule (33 CFR Parts 332) (US Army Corps of Engineers 2008)
- Wetland Mitigation in Washington State – Part 1 Agency Policies and Guidance and Part 2: Developing Mitigation Plans (Version 1) (Washington State Department of Ecology 2006)
- Selecting Mitigation Sites Using a Watershed Approach (Washington State Department of Ecology 2009)

Section 323.3 (b) of the USACE final mitigation rule (US Army Corps of Engineers 2008) prioritizes the use of mitigation bank credits, or in lieu fee program credits, when available. There are currently no established mitigation banks or approved in-lieu fee mitigation programs in place with credits available to address the aquatic and terrestrial habitat impacts that will result from this project. In instances where mitigation bank credits or in lieu fee program credits are not available, the final rule recommends permittee-responsible mitigation using a watershed approach, as the preferred approach. The Lower Columbia Fish Recovery Board (LCFRB) has published a watershed plan for the Lower Columbia River mainstem, which includes the waters of the Lower Columbia River where this project will occur (Lower Columbia Fish Recovery Board 2010a, 2010b). The mitigation actions proposed in this plan have been developed consistent with the LCFRB watershed plan, and consistent with the watershed approach guidance described in the final mitigation rule.

The proposed mitigation includes a combination of on-site, in-kind replacement of impacted aquatic habitat functions (pile removal), and on-site, out-of-kind enhancements to nearshore and riparian habitats at the site. All of the proposed mitigation activities that are proposed will be conducted within and adjacent to waters

of the Columbia River in the vicinity of the project activities, and will directly benefit the aquatic, riparian, and adjacent wetland habitats where project activities are being conducted.

The piles proposed for removal are old timber structures, representing approximately 251 square feet of existing benthic habitat impact. The locations of these piles in the adjacent backwater habitat are proximal to the areas where benthic habitat impacts associated with the project will occur. As such, the proposed pile removal activities at these locations will benefit aquatic habitat conditions in the vicinity of the project site directly. The removal of these piles will restore benthic habitat in the backwater and improve hydraulics and sediment transport within approximately 13 acres of backwater habitat, thereby enhancing fish access within an important area of backwater habitat that provides refugia for outmigrating and wintering juvenile salmonids. The pile removals will offset the shallow water benthic habitat impacts at a ratio of greater than 1:1. Additionally, the ratio of piles removed to newly installed piles will be 1:1. The supplemental habitat improvements in the backwater wetland will provide additional out-of-kind mitigation for habitat impacts associated with new overwater structures.

The ELJs installed along the shoreline will increase aquatic habitat complexity with interstitial spaces that will allow juvenile and adult salmonids to evade predation. Each ELJ will be a minimum of approximately 400 square feet in size, and the six structures will represent a total of 3,200 square feet of new large woody material, installed along approximately 800 linear feet of Columbia River shoreline. The log jams will provide refuge and foraging opportunities for juvenile and adult salmon, particularly for small outmigrant fish moving downstream during the spring and early summer peak of outmigration activity. ELJs, in conjunction with proposed riparian plantings, will also provide a natural form of bank stabilization and will protect adjacent beaches from erosion. ELJs will provide high quality out of kind mitigation for impacts associated with new overwater cover as well as additional mitigation for benthic impacts of proposed pile footprints.

ELJs are a commonly employed restoration technique on the Lower Columbia River and elsewhere to improve nearshore aquatic habitat function and complexity. A recently permitted project for a new spud barge approximately 8 miles upstream of the project site installed 4 similar ELJ structures as compensatory mitigation. The four structures were installed to offset approximately 160,000 sf of new overwater coverage (a ratio of one structure to 40,000 sf of new overwater coverage). The 8 ELJs proposed for this project will offset overwater coverage at a ratio of one structure to approximately 5,618 sf of overwater coverage.

The proposed 1.41 acres of riparian restoration activities will restore a more highly functioning riparian condition, which in turn will improve aquatic and riparian habitat function at the site by providing a natural source of leaf litter and woody debris and insect and invertebrate fauna. These improvements, in conjunction with the proposed ELJs, will also serve to naturally stabilize the bank and protect the adjacent beach form

erosion. Riparian restoration activities will offset the 0.77 acre of RHA impact associated with the project at an acreage ratio of nearly 2:1. The proposed restoration will also result in a higher functioning riparian buffer than the portions of riparian buffer that will be impacted, and will also serve as supplemental out of kind mitigation for overwater structure and benthic habitat impacts.

The proposed 0.58 acre of wetland buffer enhancement will offset the 0.09 acre of wetland buffer impact at a ratio of greater than 6:1. Wetland buffer enhancement will replace native vegetation that is impacted as a result of the proposed recreation access improvements, and will help establish a forest canopy where none currently exists. The proposed invasive species management will improve the habitat conditions within the buffer, and minimize the spread of aggressive species that could otherwise affect the quality of the adjacent wetland.

5.0 GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

The overall goal of the proposed mitigation plan is to offset the impacts to aquatic habitat functions that could result from the proposed project. This section identifies the site-specific goals, objectives, and performance standards that are included to achieve the overall goal of the plan. Goals define what the project is trying to accomplish. Objectives define the specific project elements that are being undertaken to achieve the goals. Performance standards are measurable and performance-based criteria for determining whether goals and objectives are being achieved.

5.1 Site-Specific Goals

The functions most likely to be affected by the project (and to benefit from proposed mitigation) are benthic primary and secondary productivity, nearshore fish habitat function, and riparian habitat function. All of these functions are currently impaired to some extent by existing piles in the adjacent backwater, historic dredge material placement, and a relative lack of in-stream and native riparian vegetation.

The proposed project activities have the potential to result in further incremental impairment of these functions due to creation of new overwater shading associated with the new terminal, new benthic habitat impacts associated with new piling footprints, temporary benthic habitat impacts associated with dredging for the expanded berth, and impacts to a small amount of riparian habitat associated with construction of the dock trestle.

In order to offset the incremental impacts to benthic primary and secondary productivity, nearshore fish habitat function, and riparian habitat function, the following site-specific goals have been established for this mitigation plan.

- Restore benthic habitat and improve hydraulics and sediment transport in the adjacent Columbia River backwater (by removing piles).
- Enhance nearshore aquatic habitat complexity and nearshore fish habitat function through habitat improvements (by installing eight ELJ structures along the shoreline of the Columbia River adjacent to the site).

- Enhance riparian habitat function and condition (by implementing a riparian restoration plan along the shoreline of the Columbia River adjacent to the site).
- Enhance wetland buffer function and condition (by implementing a wetland buffer enhancement plan in wetland buffer adjacent to the site).

5.2 Objectives

The specific objectives of the mitigation are as follows:

- Restore approximately 251 square feet of benthic habitat by the removal of approximately 320 piles associated with portions of two existing pile structures located in the adjacent Columbia River backwater
- Install eight ELJs along the shoreline of the Columbia River adjacent to the site.
- Enhance approximately 1.41 acres of riparian habitat along the shoreline of the Columbia River adjacent to the site, and approximately 0.58 acres of wetland buffer by installing native plantings and implementing an invasive species management program.

5.3 Performance Standards

The performance standard for these mitigation actions will consist of documenting completion of the proposed mitigation activities, monitoring the success and development of the mitigation, and providing long-term protection for the restoration site. The following performance standards have been established for this mitigation.

- **Performance Standard 1:** Install eight ELJs as described above. The structures will be installed prior to or concurrent with the construction of the new terminal.
- **Performance Standard 2:** Remove portions of two pile structures (approximately 320 piles total) in the adjacent Columbia River backwater as described previously in this document. The piles will be removed prior to or concurrent with construction of the new terminal.
- **Performance Standard 3:** Implement a 5-year invasive species management program to remove invasive species, primarily Scotch broom and Himalayan blackberry, within an area approximately 1.41 acres in size along the Columbia River shoreline at the site, and in an area 0.58 acre in size adjacent to the north end of the project site. Initial removal will be conducted prior to or concurrent with construction of the new terminal.
- **Performance Standard 4:** Install approximately 350 black cottonwoods, 750 Columbia River willows, 750 Pacific willows, and 750 Sitka willows within an area approximately 1.41 acres in size along the Columbia River shoreline at the site. Additionally, install approximately 150 black cottonwoods in a portion of the wetland buffer approximately 0.58 acre in size adjacent to the north end of the project site. Plantings will be installed prior to or concurrent with construction of the new terminal.
- **Performance Standard 5:** Monitor the restoration site, wetland buffer enhancement site, and ELJs for 5 years to evaluate site development.

Table 3 identifies the vegetation-specific performance standards for the 5-year monitoring period.

Table 3. Performance Standards

As-Built Monitoring	All plants must be present and viable.
Years 1–3 Monitoring	80% of the planted trees, shrubs, herbs, or appropriate volunteers must be present and viable. Replant species to 100%. Invasive species will not represent more than 20% cover at the site.
Years 4-5 Monitoring	80% of the planted trees, shrubs, herbs, or appropriate volunteers must be present and viable. Invasive species will not represent more than 20% cover at the site.

An as-built report will be prepared and submitted to Cowlitz County, WDFW, and the USACE within 2 months of the completion of mitigation installation.

6.0 MITIGATION WORK PLAN

The proposed mitigation activities would be conducted either prior to, or concurrently with, the construction of the marine terminal to avoid any temporal loss of aquatic habitat function.

