PORT OF ALASKA MODERNIZATION PROGRAM
Cargo Terminals Replacement (CTR)
Sediment Sampling and Analysis Plan

February 2025 – REV 2

Prepared by

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EXECUTIVE SUMMARY

USACE Permit Number:	POA-2003-00502-M21
Project Location:	Don Young Port of Alaska (POA) Cargo Terminals Replacement Project (CTR), Anchorage, Alaska
Waterbody:	Knik Arm
Dredging Area:	Approximately 3.7 acres
Total Proposed Dredging Volume:	50,000 cubic yards (includes potential over-dredge)
Max. Proposed Dredging Depth:	+20.0 feet mean lower low water (MLLW)
Dredging Side slope:	2.5 Horizontal to 1 Vertical (2.5H:1V) then backfilled with clean sand and gravel
Offshore Disposal Site:	Anchorage Harbor In-Water Disposal Site
Proposed Sediment Sampling Date:	June 2024
Proposed Dredging Dates:	2026 - 2029

Dredge Material Characterization Plan

The POA is in Anchorage, Alaska, at the southern end of the Knik Arm in the Upper Cook Inlet Basin. The POA is completing a multi-phased project, referred to as the Port of Alaska Modernization Program (PAMP) to address deficiencies and modernize its marine terminals. The Cargo Terminals of the POA are pile-supported docks constructed in1960s-1970s. This Project is urgently needed due to corrosion of the foundation piles and deteriorating structural conditions at Terminals 1, 2, and 3. The existing terminals have exceeded their useful service life, and the remaining service life is unknown.

These facilities must be replaced with new resilient terminals for the Port to continue to meet its critical role serving the Municipality of Anchorage and State of Alaska's general cargo needs. The three existing cargo Terminals 1,2, and 3 will be replaced with two larger Terminals 1 and 2 to accommodate the increasing vessel size. This Sampling and Analysis Plan (SAP) has been prepared to support the CTR project, which is being completed as Phase 2B of the PAMP.

The CTR project area consists of the area of the existing POL-1, Terminals 1, 2 and 3. The area to be dredged is currently an inter-tidal area; as such, sampling will be accomplished using a hollow-stem auger drilling rig and split-spoon samplers from existing decking. The dredge area to be characterized

during this investigation consists of material beginning at ground surface (approximately +30’ MLLW) and extending to the final dredge depth (approximately +16’ MLLW). Material to be removed includes naturally occurring estuarine sediments.

The proposed disposal site is within the Anchorage Harbor In-Water Disposal Site.

Based on the site history, it is believed that contamination is more likely to be present within the surrounding fill material. It is believed that the estuarine deposits within the dredge area are relatively uncontaminated. For this reason, the material to be dredged has been assessed as a single homogeneous layer. However, the Z-layer samples are assumed to be within or near the Bootlegger Cove Formation (BCF) clay layer and will be taken approximately 2 feet below the sediment layer. The transition between the sediment layer and the BCF layer has been set to the anticipated interface between estuarine deposits and the underlying clay based on current information. However, the transition depth will not be modified in the field and in some locations the Z-layer samples may include a portion of both deposits.

The dredge area has been divided into 4 dredged material management units (DMMUs), numbered DMMU-01 through DMMU-04. A total of 4 borings are proposed (1 per DMMU) to be completed to allow for collection of DMMU discrete samples taken at 5-foot intervals for immediate analysis and for archiving, and post-dredge surface (Z-layer) samples for archiving. The sampling approach has been prepared to comply with the Dredged Material Management Program (DMMP) 2021 Dredged Material Evaluation and Disposal Procedures User Manual (referred to herein as the 2021 DMMP User Manual) and the draft Alaska Dredged Material Evaluation Framework (ADMEF).

DMMU samples collected during the investigation will be analyzed for conventional and chemical parameters outlined within both User Manuals. The data collected during this investigation will be screened against Screening Levels and Bioaccumulation Trigger values for marine projects within the Manuals. Biological testing is not included within this SAP. Stage 2B validation will be completed on 100% of the data collected during the investigation.

The sampling program described within this SAP is intended to collect sufficient data to support (1) suitability determinations for in-water disposal of material to be dredged during the CTR project and (2) anti-degradation evaluations for the post-dredge surface. A written discussion of the findings will be prepared documenting the physical and chemical character of the proposed dredge material. The physical and chemical reports and data validation report will be included with the sediment characterization report.

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ACRONYMS

ADEC	Alaska Department of Environmental Conservation
ARI	Analytical Resources Inc.
Bgs	below ground surface
BT	bioaccumulation trigger
CFR	Code of Federal Regulations
CTR	Cargo Terminals Replacement
CUL	cleanup level
CWA	Clean Water Act
Cy	cubic yards
DMMP	Dredged Material Management Program
DMMU	Dredged Material Management Unit
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
Eurofins	Eurofins TestAmerica, Inc.
H:V	Horizontal to Vertical
JBER	Joint Base Elmendorf-Richardson
mg/kg	milligrams per kilogram
MDL	Method Detection Limits
MLLW	mean lower low water
MOA	Municipality of Anchorage
MRL	Method Reporting Limits
NES	North Extension Stabilization
NESl	NES Step 1
NES2	NES Step 2
PAHs	polycyclic aromatic hydrocarbons
PAMP	Port of Alaska Modernization Program
PFAS	Per- and polyfluoroalkyl substances
PM	Project Manager
POA	Port of Alaska
RRO	residual range organics
QA/QC	quality assurance/quality control
SAP	Sampling and Analysis Plan
SL	screening level
USACE	U.S. Army Corps of Engineers
Z-layer	Post-dredge surface

1 INTRODUCTION

The POA provides critical infrastructure for the citizens of Anchorage and greater Alaska. Half of the freight shipped into Alaska is handled by the POA and the imported goods are consumed by over 90% of Alaska's population. Existing POA facilities include three general cargo terminals, two petroleum terminals, a petroleum and cement terminal, a dry barge landing, and an upland sheet pile supported storage and work area. Many of the existing POA facilities were constructed in the 1960s, are past their design life, and need replacement. The POA is completing a multi-phased program to address deficiencies and modernize its marine terminals. The project, referred to as the Port of Alaska Modernization Program (PAMP), intends to provide safe, reliable, and cost effective POA operations and infrastructure resilience in the event of a natural disaster.

