Appendix A
Field Change Requests

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Fall 2020
Field Change Request Form

Project Name: US Moorings Project Area **Subconsultant:** Anchor QEA, LLC

Field Activity: Subsurface Sediment Sampling **Request Number:** 1

To: Hunter Young, U.S. Environmental Protection Agency **Date:** 11/2/20

Field Change Request (FCR) Title: Subsurface Sediment Sampling Intervals for Alkylated PAH and TPH Analyses

Description
As discussed in Section 5.4 of the U.S. Environmental Protection Agency (EPA)-approved *Revised Final Pre-Design Investigation Work Plan*, NW Natural proposed analyses of alkylated polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbon (TPH) at select subsurface sediment sample locations within the US Moorings Project Area (Project Area). The locations and intervals to be analyzed for these analyses are identified in Table B5-2 of Appendix B of the *Revised Final Field Sampling Plan*. Six of these locations are in the Record of Decision-identified Shallow Region of the Project Area and have sample depth intervals that are slightly different than the co-located capping evaluation sample intervals. The data quality objective (DQO) for these analyses is to obtain alkylated PAH and TPH data throughout the majority of the core. To simplify the subsurface sediment processing in these six locations while achieving the DQO, NW Natural is proposing minor adjustments to the alkylated PAHs and TPH sampling intervals to be co-located with the capping evaluation sample intervals.

Recommended Change
The locations and recommended sampling interval changes for alkylated PAHs and TPH are highlighted in yellow on the attached Table B5-2. At location USMPDI-020, the 2- to 4-foot sample interval will change to the 2- to 5-foot interval. At the other locations (USMPDI-024, USMPDI-025, USMPDI-029, USMPDI-032, and USMPDI-037), the sample interval will change from every 2 feet to 2 to 5 feet, 5 feet to 7 feet, 7 feet to 10 feet, and 10 feet to 13 feet.

Nik Bacher, Anchor QEA		11/2/20
Respondent Field Coordinator (or Designee)	**Signature**	**Date**

Approval:

Ryan Barth, Anchor QEA		11/2/20
Respondent Project Lead	**Signature**	**Date**

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Fall 2020
Field Change Request Form

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Table B5-2

Table B5-2
Select Hydrocarbon Study Analysis – Sample Locations and Intervals

Sample Location	Surface 0 to 1 foot	2 to 4 Feet	2 to 5 Feet	2 to 4 Feet, 2 to 5 Feet, or Upper DOC[1]	4 to 6 Feet	6 to 8 Feet	8 to 10 Feet	10 to 12 Feet	Upper DOC[2]
USMPDI-001	X			X					
USMPDI-002	X	X							X
USMPDI-004	X	X							X
USMPDI-005	X		X						X
USMPDI-006	X			X					
USMPDI-007	X	X							X
USMPDI-008	X		X						X
USMPDI-009	X	X							X
USMPDI-010	X		X						X
USMPDI-011	X	X							X
USMPDI-013	X	X							X
USMPDI-014	X	X							X
USMPDI-015	X		X						X
USMPDI-016	X		X						X
USMPDI-017	X	X							X
USMPDI-018	X	X							X
USMPDI-019	X		X						X
USMPDI-020	X		X						X
USMPDI-022	X	X							X
USMPDI-023	X			X					
USMPDI-024	X		X		X (5 to 7 feet)	X (7 to 10 feet)		X (10 to 13 feet)	X
USMPDI-025	X		X		X (5 to 7 feet)	X (7 to 10 feet)		X (10 to 13 feet)	X
USMPDI-026	X	X			X	X	X	X	X
USMPDI-027	X	X			X	X	X	X	X
USMPDI-028	X			X					
USMPDI-029	X		X		X (5 to 7 feet)	X (7 to 10 feet)		X (10 to 13 feet)	X
USMPDI-030	X			X					
USMPDI-031	X			X					
USMPDI-032	X		X		X (5 to 7 feet)	X (7 to 10 feet)		X (10 to 13 feet)	X
USMPDI-033	X	X			X	X	X	X	X
USMPDI-034	X	X			X	X	X	X	X
USMPDI-035	X			X					
USMPDI-036	X			X					
USMPDI-037	X		X		X (5 to 7 feet)	X (7 to 10 feet)		X (10 to 13 feet)	X
USMPDI-038	X	X			X	X	X	X	X
USMPDI-039	X			X					
USMPDI-040	X	X			X	X	X	X	X
USMPDI-041	X	X			X	X	X	X	X
USMPDI-042	X	X			X	X	X	X	X
USMPDI-043	X	X			X	X	X	X	X
USMPDI-044	X	X			X	X	X	X	X
USMPDI-046	X								X
USMPDI-047	X			X					