Proposed in-water work will be conducted only during the in-water work window that is ultimately approved for this project. The currently published in-water work window for this reach of the Columbia River is 1 November–28 February. However, regulatory agencies, including the USACE, WDFW, USFW, and NMFS, recently suggested making modifications to the window to take into account the best available science and to address newly listed species. The following work windows are proposed for this project, as explained further below:

- Pile installation will be conducted between 1 September and 31 January
- Dredging will be conducted between 1 August and 31 December
- ELJ installation will be conducted between 1 August and 31 December
- Pile removal may be conducted year-round
- Work conducted below the OHWM, but outside the wetted perimeter of the river (in the dry), may be conducted year-round

These work windows are necessary to accommodate the construction schedule, while simultaneously being cognizant of avoiding biologically sensitive time periods for given activities. One of the driving timing considerations is the need to conduct all or most berth dredging prior to pile installation. The proposed dredging window is designed to begin early enough in the season to allow pile driving activities to begin on schedule, while avoiding the bulk of the peak juvenile salmonid outmigration in the spring/summer, and the peak run timing for Pacific eulachon in the late winter/early

spring. An early pile installation window will minimize the need for pile installation to be extended into the late winter/early spring timeframe. The project proposes to use impact driven concrete structural piles (rather than steel), which are not known to result in injurious levels of underwater noise. For this reason, an early start to the pile installation window will not result in adverse effects to any fish or other aquatic species. ELJ installation could be conducted during late summer, fall, or early winter, to accommodate the range of times when Columbia River water levels could be low, to allow better access to the shoreline, and to minimize disturbance to the aquatic environment. Pile removal activities, and work conducted below the OHWM, but outside the wetted perimeter of the river (i.e., in the dry), are not expected to result in significant impacts to aquatic species or resources and, as such, these activities could be conducted year-round.

Construction crews and methods will be influenced by weather, timing, and available equipment as well as this timeframe.

The proposed project would be developed in one or two phases. The construction duration would be approximately 26 to 48 months depending on whether it is built in one or two phases. Construction is expected to begin in mid-2016 and be completed as early as mid-2018 and as late as mid-2020.

It is anticipated that pile driving will be completed over approximately 120 days (not necessarily consecutive) during the 2016–2017 and/or 2017/2018 in-water work windows. Ordinarily, work will be conducted during standard daylight working hours, roughly 8 to 10 hours a day.

Aquatic habitat mitigation construction activities will most likely be conducted using cranes and similar equipment operated from one or more barges temporarily located within the backwater area. Water depths are relatively shallow in the backwater area where pile removal will be conducted and, as a result, equipment access to this area may be limited. A small barge will most likely be floated in on a high tide, grounding out if necessary as waters recede.

Pile removal activities conducted as part of the aquatic habitat mitigation activities most likely will be conducted by directly pulling piles. If necessary, a vibratory hammer could also be used.

Construction of the ELJ structures will be conducted using small equipment operated from land. Anchor piling will be installed using either a vibratory hammer, or by pushing them directly into the substrate with crane-mounted equipment. Logs and debris most likely will be placed using a backhoe or similar land-based equipment.

Invasive species removal will be conducted within the riparian restoration area prior to plant installation. Invasive species, primarily Scotch broom and Himalayan blackberry, will be controlled by manual removal (hand pulling, cutting, and/or mowing)

throughout the site prior to plant installation. If deemed necessary, an appropriate herbicide treatment may also be proposed to limit regeneration.

After the completion of invasive species removal, mitigation plantings will be installed throughout the restoration site. No grading is proposed. Cuttings (6-foot whips) will be installed with a minimum of approximately half of the length of the cutting below the soil surface. An auger will likely be used to excavate holes for the cuttings. For bare-root stock, a hole, 1 foot in diameter and 1 foot deep, will be excavated. The holes should be large enough to accommodate the plant roots without restriction. Plants will be held in place with the top of the root mass at ground level. Topsoil will be backfilled around the roots and lightly tamped to remove any air pockets in the soil. Compost will be placed 3 inches deep around the newly planted trees and shrubs.

All plants will be harvested as live stakes from local sites and/or obtained as bare-root stock from nurseries specializing in native Pacific Northwest plant materials. Bare-root shrubs and trees and live stake cuttings will be planted between December 1 and March 31, when plants are dormant. If soils are not saturated at the time of planting, each plant should be watered at the time of planting. Irrigation could be provided by any number of methods, but will most likely be provided either by a temporary irrigation system or by a manual method (a water truck or similar).

BMPs, including appropriate spill control measures, will be implemented throughout the project to minimize the potential for any water quality impacts during construction. If a pile breaks during extraction, it will be cut off at mudline and/or pushed into the sediment and, if necessary, the hole will be filled with clean sand consistent with agency-approved BMPs. Removed piles, stubs, creosote-treated timber elements, and associated sediments (if any) will be temporarily stored and contained on a barge. If piles are placed directly on the barge and not in a container, the storage area will consist of a row of hay or straw bales, filter fabric, or similar material placed around the perimeter of the barge. All creosote-treated material, pile stubs, and associated sediments (if any) will be disposed of by the contractor in a landfill approved to accept those types of materials.

7.0 MONITORING, MAINTENANCE, AND SITE MANAGEMENT

A monitoring program will track the development, persistence, and vitality of the mitigation, including the persistence of the ELJ structures and the planted vegetation within the riparian mitigation site. Baseline conditions for monitoring will be established and included in the as-built monitoring report. This description will contain figures and written information on the riparian mitigation site as constructed, based on information collected during construction. The mitigation will be monitored annually in late May or June for a period of 5 years beginning in the first growing season following the installation of plants. The following tasks are included in mitigation monitoring activities.

- Completing an annual count of all viable woody plants, including desirable volunteer species. The count will include evaluating vegetation visually for stress

and general condition and recording plant species determined to be stressed or in poor condition.

- Evaluating the condition of the ELJ structures to determine whether maintenance is required. No formal fish monitoring will be conducted.
- Taking ground-level photographs from representative photo monitoring points. The photographs will be labeled and become part of the project's permanent monitoring record.
- Describing the development and status of the overall site vegetation and providing recommendations for site management, including, if necessary, contingency measures to address deficiencies.
- Submitting the report or memorandum to USACE, WDFW, Ecology, and the County annually for 5 years.

8.0 CONTINGENCY MEASURES

Contingency measures are corrective measures to be taken when monitoring indicates project goals are not being met. By nature, the proposed riparian enhancement plan is a long-term maintenance and adaptive management plan. The details of the management plan, including target species, frequency of removal activities, and specific treatments, may change and evolve over time as the site develops and is managed.

Contingency measures that could be implemented as part of this mitigation plan include those listed below.

8.1 Replacement Plantings

Replacement plantings will be made throughout the monitoring period to keep the site on track to satisfy the Year 5 performance standards for success. Vegetation survival will be evaluated during each annual monitoring period, and replacement planting recommendations will be provided in each annual monitoring report.

8.2 Plant Protection

Plant protection measures may be implemented if there is evidence of potential impact to planted stock from herbivory. Beavers are known to occasionally be present along the Columbia River shoreline in the vicinity, and could potentially affect the survival of planted species within the riparian restoration and/or wetland buffer enhancement sites. Specific measures could include individual plant protectors or temporary fencing of these areas to temporarily exclude beavers or other species while plantings become established.

8.3 Planting Plan Modifications

The planting plan (i.e., plant species, sizes, planting densities) may be modified if the results of annual monitoring identify problems with the original planting plan. For example, if annual monitoring attributes plant mortality to an inappropriate hydrologic regime, a recommendation may be provided to substitute an alternative native plant species that is better adapted to thrive in the conditions that are developing at the site.

Any recommended changes to the planting scheme will be documented in the annual monitoring report

8.4 Engineered Log Jam Maintenance

The function and condition of the ELJ structures will be evaluated during each annual monitoring report. If the results of annual monitoring indicate that one or more of the structures is not functioning to provide instream habitat, one or more components of the structure may be repaired or replaced, and these actions will be discussed in the annual report.

9.0 FINANCIAL ASSURANCES AND SITE PROTECTION

Port infrastructure represents a significant investment. The Port has a built-in incentive to conduct the mitigation actions described in this document, and further financial assurances (performance and/or maintenance bonds etc.) or site protections should not be necessary. No supplemental financial assurances or site protections (covenants, deed restrictions etc.) are proposed in this mitigation plan.