This SAP has been prepared to support the CTR project, which is being completed as Phase 2B of the PAMP. The CTR project intends to construct new cargo terminals to replace the existing terminals and stabilize the shoreline and create new uplands where the 30,000-50,000 cy of dredged material will be excavated, then backfilled.

This SAP follows the guidance presented within the 2021 DMMP User Manual (Dredged Material Management Office, 2021) and the 2024 draft ADMEF. The sampling program described within this SAP is intended to collect sufficient data to support (1) suitability determinations for in-water disposal of material to be dredged during the CTR project and (2) antidegradation evaluations for the post-dredge surface.

A Tier 1 Analysis for the CTR project was prepared by HDR, Inc., and Jacobs in September 2024. The analysis includes a detailed explanation of the proposed project activities, descriptions and photographs of the existing CTR project area, and summaries of previous assessments completed within and near the project area. Pertinent information from the Tier I Analysis is summarized in Section 1.4 of this SAP.

1.1 Project Description

The CTR project will reshape the shoreline within the CTR project area and will include the removal of the existing docks, riprap armor material (shoreline), and approximately 30-50,000 cubic yards (cy) of material from the CTR project area. The proposed new shoreline will include a finished surface elevation of +38 feet MLLW. The seaward area immediately adjacent to the shoreline will be armored and sloped at a grade of 2.5H:1V.Ground improvements are being completed using deep soil mixing, jet grouting methods and/or stone columns in advance of the other construction activities to stabilize the location landside of the dock. The proposed disposal site for the dredged material is the Anchorage Harbor In-Water Disposal Site (offshore). Project drawings were attached to the U.S. Army Corps of Engineers (USACE) permit application (USACE, 2024).

1.2 Project Location

The POA is in Anchorage, Alaska, at the southern end of the Knik Arm in the Upper Cook Inlet Basin (Figure 1). The CTR is situated north of the Petroleum and Cement Terminal and POL-2 (Figure 2). The Cargo Terminals are located at the following:

- Municipality of Anchorage (MOA) Tract H, Port Subdivision Transit Area and T2.

- Sections 6 and 7, Township 13 North, Range 3 West (U.S. Geological Survey Anchorage A-8 NW 7.5-minute quadrangle)
- MOA tax parcel 002-011-22-001

As shown in Figure 2, the existing shoreline within the CTR project area extends east from the Knik Arm waterway and into an inter-tidal area or notch located behind Terminal 1. Shoreline to the north and south of the notch consists of riprap armored embankment. Sampling will be completed within the CTR project dredge area to support disposal of dredged material within the Anchorage Harbor In-Water Disposal Site.

1.3 Site History

The Cargo Terminals were constructed in the 1960s and 1970s. Prior to construction, the project areas were partially developed for barge-loading and off-loading, but also consisted of inter-tidal habitat. The Cargo Terminals primarily consist of a pile-supported dock structure that supports both roll-on, roll-off and load-on, load-off cargo transport; the northern and southern ends of the project/dredge area are supported by a riprap armored embankment.

The area of proposed dredging was never filled and remains undeveloped except for a pile-supported structure covering the western half of the approximate 3.7- acre area. The area is made up primarily of inter-tidal habitat. The soil/sediment is comprised of estuarine silt, sand and cobble. Following construction, the area has remained undeveloped with no significant spills or contamination known to exist.

However, several contaminated sites exist within 1,500 feet of the area to be dredged. The primary contaminants are petroleum products like diesel and jet fuel. The sediment will be tested for all contaminants of concern listed in the two User Manuals (identical lists), including gasoline, diesel, oil and lubricants along with metals, PCBs and Semi-volatile Organic Compounds among the other chemicals listed. See Figure 1-3 for the location of the contaminated sites within 1,500 feet of the CTR.

The dredge area will be backfilled with clean fill material from the North Extension Stabilization Project stockpile currently located at the north end of the Port property and from a commercial material source.

Because of the conditions within the vicinity of the dredge area, the test boreholes will be drilled from the existing pile-supported deck through drain holes down to the in-situ sediments.

1.4 Figure 1-3: Nearest Contaminated Sites to CTRTier 1 Analysis

Previous studies and documents relevant to the CTR project are discussed in detail within this Tier 1 Analysis (Jacobs and HDR, 2024).

1.4.1 Fill Material Studies

In 2023, Shannon and Wilson (S&W) on behalf of the POA published results of the Sampling and Analysis Plan boreholes and testing for the North Extension Stabilization Step 1 (NES1) soil and sediment. More than 100,000 cy of material was stockpiled at the north end of the Port's property. This stockpile will be the source of most fill material used within the CTR project area along with commercially sourced armor rock, filter rock and some granular fill. The S&W Report concluded that the material that was stockpiled was clean fill free of contamination. In 2024, the USACE authorized by permit the material to be excavated, dredged and sheet pile removal pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA). In addition, the Alaska Department of Environmental Conservation (ADEC) issued a Certificate of Reasonable Assurance pursuant to Section 401 of the CWA for NES1.