Table B5-2
Select Hydrocarbon Study Analysis – Sample Locations and Intervals

Sample Location	Surface 0 to 1 foot	2 to 4 Feet	2 to 5 Feet	2 to 4 Feet, 2 to 5 Feet, or Upper DOC[1]	4 to 6 Feet	6 to 8 Feet	8 to 10 Feet	10 to 12 Feet	Upper DOC[2]
USMPDI-048	X	X			X	X	X	X	X
USMPDI-049	X	X			X	X	X	X	X
USMPDI-050	X	X			X	X	X	X	X
USMPDI-051	X	X			X	X	X	X	X
USMPDI-052	X	X			X	X	X	X	X
USMPDI-053	X	X			X	X	X	X	X
USMPDI-055	X								X
USMPDI-056	X			X					
USMPDI-057	X	X			X	X	X	X	X
USMPDI-071	X								
USMPDI-072	X								
USMPDI-073	X								
USMPDI-074	X								
USMPDI-075	X								
USMPDI-076	X								
USMPDI-077	X								
USMPDI-078	X								
USMPDI-079	X								
USMPDI-080	X								
USMPDI-081	X								
USMPDI-082	X								
USMPDI-083	X								

Notes:
X: Indicates interval to be analyzed for additional alkylated PAHs and TPH per Table C-5 of the QAPP.
1. The DOC sample interval will be selected for analysis if it overlaps with a selected capping interval.
2. Interval depth to be determined in the field; if overlapping with other cap modeling interval, only the DOC sample interval will be analyzed.
DOC: depth of contamination, sample interval is the uppermost visually impacted interval
PAH: polycyclic aromatic hydrocarbon
QAPP: *Revised Final Quality Assurance Project Plan*
TPH: total petroleum hydrocarbons
USM: US Moorings
* Contingent location, only applies if sediment core is needed at this location

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Project Name: US Moorings Project Area **Subconsultant:** Anchor QEA, LLC

Field Activity: Riverbank Angled Boring Collection **Request Number:** 2

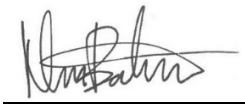
To: Hunter Young, U.S. Environmental Protection Agency **Date:** March 24, 2021

Field Change Request (FCR) Title: Angled Riverbank Boring Location Abandonment

Description
As discussed in Section 6.4 of the U.S. Environmental Protection Agency (EPA)-approved *Revised Final Pre-Design Investigation Work Plan* (PDIWP), NW Natural proposed the advancement of riverbank angled borings at 13 locations within the US Moorings Project Area (Project Area). The locations of the proposed borings are identified in Figure B3-3 of the *Revised Final Field Sampling Plan* (Appendix B to the PDIWP). During the utility locate in preparation for boring advancement, utilities were identified adjacent to two of the proposed locations (USMPDI-065 and USMPDI-066) located in an alleyway between the top of riverbank and adjacent upland structures (Figure 1). The two locations were air-knifed to expose the utilities to further evaluate the possibility of safely advancing the borings at these locations (Attachment A). Neither location could safely be drilled at the proposed locations due to the utility conflicts and the lack of space needed to position the drill rig between the top of riverbank and the adjacent uplands structures. Just north of the target USMPDI-066 location, the building configuration would allow sufficient space for the drill rig to lay down the drill rig mast to advance a boring along the top of riverbank where no utility conflicts were identified. Repositioning USPDI-066 to this location would require a commensurate shift north by location USMPDI-065, but this shift would result in a spacing of approximately 80 feet to USMPDI-064 that is much less than the proposed 150 feet in the PDIWP. During the utility locate, a 12-foot-tall timber bulkhead situated along the alignment shown in Figure 1 was identified that creates a physical barrier between the uplands and the riverbank adjacent to location USMPDI-070. An angled boring cannot be advanced in this location without penetrating the bulkhead, and advancing a vertical boring here would not achieve the data quality objective of characterizing the riverbank soil/sediment quality nor support the sediment remedy remedial design. USMPDI-069, the next boring to the north of this location, had to be adjusted south based on space restrictions and the presence of utilities. Relocating USMPDI-070 to the north to clear the timber bulkhead would position these borings approximately 50 feet apart, which is much closer than the proposed 150 feet in the PDWIP.