10.0 REFERENCES

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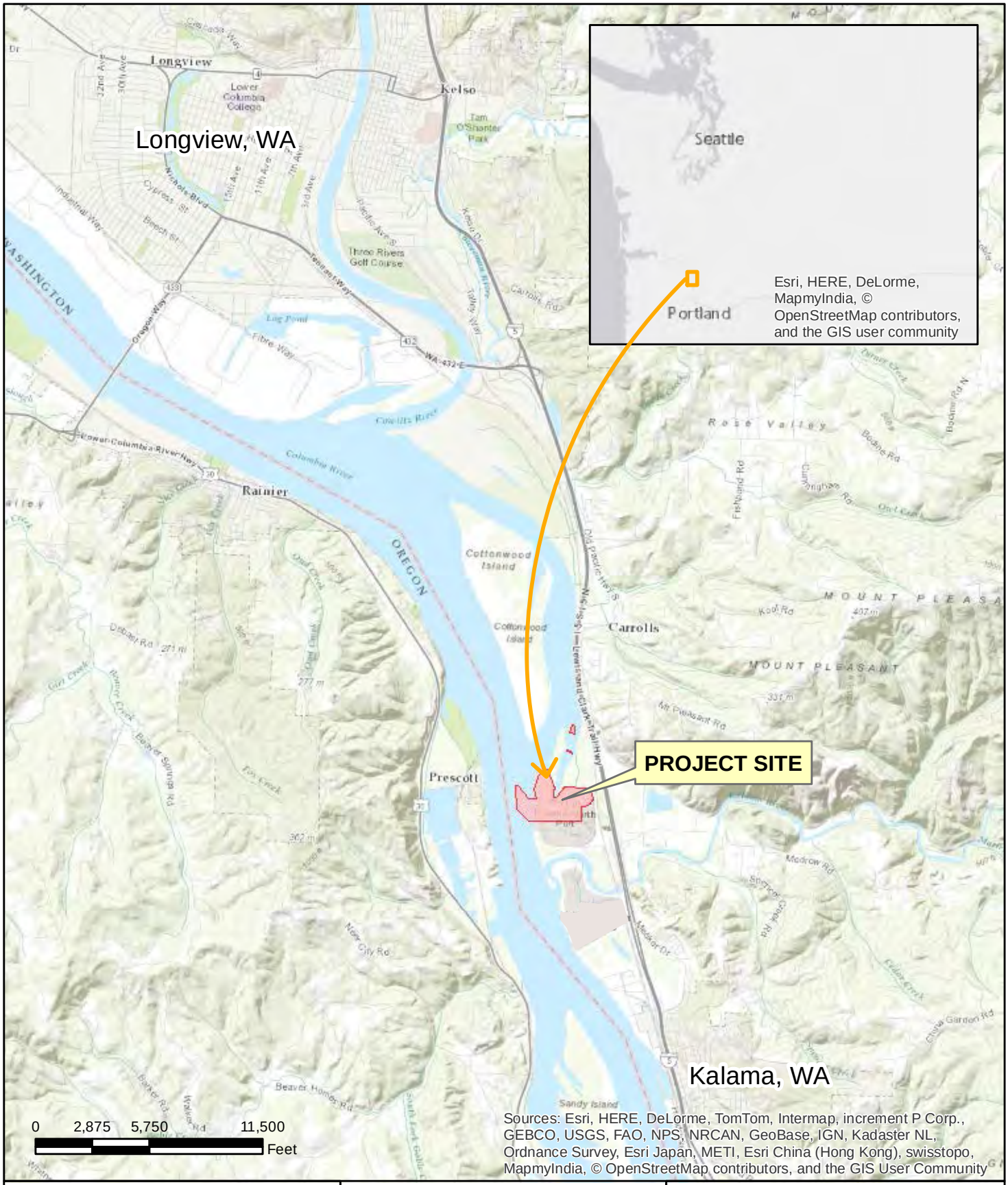
Appendix A
Figures



PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River
COUNTY OF: Cowlitz County
STATE OF: WA
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 1: VICINITY MAP

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, Wa. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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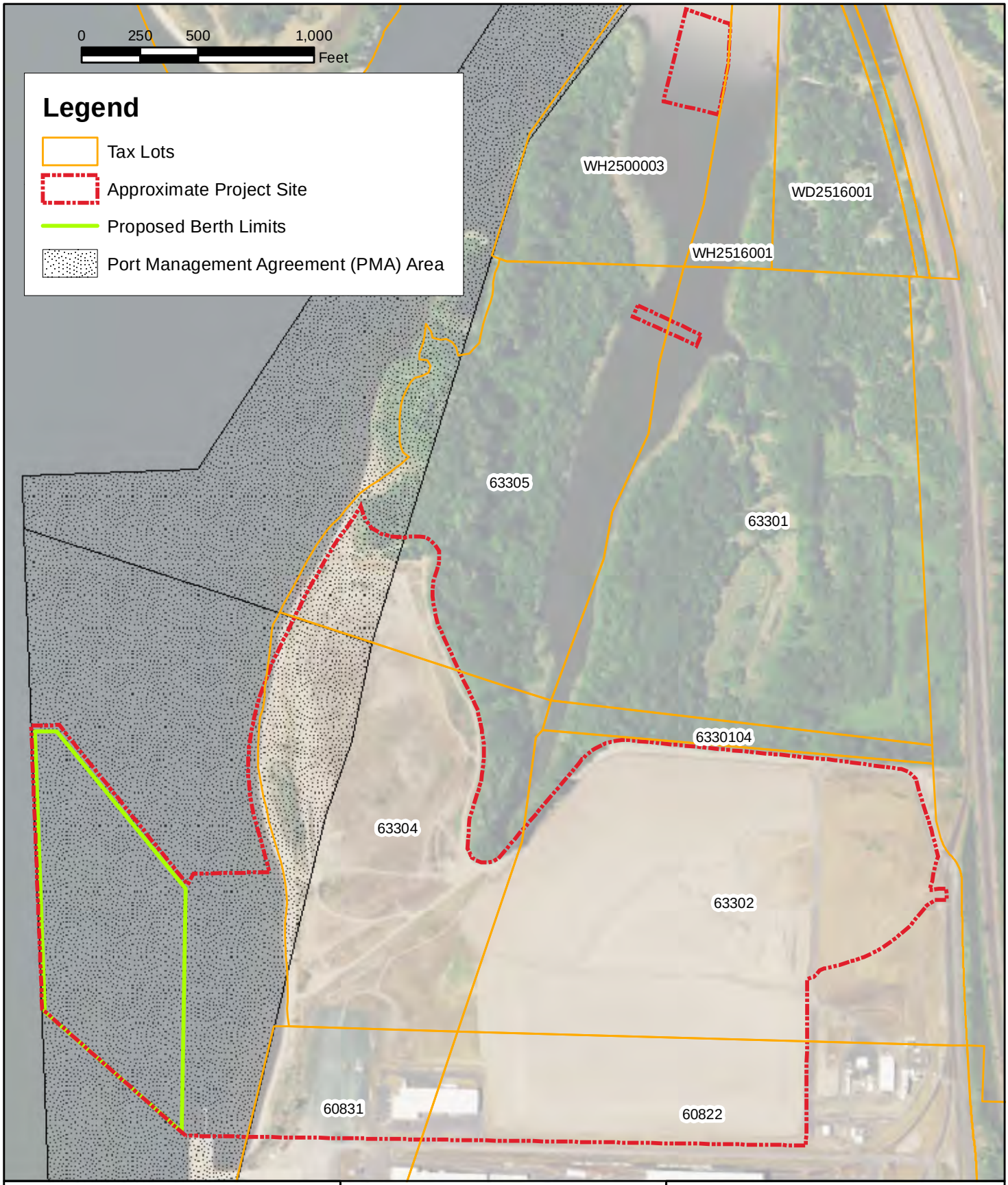

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River
COUNTY OF: Cowlitz County
STATE OF: WA
APPLICATION BY: PORT OF Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, WDFW, BNSF

FIGURE 2: PARCEL MAP

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, Wa. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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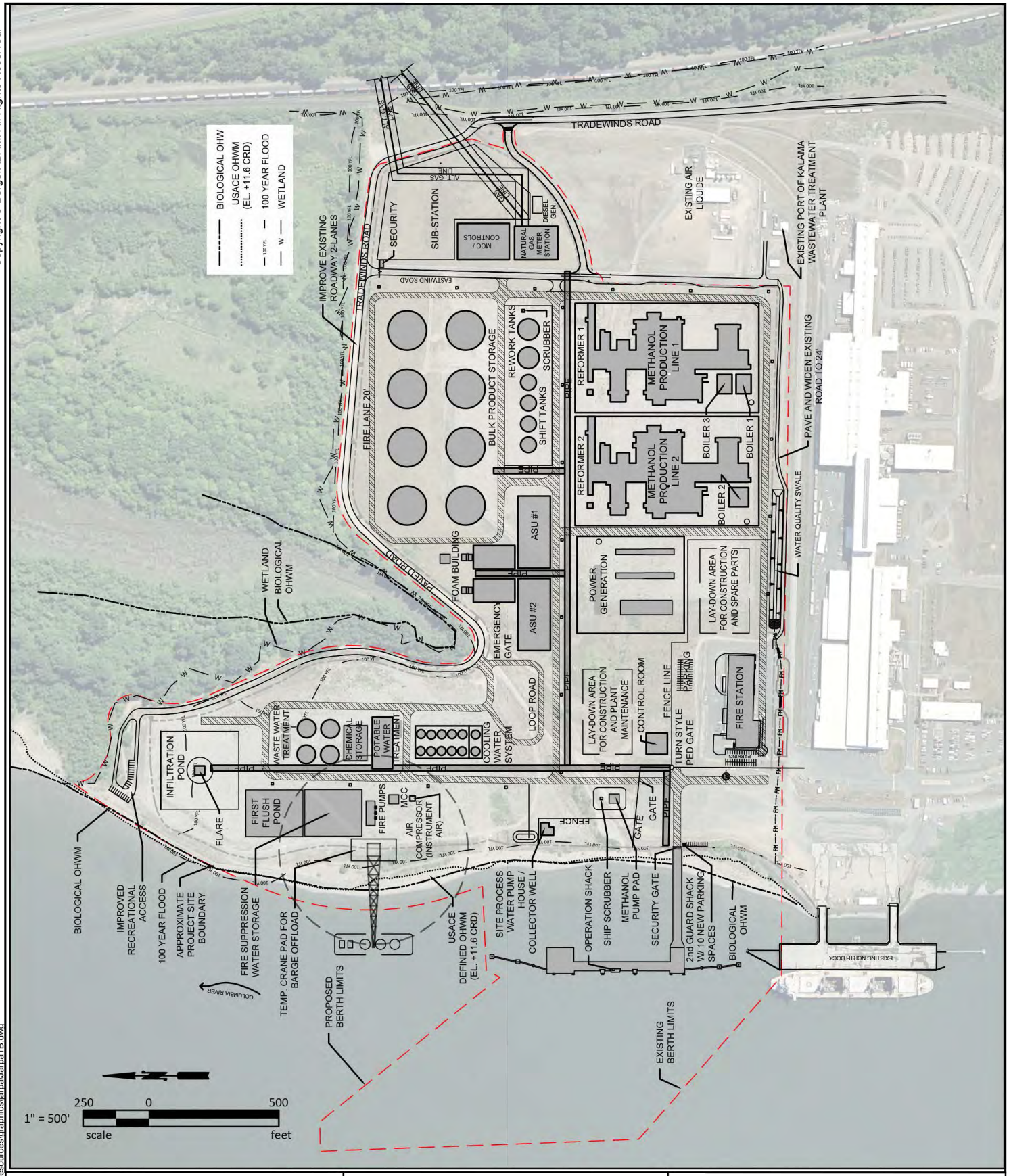