1.4.2 Phase I Environmental Site Assessment (ESA)

In 2023, S&W completed a Phase I ESA for the CTR project area. The Phase I ESA, included as an appendix, identified the following Recognized Environmental Conditions (RECs):

- The Property is part of the ADEC-listed “MOA Port of Anchorage” contaminated site. According to the ADEC, hydrocarbon contamination is fairly widespread at the POA, resulting from historical releases from pipelines and tank farms dating back to the 1964 Earthquake. According to the ADEC, numerous environmental assessments have been conducted at the POA as part of construction projects. Sampling conducted as part of these projects have documented petroleum-impacted groundwater at the Property.
- The “JBER-Elmendorf 12-inch Jet Pipeline” site is an “Active” ADEC-listed contaminated site located approximately 200 feet east/southeast of the Property. According to the ADEC database “based on available information, it is clear that all fuel contamination in the area cannot be solely attributed to the 1994 Air Force JP-8 leak and is the result of multiple historical releases from various sources in the immediate area”. Cleanup and assessment activities are ongoing. Based on the location and distance of the site from the Property, there is a potential that the site has impacted the Property.
- The Emergency Response Notification System (ERNS) lists reported hazardous substance releases in quantities greater than the reportable quantity. According to the ERIS report, the Property is listed on the ERNS list six separate times. Additional information regarding the releases could not be located. The source and composition of the fill used in the filling of the tidelands east of the wharf is unknown. According to the ADEC, all fill material at the POA is considered potentially contaminated. In addition, based on the length of site occupancy, and our experience at other similar sites, there is a potential that miscellaneous debris have been buried onsite. If present, there is a potential that contaminants present within the debris could impact the Property.
- Two fuel terminals, which includes fuel piping, are located at the Property. Based on the length of site operations and other documented releases at the site, there is a potential that undocumented releases from fuel offloading operations could impact the Property.
- Multiple containers and drums were observed at the Property. Based on the length of site operations and other documented releases at the Property, there is a potential that undocumented releases from the drums and containers, and potential former drums and

containers stored on the Property, could impact the Property.

- The current structures on the Property and current and/or former structures in the vicinity of the Property pre-date the availability of sewer services. It is possible that septic systems were utilized on the Property or nearby parcels. These systems could potentially impact the Property if petroleum products or chemicals were disposed though these systems.

1.4.3 Phase II Environmental Site Assessment

The Port also contracted Shannon and Wilson to perform a Phase II ESA for the CTR Project:

- The Phase II ESA included advancing Borings B-01 through B-07, which were completed as temporary wells TW-01 through TW-07, respectively. In addition, one boring (Boring B-08) was advanced east of the Port Administration building in the intertidal area. Sampling of the borings and temporary wells was conducted to further evaluate the RECs identified in Section 2 of the Phase II ESA Report. In general, the identified RECs listed in report do not represent specific locations which can be evaluated. Instead, the RECs represent areawide potential concerns.
- Prior to advancing the soil borings, the utility locate center and the POA were contacted to mark buried utilities within the project area. Eight soil borings, designated Borings B-01 through B-08, were advanced by Discovery using a GeoProbe® direct-push drilling rig in the approximate locations shown on Figure 2. The borings were advanced to depths ranging from 10 to 20 feet below ground surface (bgs) to facilitate the collection of soil samples and/or the installation of the temporary groundwater monitoring wells.
- During low tide, Boring B-08 was advanced through a drain in the elevated parking structure east of the POA Administration Building. At the time of drilling, the surface of the elevated parking structure was approximately 16 feet above the mudline. Discovery inserted drill tooling into the drain until it was in contact with the sediment below the parking structure and then began drilling. Per our work plan, a temporary well was not installed in Boring B-08.
- Soil samples from Borings B-01 through B-08 were recovered on a continuous basis using 5-foot long, 2.25-inch outside diameter MC5 macro-core® samplers. Each sampling sleeve was removed from the sampling device and split down the long axis. If sample recovery was at least 80 percent, the soil section was divided into two equal intervals for field screening and sampling purposes. The field screening and analytical soil samples were collected from the central portion of each interval.

Figure 1: Locations of the boreholes from the Phase II ESA

Soil Samples:

- Arsenic (3.74 milligrams per kilogram [mg/kg] to 17.2 mg/kg) was detected in each project sample at concentrations exceeding the ADEC Method Two cleanup level of 0.20 mg/kg. However, there is no known record of potential releases or usage of arsenic at the site. Therefore, the reported arsenic concentration is likely the result of naturally occurring arsenic. In addition, DRO (maximum 107 mg/kg), RRO (maximum 1,060 mg/kg), benzene (0.00443 J mg/kg), toluene (0.0121 J mg/kg), naphthalene (0.0109 J mg/kg), 15 PAHs, barium (maximum

161 mg/kg), cadmium (maximum 0.131 J mg/kg), chromium (maximum 41.6 mg/kg), lead (maximum 11.2 mg/kg), and mercury (0.105 J mg/kg) were detected at concentrations less than the respective ADEC Method Two cleanup levels. The remaining tested analytes were not detected.

1.4.4 U.S. Army Corps of Engineers (USACE) Maintenance Dredging Program

In May 2023, the Maintenance Dredging contractor for USACE sampled and tested the sediments within the Federal Project dredge prism. All analytes in all samples tested non detect or below the screening levels in the ADMEF, except for selenium in one sample (which was found at a concentration of 3.6 mg/kg (screening level = 3.0 mg/kg) [Unpublished data via correspondence with Matthew Ferguson, USACE, Alaska District, JBER, Alaska].

1.5 Site Ranking

The U.S. Environmental Protection Agency (EPA) reviewed and commented on the USACE Alaska District Public Notice (POA-2003-00502-M22) for the project. EPA recommended sediment sampling and use of the ADMEF. Based on the previous SAP for the nearby NES1, the Port recommends using a low-moderate site ranking.