Recommended Change
NW Natural proposes to abandon riverbank angled boring locations USMPDI-065 and USMPDI-070 due to the presence of utilities and timber bulkhead wall, respectively, and repositioning the locations to avoid these conflicts will result in a boring separation much closer than the proposed 150 feet and therefore unnecessary to support design. Consistent with Section 3.3.2 and Figure B3-2 of the *Revised Final Field Sampling Plan* (Appendix B to the PDIWP), NW Natural will attempt to collect three-point composite surface (0 to 1 foot below ground surface) soil samples from the face of the riverbank at locations USMPDI-078 and USMPDI-083 adjacent to the proposed abandoned riverbank angled boring locations USMPDI-065 and USMPDI-070, respectively, to characterize the riverbank soil quality in these areas. If collecting the surface samples is not feasible, NW Natural will discuss with EPA whether additional data is necessary to support remedial design.

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Nik Bacher, Anchor QEA		March 24, 2021
Respondent Field Coordinator (or Designee)	**Signature**	**Date**

Approval:

Ryan Barth, Anchor QEA		March 24, 2021
Respondent Project Lead	**Signature**	**Date**

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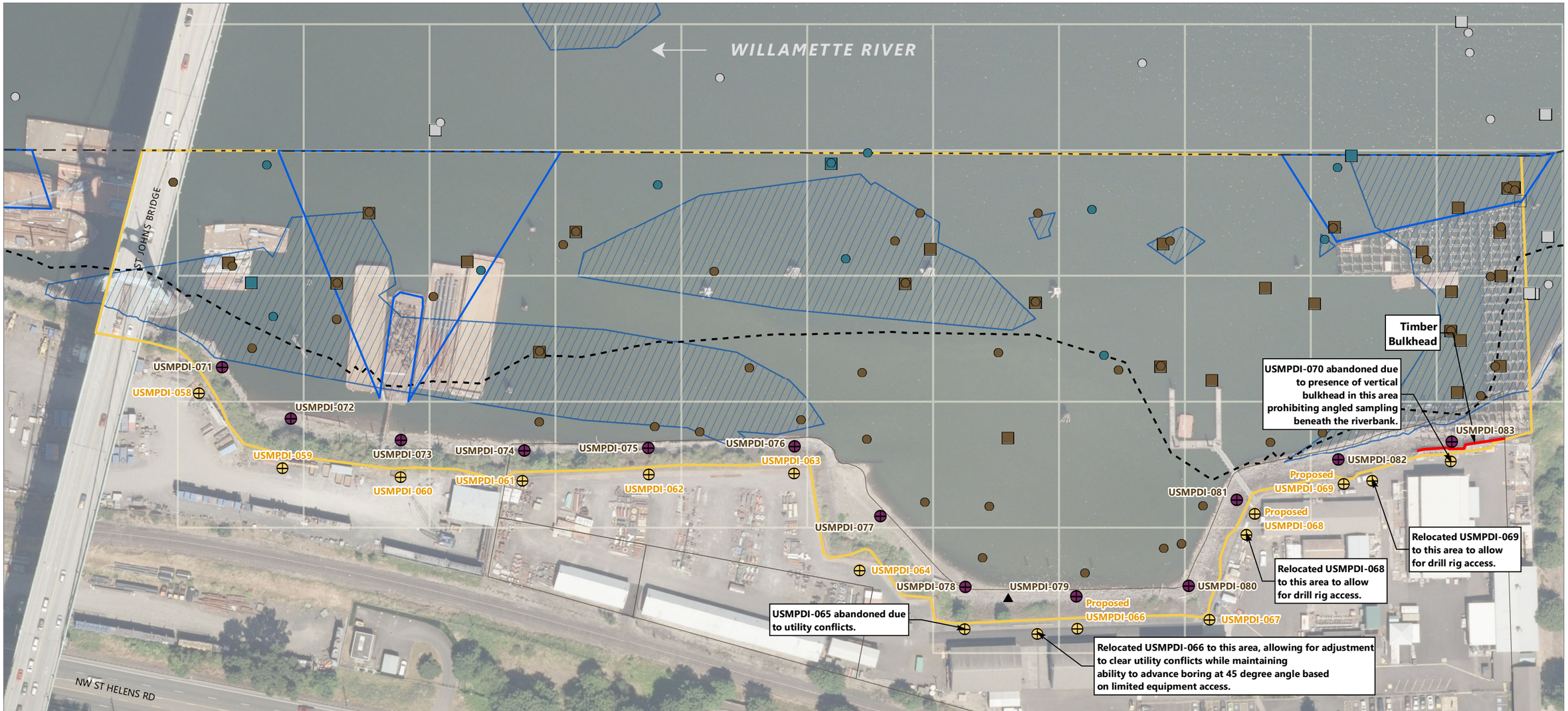
Figure