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 3: CONCEPTUAL SITE PLAN

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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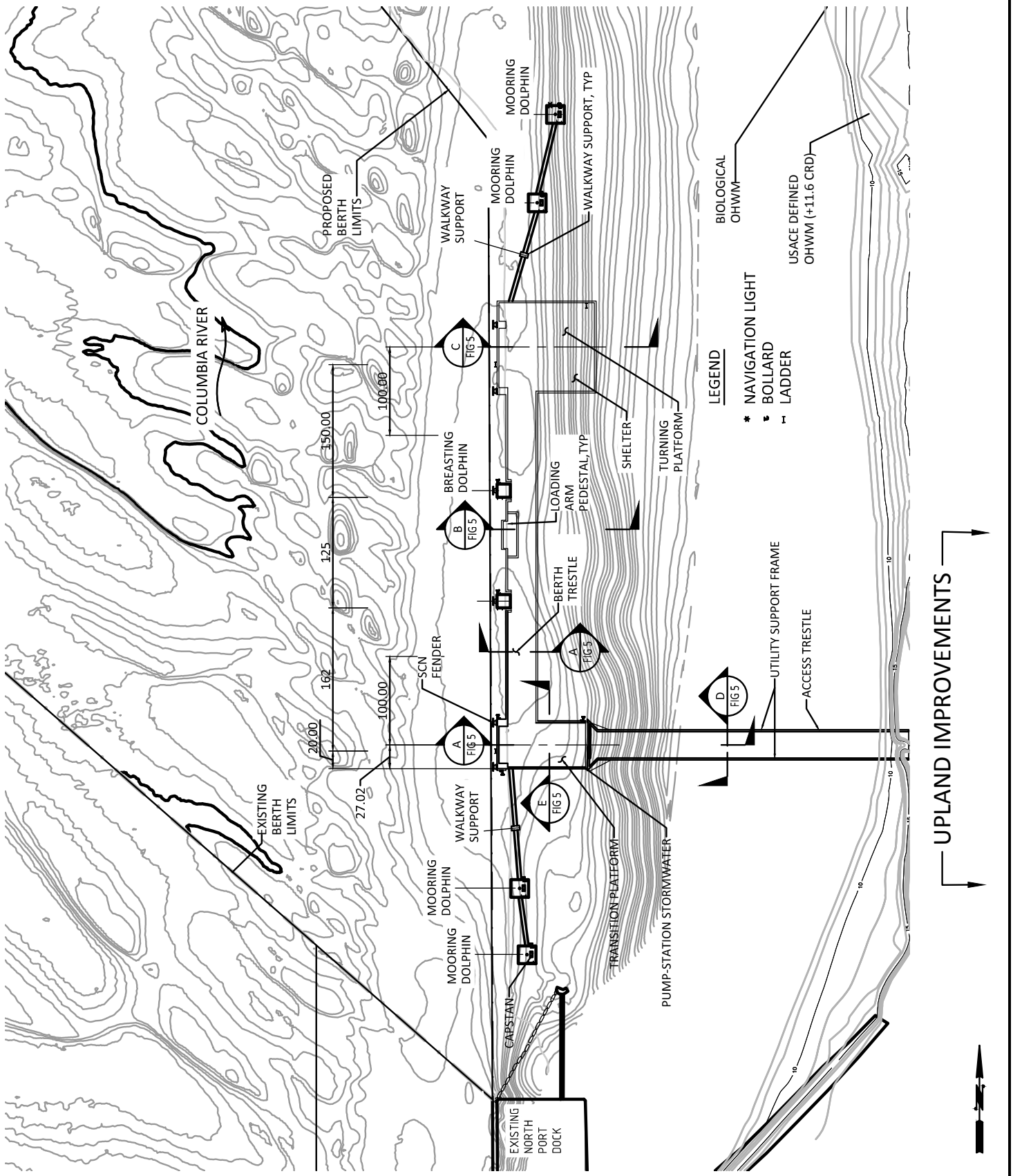

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 4: Marine Terminal Plan

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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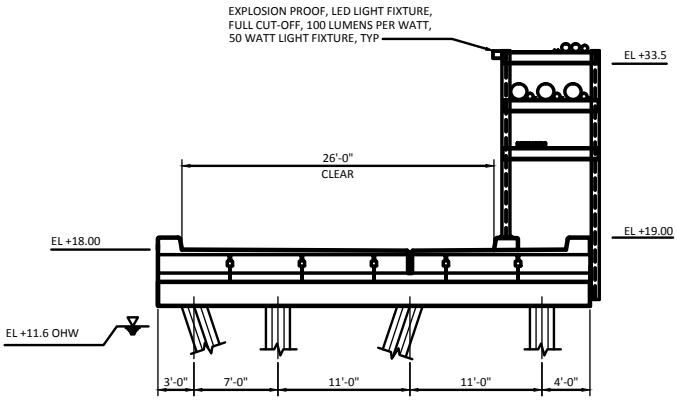
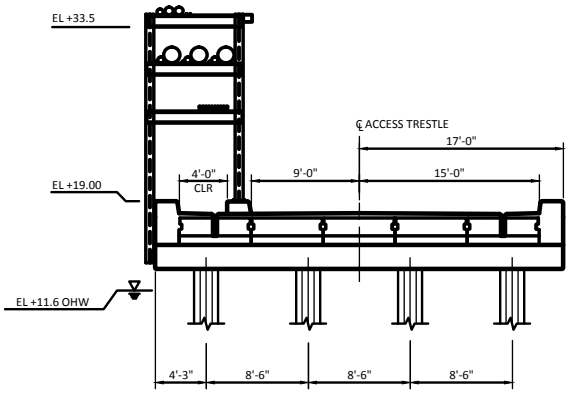
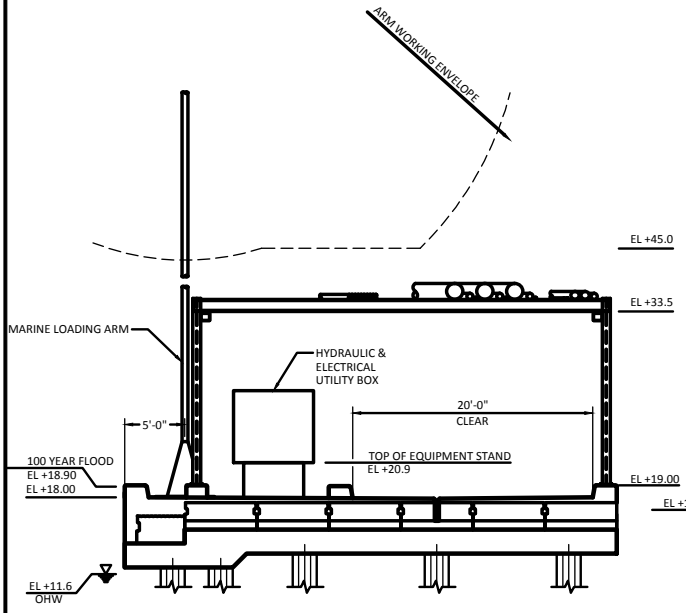


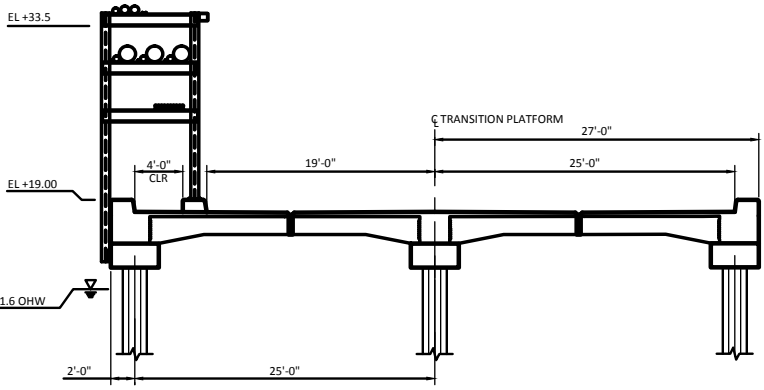
A S-4 BERTH TRESTLE
SCALE: 3/16"=1'-0"