1.6 Physical Characteristics of the Dredge Area

Two soil units are anticipated to be encountered within the CTR project area, including:

- Estuarine deposits: Non-plastic silt or silt with varying amounts of sand and gravel. Layer thickness ranged from 5 to 35 feet thick.
- Bootlegger Cove Formation: Clay layer underlying the estuarine deposits.

A cross section (west-east) through the CTR project area is shown in Exhibit 2-3.

1.7 Project Team and Responsibilities

The project owner is the POA. The POA Port Director is Mr. Steve Ribuffo.

HDR and Jacobs are responsible for project management. Mr. Mike Holley prepared this SAP based on an earlier version provided by Shannon and Wilson that was approved for the NES1 Project.

Shannon & Wilson will implement the SAP and will prepare the sediment characterization report. Mr. Dan McMahon, PMP will serve as the Shannon & Wilson Principal-In-Charge. Dan will designate a Project Manager (PM) who will coordinate field activities and subcontractor utilization. Ms. Shoshana Howard supported SAP preparation and will support sediment characterization report preparation activities. Field sampling activities will be overseen by ADEC Qualified Environmental Professionals provided by Shannon & Wilson. Shannon & Wilson will complete Stage 2B validation on 100% of the data. Dan McMahon will provide the project QC for the sediment report.

Discovery Drilling, Inc., under subcontract to Shannon & Wilson, will provide the equipment and personnel to advance the borings in the CTR project area. Analytical Resources Inc. (ARI), under subcontract to Shannon & Wilson, will provide conventional and chemical analytical services for the

project. ARI will complete analysis in accordance with the DMMP and ADMEF.

2 SAMPLING PROGRAM

2.1 Conceptual Dredging Plan

As shown in Figure 2, the existing shoreline within the CTR project area extends into the Knik Arm waterway, except for a “notch” indentation into the shore behind Terminal 1. The shoreline to the north and south of the notch consists of riprap armored embankment. The CTR project will include removal of the riprap armor material and dredging to remove undesirable silty sediments within the project area. Once the sediment is removed, then the notch will be filled with clean sand and gravel.

The proposed new shoreline with the CTR project area will include a finished surface elevation of +38 feet MLLW along the shoreline. The seaward area immediately adjacent to the shoreline will include a 2.5H:1V slope down to a depth of 0 feet MLLW.

This 2.5H:1V sloped section will be finished with armor stone overlying filter rock and granular fill. From the base of the 2.5H:1V slope sections, the dredge surface will extend to the natural slope behind the existing terminals. Appendix A includes figures from the Section 10/404 permit application (POA-2003-00502-M22) for the CTR project. The figures include details about the proposed offshore disposal site, the current CTR project area conditions, the proposed new shoreline, and cross sections depicting the future slope adjacent to the shoreline and armored bank details.

The proposed dredging will be accomplished using clamshell, bulldozer or dragline methods with material loaded to a scow barge for offshore disposal at the Anchorage Harbor In-Water Disposal Site. Ground improvements are proposed to begin in 2025 using deep soil mixing or jet grouting methods to stabilize below the area that is proposed to be armored and sloped at 2.5H:1V.

2.2 Configuration of DMMUs

A DMMU is the smallest volume of dredge material that can be dredged, and for which a separate disposal decision can be made by the local review team. Material to be dredged from the CTR project area is made up of estuarine deposits. Clay of the Bootlegger Cove Formation is present below the estuarine deposits. Based on the site history, it is believed that contamination is more likely to be present within the estuarine deposits than within the underlying material. For this reason, the material to be dredged has been included in a single layer: The entire layer is intended to target the estuarine sediments on top of the Bootlegger Cove clay layer, including silt, sand and cobble. This layer is estimated to contain approximately 30,000-50,000 cubic yards (cy).

The transition depth between the Homogeneous Sediment Layer and the BCF Layer has been set at the anticipated interface between estuarine material and the clay layer, based on currently available data (approximately 10-30 feet). To simplify the field sampling approach and avoid future DMMU boundary adjustments, the transition depth will not be modified based on field observations. For this reason, some of the DMMUs may include a portion of clayey material (when the actual transition is shallower than anticipated). Similarly, some of the DMMUs may include no clayey

material (when the actual transition is deeper than anticipated).

Based on a low-moderate site ranking and the assumption that the Sediment Layer is more likely to be impacted than the BCF (Clay) Layer, maximum DMMU volumes of 40,000 cy are appropriate for the Homogeneous Sediment Layer, respectively (values taken from Table 5-7 of the 2021 DMMP User Manual; same table as the ADMEF). Using this volume, the Sediment Layer can be characterized using 2 DMMUs (calculated by dividing 50,000 cy by 40,000 cy and rounding up to the nearest whole value). The Port drilled two boreholes in each DMMU for a total of four (4) test holes. As shown in Exhibit 2-1, the DMMUs have been assigned names of DMMU - 01 and DMMU - 02.

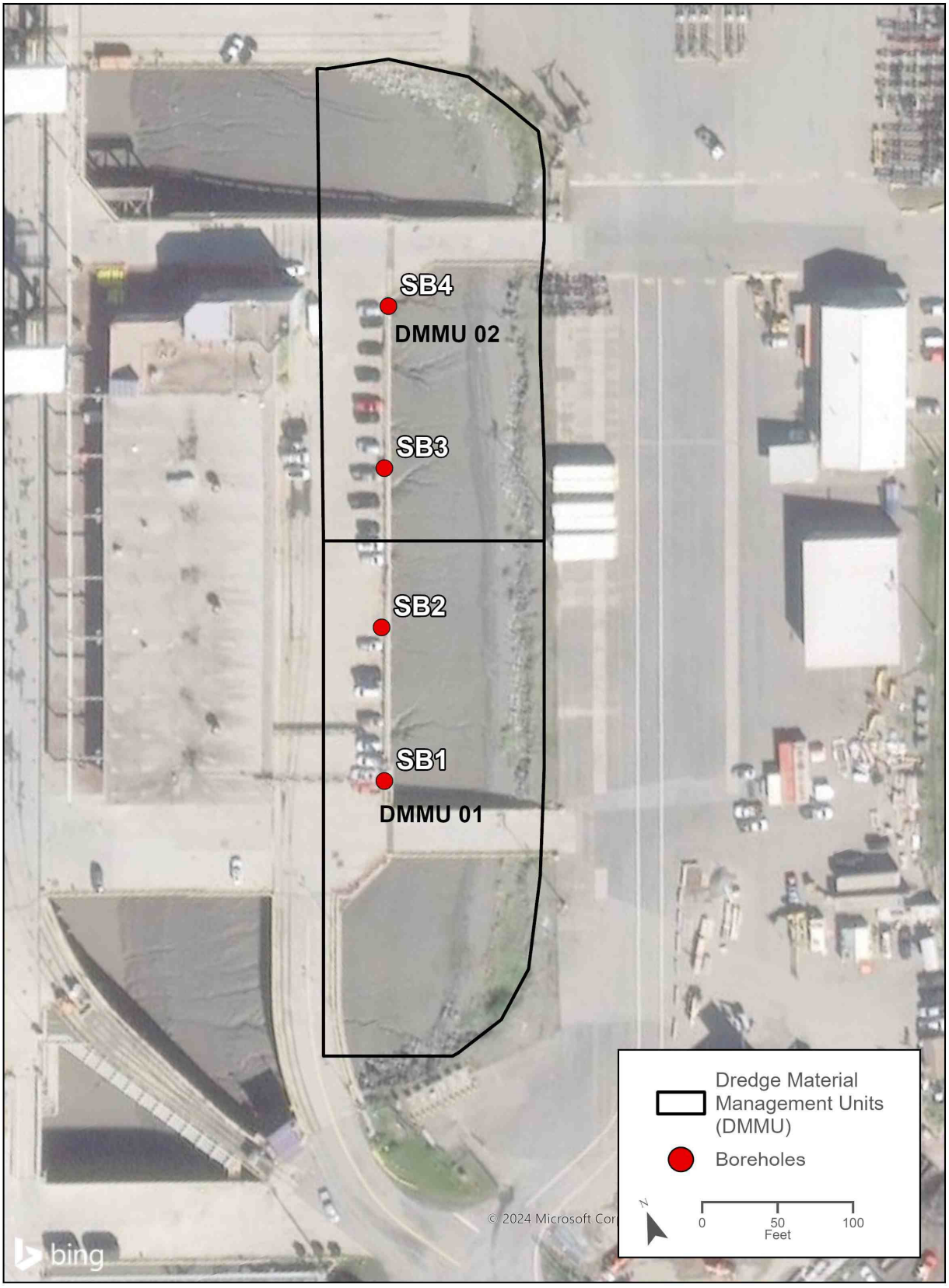

Exhibit 2-1: Plan View of Surface Layer DMMUs: DMMU-01SB1 through DMMU-02SB4

Detailed figures outlining the DMMU extents are provided in Appendix B. The vertical extent and approximate volume of each DMMU is summarized in Exhibit 2-2, below.

Vertical Extent Approximate Volume

DMMU ID	Depth	(cy)
DMMU-1	0 to -16	15,000 ± 1,000
DMMU-2	0 to -16	15,000 ± 1,000

Exhibit 2-2: Proposed Dredge Material Management Units

Samples will be collected from and tested separately for each DMMU. The Sediment Layer DMMUs extend from ground surface to the anticipated start of the BCF Layer.1 Samples of the post-dredge surface (Z-layer) will be collected and archived for potential analysis. The Z-layer is defined as the sediment/clay that extends 2 feet below the bottom elevation of the DMMU. The bottom elevation of the Z-layer is the limit of characterization. A generalized cross section of the layers is provided in Exhibit 2-3.

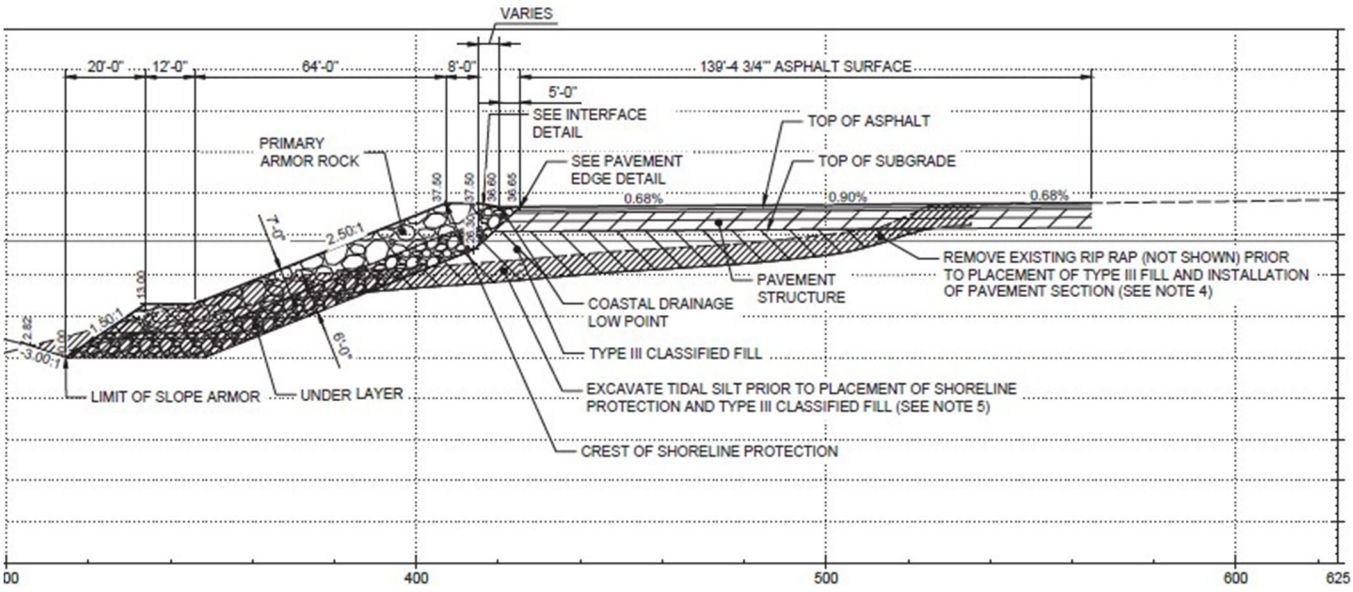

Exhibit 2-3: Generalized Cross Section of Dredge Area depicting proposed excavation and backfill