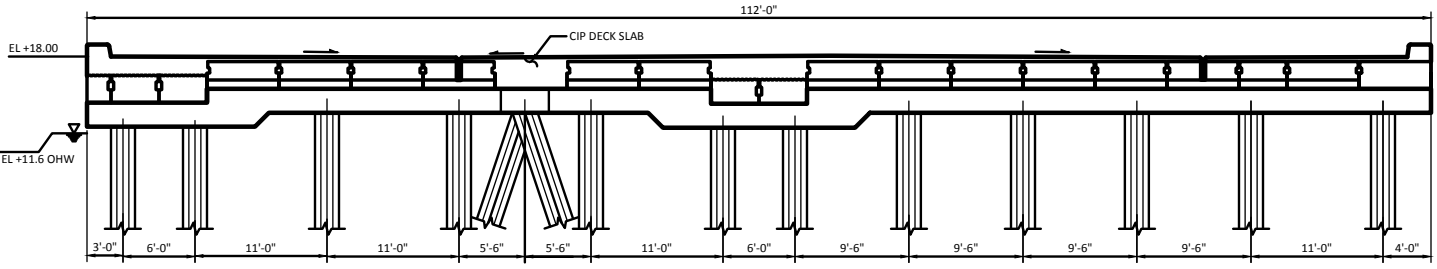
D S-4 ACCESS TRESTLE @ UTILITY FRAME
SCALE: 3/16"=1'-0"



B S-4 BERTH TRESTLE @ MARINE LOADING ARM
SCALE: 3/16"=1'-0"



E S-4 TRANSITION PLATFORM @ UTILITY FRAME
SCALE: 3/16"=1'-0"



C S-4 DOCK SECTION-TURNING PLATFORM
SCALE: 3/16"=1'-0"

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 5: DOCK CROSS-SECTIONS

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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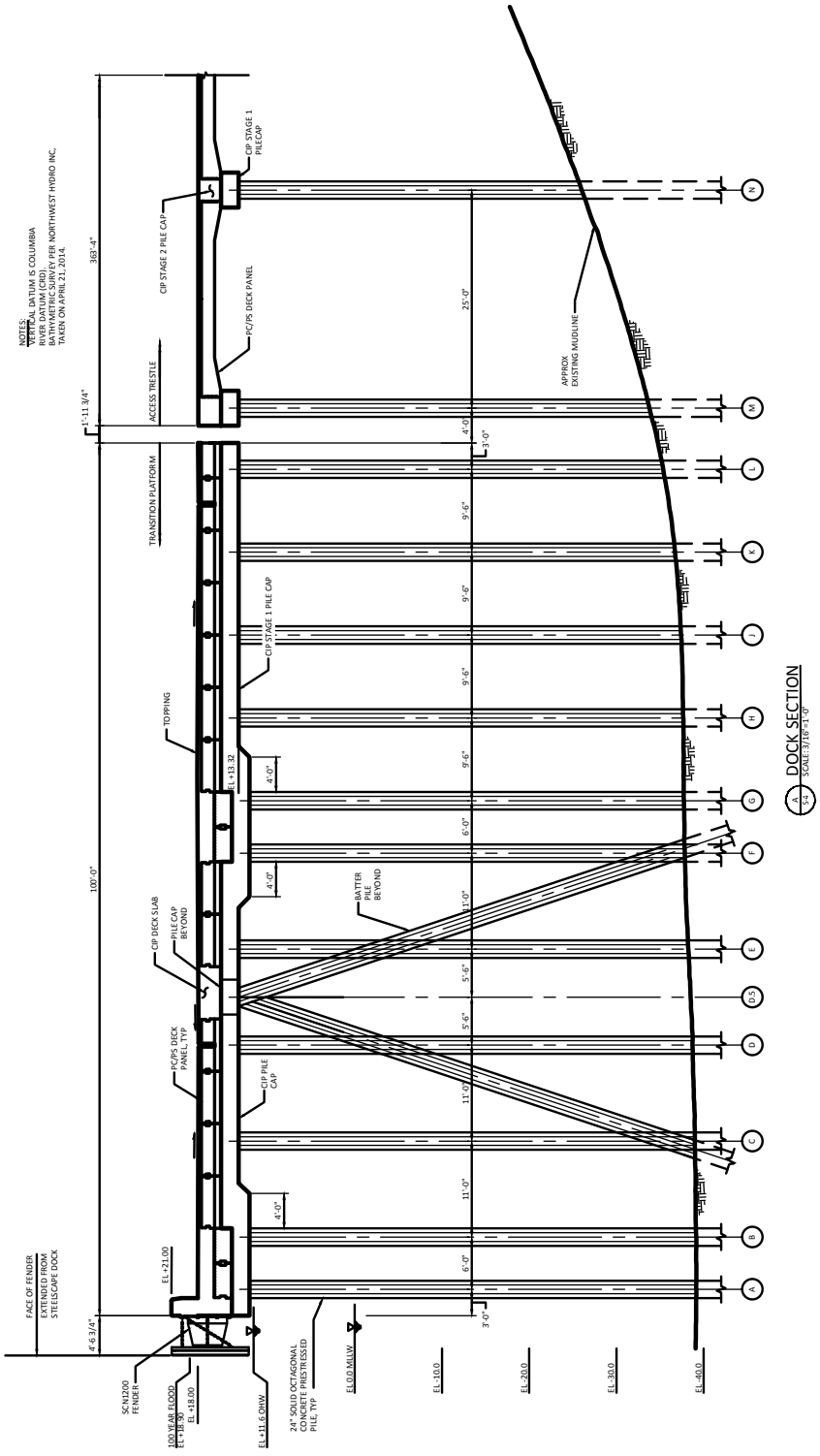

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 6: TRESTLE SECTION

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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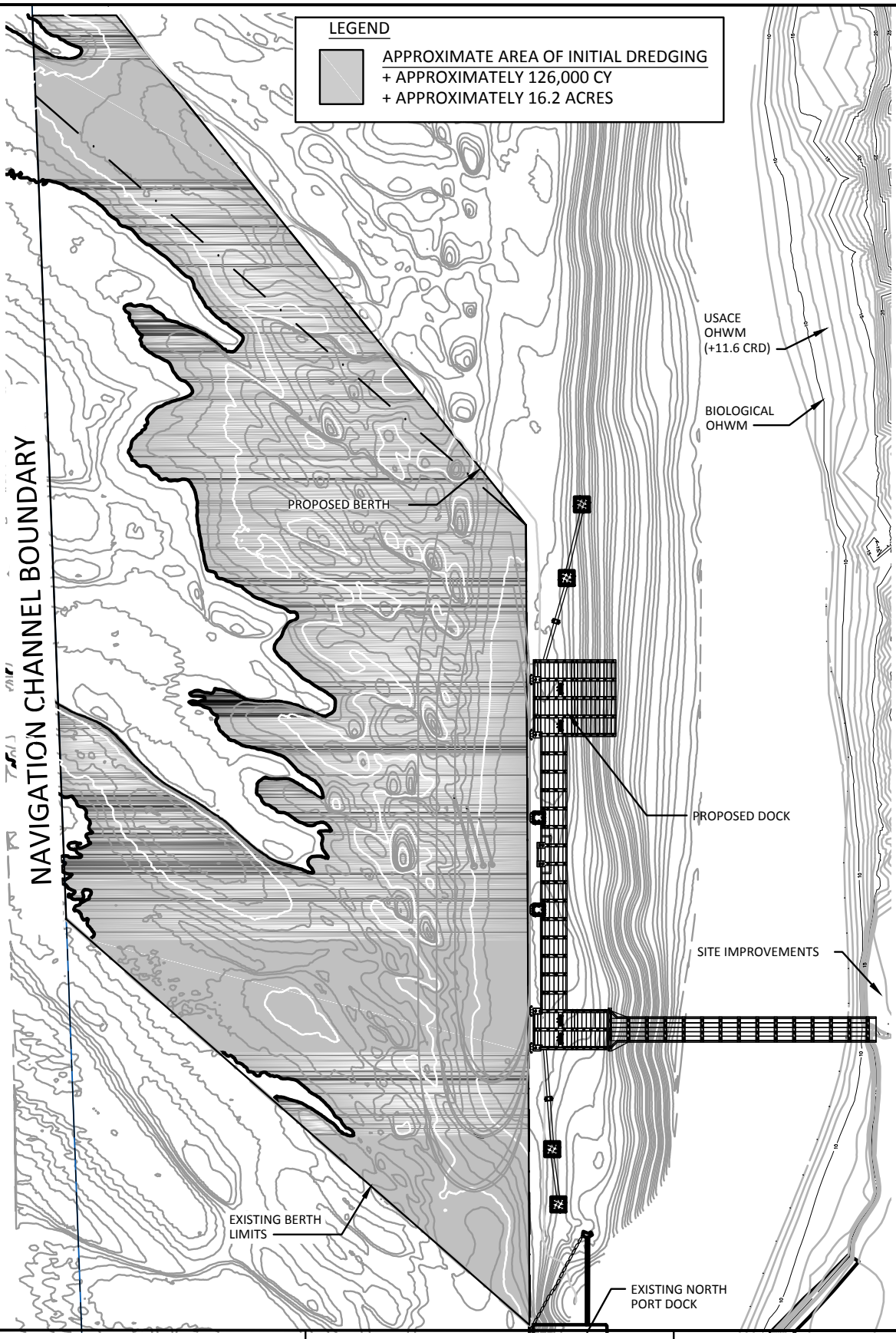