3 SAMPLE COLLECTION AND HANDLING PROCEDURES

3.1 Sampling Locations and Compositing Scheme

A total of 4 borings, numbered B-01-24 through B-04-24, were completed within the CTR project area for the collection of sample material from within the dredge prism and post-dredge surface (Z-layer). Each boring will extend from the surface, through a DMMU and into the Z--layer. Additional, samples were taken below the DMMUs to a depth of –30.

Prior to advancing the soil borings, the utility locate center and the POA was contacted to mark buried utilities within the project area. In addition, a Port of Alaska Dig Permit was completed and submitted to the POA Safety Coordinator. The borings were completed using a hollow-stem auger drilling rig. Split-spoon samples will be collected at 5.0-foot intervals at each boring, with the last split-spoon targeting to a total depth of 2 feet below the proposed final dredge depth (the Z-layer).

As shown in Figure 3A, one boring will be completed within each DMMU. Proposed exploration details including boring locations are summarized in Table 1.

Material from each split-spoon will be used to create DMMU samples (Section 3.1.1). Discrete samples will be collected from each boring (Section 3.1.2). Material from the final split-spoon of each boring will be used to create a Z-layer sample (Section 3.1.3).

DMMU ID	Latitude	Longitude
DMMU – 01SB1	61.2383 N	-149.8880 W
DMMU – 01SB2	61.2386 N	-149.8878 W
DMMU – 02SB3	61.2389 N	-149.8875 W
DMMU – 02SB4	61.2392 N	-149.8872 W

Table 1: Locations of boreholes for each DMMU

3.1.1 DMMU Discrete Samples

For each DMMU, discrete samples will be generated using sediment from each split-spoon sample completed at 5-foot intervals within each DMMU. This material will be taken from each boring. The DMMU samples will be submitted for immediate analysis of conventional and chemical parameters

(detailed in Section 3.7).

The samples for each DMMU will be named CTR-DMMUXX, where XX corresponds to the DMMU number. For example, the composite sample for DMMU-02 will be named:

CTR-DMMU02

3.1.2 Discrete Samples

Discrete samples taken from each boring will be named B-XX-24-YY-DMMUZZ, where XX corresponds to the boring number, YY corresponds to the sample depth, and ZZ corresponds to the DMMU number. For example, a discrete sample taken from boring

B-01-24, from a depth of 10 feet bgs within DMMU-01, will have the following sample ID:

B-01-24-10-DMMU01

As shown in Table 1, specific discrete sample names have not been assigned because the sample names will include sample depth information (based on field conditions). The number of discrete samples to be collected may vary from boring to boring.

3.1.3 Z-Layer Samples

One split-spoon sample will be taken from the Z-layer (the two feet of sediment/clay immediately below the proposed dredge depth) from each boring. The Z-layer samples will be archived for potential future analysis of other parameters, if additional testing is merited.

Due to confusion regarding Z-layer sampling the driller pulled samples well below the actual Z-layer approximately 14 feet below the dredge prism.

3.1.4 Quality Assurance Samples

Approximately 20% of samples collected in the field will be submitted as blind duplicates using a dummy sampling identifier. This corresponds to one DMMU sample duplicate with only 4 boreholes.

Duplicate samples will be labeled sequentially using the same conventions described in the prior sections (dummy DMMU numbers will begin at DMMU-01 and dummy boring numbers will begin at B-01-24).

3.2 Field Notes

Field notes will be maintained during sampling and compositing operations. Field notes will be recorded on the Boring Log and within the Field Notebook. The following information will be recorded in field notes:

- Names of person(s) collecting and logging the samples, including Contractor staff.
- Date and start/stop times of sampling event and time each sample is collected.
- Weather conditions.
- Geographic location of each sample station.
- The boring number and samples collected from the boring, including duplicate samples.
- Description of soil.
- Deviations from the approved SAP.

3.3 Decontamination

All devices, instruments, trays, bowls, utensils, and other items that may come into contact with sample material must meet high standards of cleanliness. All equipment that may be in direct contact with sample material will be made of glass, stainless steel, high-density polyethylene, or polytetrafluoroethylene. All handwork will be conducted using disposable nitrile gloves. Sampling equipment will be cleaned between stations according to the following procedure:

- Remove excess soil with a brush and in situ water.
- Clean with a phosphate-free detergent solution (such as Liquinox ©).
- Rinse equipment thoroughly with clean in situ water.
- Triple rinse with analyte-free water.
- Cover (no contact) all cleaned items with aluminum foil.
- Store in a clean, closed container for the next use.

All drilling equipment will require decontamination. Discovery will construct an on-site decontamination area. Decontamination water will be containerized in 55-gallon drums for future disposal. The drums will be labeled with the source, date generated, project number, and contact information.

3.4 Sampling Methods

3.4.1 Hollow-Stem Auger Drilling

Approximately 1 liter of sample material is required for the conventional and chemical analyses. The contents of each split spoon will be photographed, logged, and discrete samples will be placed in containers, sealed, and labeled. Field forms are provided in Appendix C.