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 7: DREDGING PLAN

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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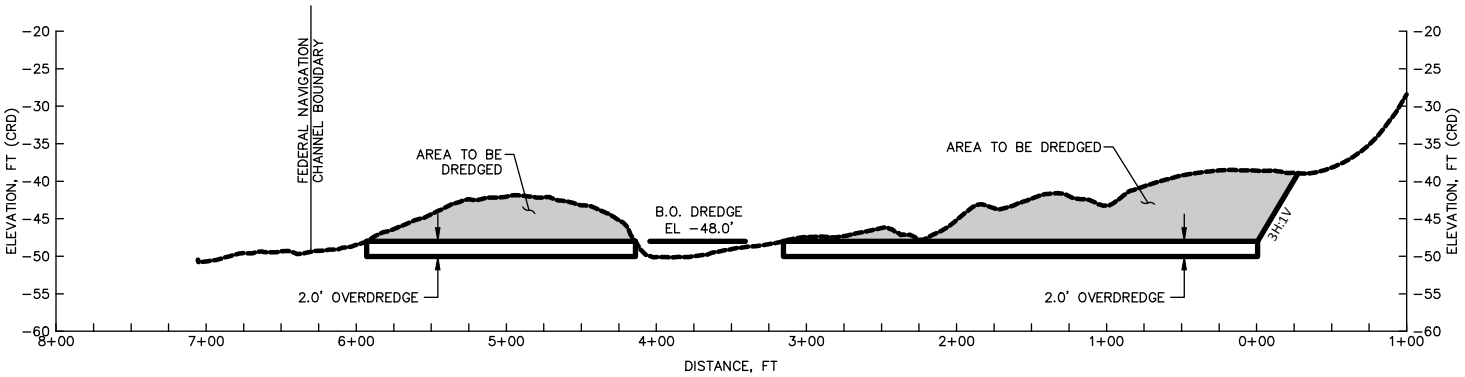

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 8: DREDGING SECTION

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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LEGEND

ZONE 1: **SHALLOW WATER (CORPS OHWM ELEVATION [11.6 CRD] TO 20 FEET BELOW CORPS OHWM)**

ZONE 2: **DEEP WATER (DEEPER THAN 20 FEET BELOW CORPS OHWM)**

Shoreline Location Description	Area of Over-water Coverage		# Piles			Area of Pile Footprint (sf)
	Solid	Grated	24-inch Concrete	12-inch Steel	18-inch Steel	
Shallow Water (Corps OHWM elevation [11.6 CRD] to 20 feet below Corps OHWM)						
Access Trestle	**10,925 sf**	**N/A**	**52**	**-**	**-**	**173**
Subtotal	**10,925 sf**	**N/A**	**52**	**-**	**-**	**173**
Deep Water (Deeper than 20 feet below Corps OHWM)						
Access Trestle	**1,450 sf**	**N/A**	**9**	**-**	**-**	**30**
Transition Platform	**5,400 sf**	**N/A**	**41**	**-**	**-**	**136**
Berth Trestle	**13,470 sf**	**N/A**	**58**	**-**	**-**	**192**
Turning Platform	**11,648 sf**	**N/A**	**68**	**-**	**-**	**225**
Fender System	**N/A**	**N/A**	**-**	**12**	**-**	**11**
Breasting Dolphins (2)	**450 sf**	**N/A**	**14**	**-**	**-**	**46**
Mooring Dolphins (4)	**800 sf**	**N/A**	**48**	**-**	**-**	**159**
Grated Walkway	**N/A**	**1,588 sf**	**-**	**-**	**4**	**7**
Subtotal	**34,018 sf**	**1,588 sf**	**290**	**12**	**4**	**806**
10% Contingency for Concrete Piles*	**N/A**	**N/A**	**30**	**N/A**	**N/A**	**100**
Total in-/Over-water	**44,943 sf**	**1,588 sf**	**320**	**12**	**4**	**1,079**

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 9: AQUATIC IMPACTS

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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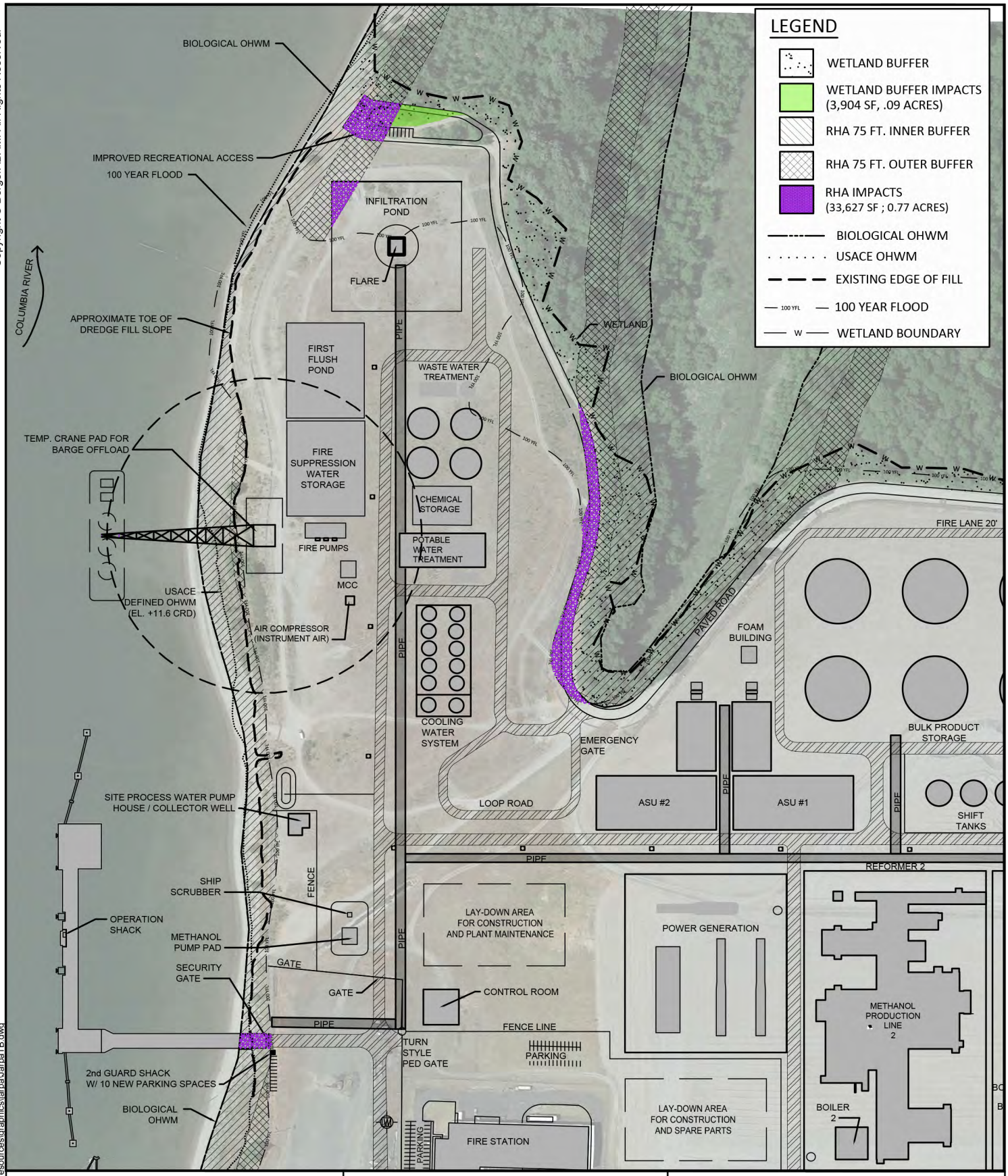

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 10 : RIPARIAN &WETLAND BUFFER IMPACTS

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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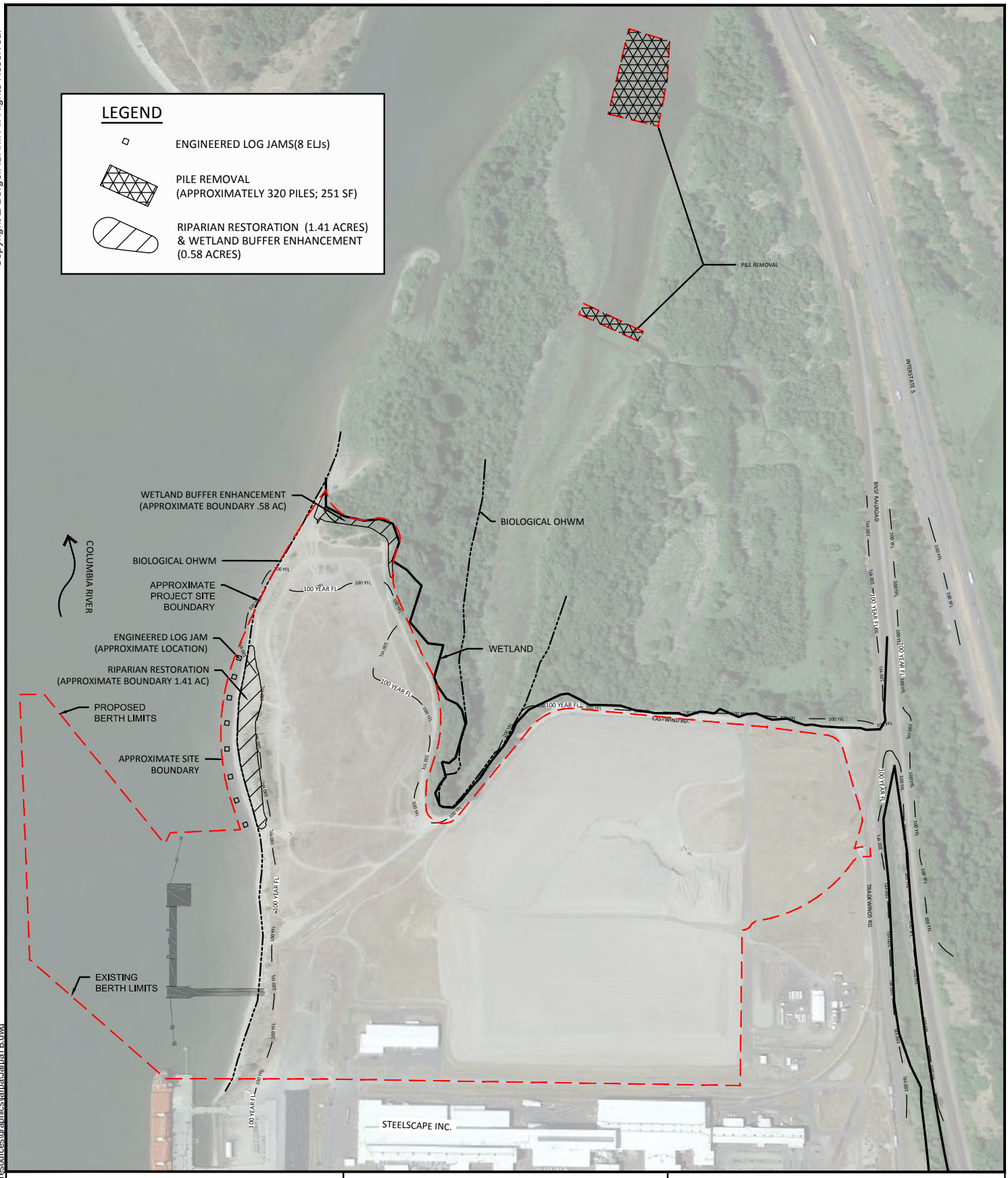