3.5 Sample Transport and Chain-of-Custody

After sample containers have been filled and packaged to prevent breakage, they will be packed on wet ice in coolers. Chain-of-custody procedures will commence in the field. Transport of coolers to the contract laboratories will be performed by field personnel and a courier service and will be tracked by the PM. The remaining samples will be transported to ARI in Tukwila, Washington.

3.5.1 Specific procedures are as follows:

- Samples will be packaged and transported in accordance with the U.S. Department of Transportation regulations as specified in 49 Code of Federal Regulations (CFR) 173.6 and 49 CFR 173.24.
- Individual sample containers will be packed to prevent breakage.
- The coolers will be clearly labeled with sufficient information (name of project, time and date container was sealed, name of person sealing the cooler, and office name and address) to enable positive identification.
- Chain-of-custody forms will be enclosed in a plastic bag and placed inside the coolers. Upon transfer of sample possession to the laboratory, the persons transferring custody of the coolers will sign the chain-of-custody form. Upon receipt of the samples at the laboratory, the coolers will

be inspected, and the receiver will record the condition of the samples.

- Custody seals will be used on coolers during transport.

3.6 Agency Communications

USACE was notified on July 30, 2024, and USACE confirmed that the activity was covered under a non-reporting Nationwide Permit with no further authorization required.

4 LABORATORY ANALYSIS

The DMMU samples will be analyzed for sediment conventional and chemical parameters as listed in Tables 8-1 and 8-3 of the 2021 DMMP User Manual. Because biological testing is not proposed to be completed, for total sulfides and ammonia analyses (which are primarily used to support biological testing will not be completed). A small volume of sample material from each DMMU sample will be archived for additional testing if merited by analytical results.

The Z-layer samples and duplicate samples per boring will be archived and available for additional testing if merited by analytical results. The number of samples for each analysis is summarized in Exhibit 4-1, below:

Analytical Parameter	Analytical Method	DMMU Composite	Z-Layer[1]	Discrete Samples	QA Samples
Total Solids	SM 2540 G-97	-	4	8*	4
Total Volatile Solids	PSEP 1986	-	4	8*	4
Grain Size	PSEP 1986	-	4	8*	4
Total Organic Carbon	EPA9060A	-	4	8*	4
Metals	EPA60208/74718	-	4	8*	4
Butyltins (bulk)	EPA8270E-SIM	-	4	8*	4
PAHs	EPA8270E/8270E-SIM	-	4	8*	4
Chlorinated Hydrocarbons	EPA82700-SIM	-	4	8*	4
Phthalates	EPA82700/82700-SIM	-	4	8*	4
Phenols	EPA82700-SIM	-	4	8*	4
Miscellaneous Extractables	EPA82700/82700-SIM	-	4	8*	4
Pesticides & PCBs	EPA8081B	-	4	8*	4
Archive1	-	0	4	8*	4

Exhibit 4-1: Number of Analyses

* 24 discreet samples collected, however, only 8 of 24 were within the dredge prism.

NOTES:

1. Z-layer and archive samples (shaded gray) to be collected for contingency analysis (not immediate analysis).

2. PCBs = polychlorinated biphenyls; PSEP = Puget Sound Estuary Partnership; QA = quality assurance; SIM = selective ion monitoring.

Individual analytes, sample quantitation limits and screening levels are provided in Table 2. The waters of the Knik Arm are marine; as such, the DMMP SLs and BTs established for marine projects will be used to evaluate dredged material suitability. All reasonable means will be used to meet analytical target levels. Detection of analytes between the Method Reporting Limits (MRLs) and Method Detection Limits (MDLs) will be flagged "J" and reported as an estimate. For undetected chemicals, the laboratory goal will be to achieve MDLs or limits of detection below the DMMP marine water SLs and BTs. If the laboratory is unable to achieve sufficiently low MDLs for particular analytes, prior to submitting the final data report, the reasons for the elevated MDLs will be reported.

Samples will be shipped or couriered to the contract laboratories for receipt an analysis within holding times. Samples will be maintained by the laboratory at the temperatures specified in Exhibit 4-2 and analyzed within the holding times shown in the exhibit. The exhibit includes DMMP-recommended bottle types and sizes; however, the laboratory has provided their preferred bottles for the project. In some cases, material for multiple analyses can be extracted from one bottle.

DMMP Recommended Holding Time and Storage1

Analytical Parameter	Holding Time	Temp/ Preservation	Sample Size	Container	Lab Specified Requirements
Grain Size	6 months	4 ± 2 degrees C	100-200 g (75-150 ml)	16 oz glass or HOPE	16 oz HOPE (bottle or bag)
Total Solids	14 days 6 months	4 ± 2 degrees C -18 ± 2 degrees C	125 g (100 ml)	8 oz glass or HOPE	4 oz glass
Total Volatile Solids	14 days 6 months	4 ± 2 degrees C -18 ± 2 degrees C	125 g (100 ml)	8 oz glass or HOPE	4 oz glass
Total Organic Carbon	14 days 6 months	4 ± 2 degrees C -18 ± 2 degrees C	125 g (100 ml)	8 oz glass or HOPE	4 oz glass
Metals	6 months 2 years	4 ± 2 degrees C -18 ± 2 degrees C	50 g (40 ml)	4 oz glass	4 oz glass
Mercury	28 days 1 year	< 6 degrees C -18 ± 2 degrees C	50 g (40 ml)	4 oz glass	4 oz glass
Butyltins (bulk)	6 months	-18 ± 2 degrees C	50g (40ml)	4 oz glass	16 oz glass
PAHs, chlorinated hydrocarbons, phthalates, phenols, miscellaneous extractables, pesticides, and PCBs	14 days until extraction 1 year until extraction 40 days after extraction	4 ± 2 degrees C -18 ± 2 degrees C 4 ± 2 degrees C	150 g (120 ml)	8 oz glass (x2) or 16 oz glass (x1)	16 oz glass
Archive	16oz glass jar without preservative	Stored at -18 ± 2 degrees C			

Exhibit 4-2: DMMP Recommended Sample Holding Times and Storage Guidance

NOTES:

1. Recommended sample holding times and storage guidance from the 2021 DMMP User Manual (Table 7-2).

2. Sample requirements provided by laboratory.

3. 2021 DMMP User Manual does not include recommendations for benzene or PFAS. Information provided by the laboratory.

C = Celsius; g = grams; HOPE=high-density polyethylene; ml =milliliter; oz=ounce; PAHs =polycyclic aromatic hydrocarbons; PCBs =polychlorinated biphenyls

5 QUALITY ASSURANCE AND QUALITY CONTROL

The chemistry quality assurance/quality control (QA/QC) procedures found in Exhibit 5-1 below will be followed. Laboratory methods are provided in Appendix D.

Analyte Type	Method Blank[1]	Duplicate or matrix Spike Duplicate[1]	Sediment Reference Material or Laboratory Control Sample[1]	Matrix Spikes[1]	Surrogates[2]
Total Solids		X	X		
Total Organic Carbon	X	X	X		
Grain Size		X_3			
Metals	X	X	X	X	
$SV0C_{s4}$	X	X	X	X	X
Pesticides	X	X	X	X	X
PCBs	X	X	X	X	X
Butyltins	X	X	X	X	X
TPHs	X	X	X	X	X

Exhibit 5-1: Minimum Laboratory Quality Assurance/Quality Control

NOTES:

1. Frequency of analysis is one per batch. Laboratory control sample to be used rather than Sediment Reference Material.
2. Surrogate spikes will be included with every sample, including matrix-spiked samples, blanks, and reference material.
3. Triplicate.
4. Initial calibration required before any samples are analyzed, after each major disruption of equipment, and when ongoing calibration fails to meet criteria. Ongoing calibration required at the beginning of each work shift, every 10 to12 samples, or every 12 hours (whichever is more frequent), and at the end of each shift.

   SVOCs = semi-volatile organic compounds; TPH = total petroleum hydrocarbons

The analytical laboratory will document the activities associated with sample analyses and will prepare a written report. The following will be included in the report:

- Results of the laboratory analyses and QA/QC results.
- All protocols used during analysis.
- Chain-of-custody procedures, including explanation of any deviations from those identified herein.
- Descriptions of the laboratory analytical protocols and summary of issues encountered during the analysis of sediment samples (e.g., matrix interference and potential sources of interference, elevated detection limits, etc.).
- Location and availability of laboratory data report.

As appropriate, this SAP may be referenced in describing protocols.

6 REPORTING

A Sediment Characterization Report will be prepared to document the physical and chemical character of the proposed dredge material. The physical and chemical reports will be included as appendices to the report; individual copies will be furnished as requested.

Shannon & Wilson will complete Stage 2B validation on 100% of the data. A data validation report will be incorporated as an appendix to the report.

The following will be included in the Sediment Characterization Report:

1. A summary of the sampling event
   a. Sampling equipment and protocols used.
   b. Table with coordinates of actual sampling locations and observed lithologic conditions.
2. Deviations from the approved SAP.
3. A plan view showing sampling locations with an overlay of the DMMU boundaries.

4. A table summarizing the compositing scheme.
5. Table of analyzed concentrations for all the chemicals of concern, lab and validation qualifiers, method reporting limits and MDLs, relevant SLs and BTs, and all SL exceedances highlighted.
6. Chemistry QA review and summary of the data validation results.
7. Appendices/attachments:
    a. Boring logs. Boring logs will include boring coordinates, observed depth to groundwater, and the depth of the interface between the fill and estuarine layers (if observed within the boring).
    b. Photos of the sampling event, to include photos of each split-spoon sample.
    c. Chemistry data report (including a case narrative and laboratory QA/QC reports)
    d. Data validation report

Shannon & Wilson has prepared the enclosed "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of our reports.

7 REFERENCES

Alaska Dredge Material Evaluation Framework (ADMEF), U.S. Army Corps of Engineers, 2024. Draft dredged material evaluation and disposal procedures user manual, available: https://www.poa.usace.army.mil/Portals/34/docs/operations/DraftAlaskaDredgedMaterialEvaluationFrameworkMay2024.pdf

Dredged Material Management Office (DMMO), U.S. Army Corps of Engineers, Seattle District, 2021, Dredged material evaluation and disposal procedures user manual, available: Dredged Material Evaluation and Disposal Procedures User Manual, July 2021 (oclc.org), July.

Shannon & Wilson, 2022, Phase 1 Environmental Site Assessment report, Anchorage Port Modernization Program, Port of Anchorage, Alaska: Report prepared by Shannon & Wilson, Anchorage, Alaska, for the Municipality of Anchorage, Anchorage, Alaska.

Shannon & Wilson, 2023, Phase 2 Environmental Site Assessment report, Anchorage Port Modernization Program, Port of Anchorage, Alaska: Report prepared by Shannon & Wilson, Anchorage, Alaska, for the Municipality of Anchorage, Anchorage, Alaska.

U.S. Army Corps of Engineers (USACE), Alaska District, JBER, Alaska, Email correspondence with Matthew Ferguson providing unpublished data of sediment sampling in 2023.

USACE, Alaska District, JBER, Alaska, Public Notice for POA-2003-00502 M21. July 17, 2024.

U.S. Environmental Protection Agency (EPA), 2024, Correspondence from the EPA Region 10 Water Division to the U.S. Army Corps of Engineers, Alaska District, regarding Revised Public Notice (PN) POA-2003-00502-M22, Knik Arm project, August 16.