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 11: MITIGATION OVERVIEW

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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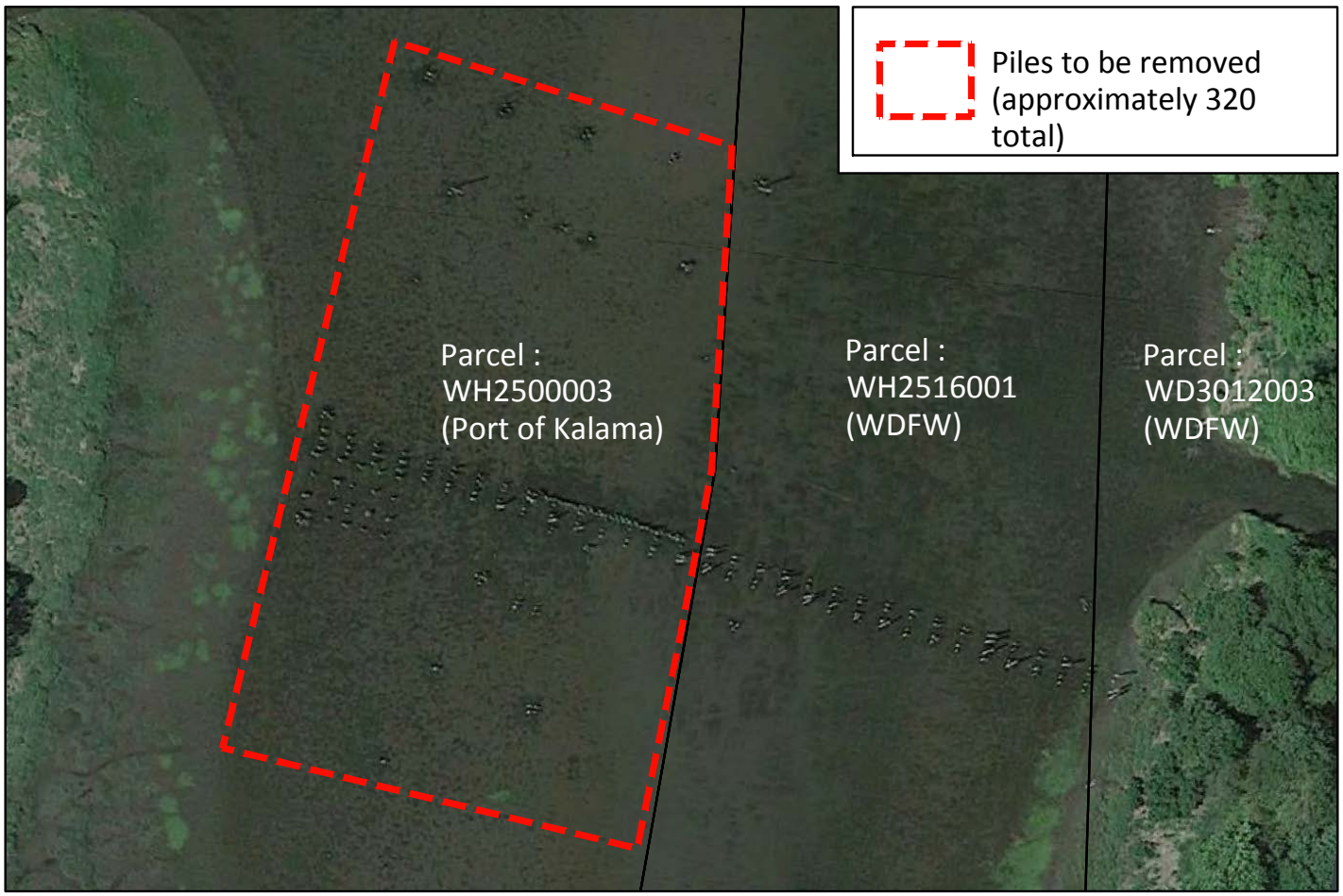
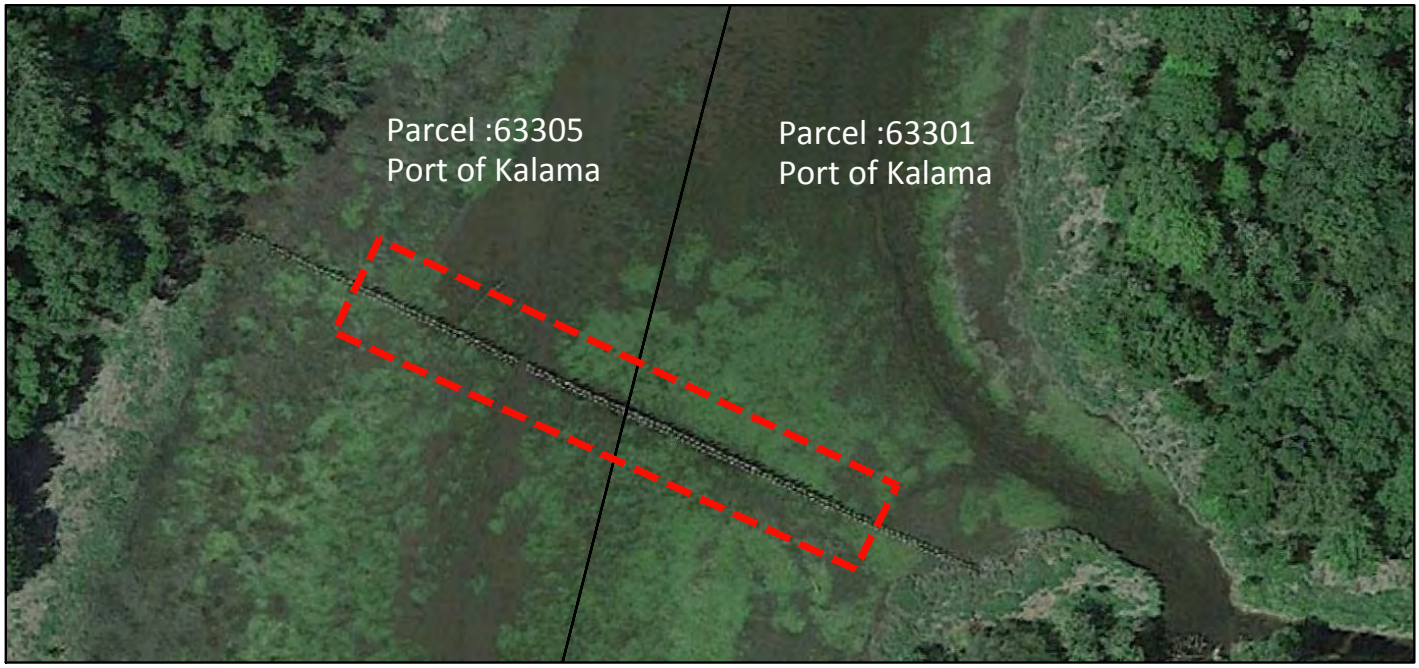


APPROXIMATE NUMBER OF PILES TO BE REMOVED FROM PORT PROPERTY=320



PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 12: PILE REMOVAL

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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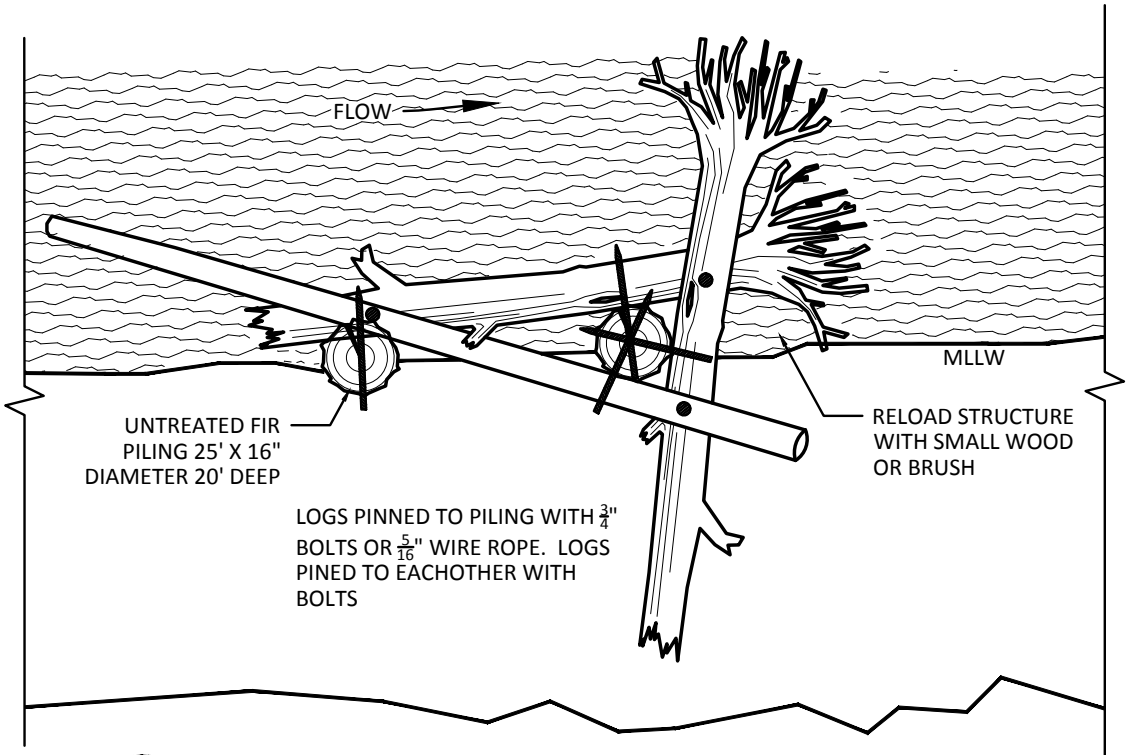
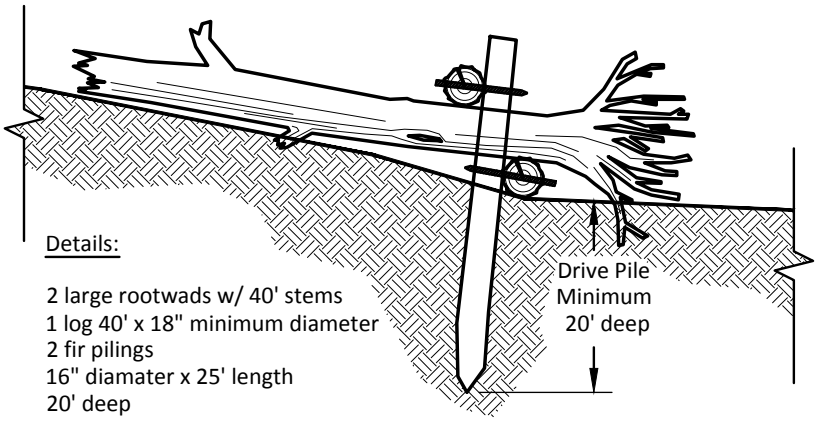


1 — Engineered Log Jam Plan

SCALE: NTS



2 — Engineered Log Jam Section

SCALE: NTS

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 13: ENGINEERED LOG-JAM DETAILS

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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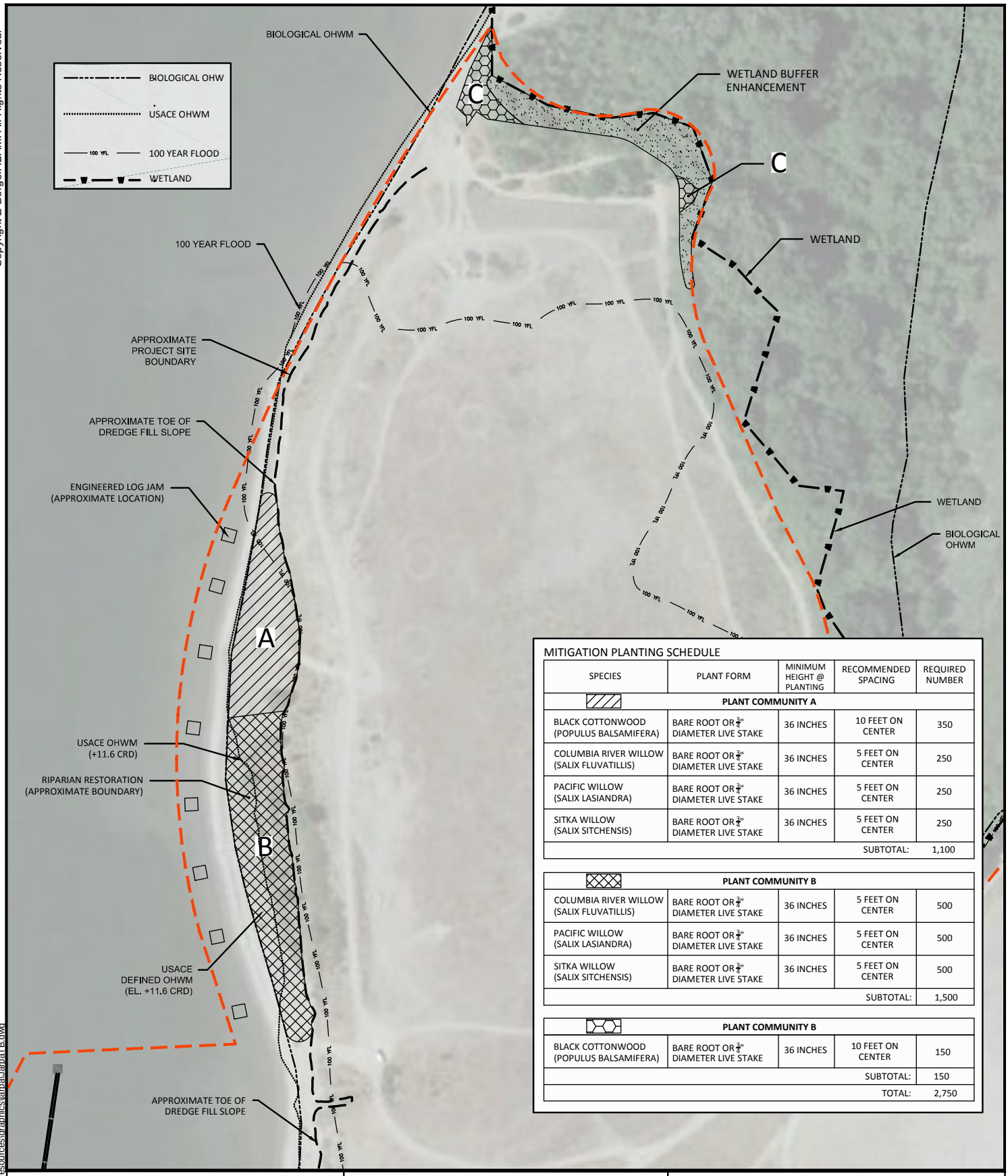

MITIGATION PLANTING SCHEDULE

SPECIES	PLANT FORM	MINIMUM HEIGHT @ PLANTING	RECOMMENDED SPACING	REQUIRED NUMBER
PLANT COMMUNITY A				
BLACK COTTONWOOD (POPULUS BALSAMIFERA)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	10 FEET ON CENTER	350
COLUMBIA RIVER WILLOW (SALIX FLUVATILLIS)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	250
PACIFIC WILLOW (SALIX LASIANDRA)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	250
SITKA WILLOW (SALIX SITCHENSIS)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	250
			SUBTOTAL:	1,100
PLANT COMMUNITY B				
COLUMBIA RIVER WILLOW (SALIX FLUVATILLIS)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	500
PACIFIC WILLOW (SALIX LASIANDRA)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	500
SITKA WILLOW (SALIX SITCHENSIS)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	5 FEET ON CENTER	500
			SUBTOTAL:	1,500
PLANT COMMUNITY B				
BLACK COTTONWOOD (POPULUS BALSAMIFERA)	BARE ROOT OR ¾" DIAMETER LIVE STAKE	36 INCHES	10 FEET ON CENTER	150
			SUBTOTAL:	150
			TOTAL:	2,750

PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River, river mile 72
COUNTY OF: Cowlitz
APPLICATION BY: Port of Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, BNSF, WDFW

FIGURE 14: RIPARIAN PLANTING DETAILS

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, WA. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Project

LATITUDE: 45Á02' 40"
LONGITUDE: -122Á52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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PURPOSE: Construct a facility to manufacture and export methanol

IN: Columbia River
COUNTY OF: Cowlitz County
STATE OF: WA
APPLICATION BY: PORT OF Kalama

ADJACENT PROPERTY OWNERS: Port of Kalama, WA DNR, WDFW, BNSF

FIGURE 15: ACTION AREA

Port of Kalama

Address: 110 W. Marine Dr.
Kalama, Wa. 98625

PROJECT: Kalama Manufacturing and Marine Export Facility Porject

LATITUDE: 45° 02' 40"
LONGITUDE: -122° 52' 00"
DATUM: CRD Columbia River Datum
OHWM (USACE)= +11.6' CRD

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