LEGEND:

- Project Area Boundary
- Navigation Channel
- US Moorings Property Boundary
- Post-ROD SMAs[5]
- Future Maintenance Dredging Area
- Approximate Shallow/Intermediate Zone Boundary
- Timber Bulkhead

Locations Outside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

Locations Inside Project Area

Pre-RD Group Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

ROD Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location
- Seep Sample Location

Proposed PDI Sampling Program

- Angled Top of Riverbank Boring
- Riverbank Soil Sample (for Erodability Testing)

NOTES:

1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 91) Oregon State Plane North, International Feet.
3. Vertical datum is City of Portland (COP), Feet.
4. Aerial imagery from City of Portland 2018.
5. Sediment management areas developed consistent with the ROD-identified methods using the post-ROD dataset identified in the Pre-Design Investigation Work Plan.
6. Shown grid is in 150-foot by 150-foot dimensions to support remedial design data density determinations.

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Feet

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ANCHOR QEA

Figure 1
Revised Proposed Angled Top of Riverbank Boring Locations
Field Change Request No. 2
US Moorings Project Area
USMS0031885

Attachment A

Approximate 1-inch waterline. Locator depth identified at 4.66 feet bgs. Not exposed in field.

Approximate 6-inch fire suppression waterline.

Asphalt roadway not in photograph but above stake in photograph.

Approximate 6-inch fire suppression waterline. Top of pipe at 2.83 feet bgs and bottom at 3.33 feet bgs. Location of 6-inch line is 3.5 feet east of asphalt road. View looking southwest.

Approximate 1-inch waterline. Top at 2.39 feet bgs and bottom at 2.5 feet bgs. View looking northwest. Line 2.95 feet east of stake.

Fence line

Approximate 1-inch waterline. Top at 2.39 feet bgs and bottom at 2.5 feet bgs. View looking northeast.

No riverbank wedge behind vertical timber bulkhead.

12-foot-high timber bulkhead separating uplands from intertidal area.

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Project Name: US Moorings Project Area **Subconsultant:** Anchor QEA, LLC

Field Activity: Riverbank Surface Soil Collection **Request Number:** 3

To: Hunter Young, U.S. Environmental Protection Agency **Date:** April 1, 2021

Field Change Request (FCR) Title: Riverbank Surface Soil Location Abandonment

Description
As discussed in Section 6.3 of the U.S. Environmental Protection Agency (EPA)-approved *Revised Final Pre-Design Investigation Work Plan* (PDIWP), NW Natural proposed to collect riverbank surface (0 to 1 foot) soil for erodibility testing at 13 locations within the US Moorings Project Area (Project Area). The locations of the proposed surface soil locations are identified in Figure B3-2 of the *Revised Final Field Sampling Plan* (FSP; Appendix B to the PDIWP) and were preliminarily identified at approximately 150-foot center across the entire Project Area riverbank pending any necessary repositioning during field sampling based on the encountered presence/absence of erodible soils. On March 29, 2021, Anchor QEA and EPA oversight personnel performed visual reconnaissance throughout the entire Project Area riverbank to document any presence of erodible soils (material less than 2 inches in diameter per Section 3.3.2 of the FSP) suitable to be collected for analysis. Representative photographs of the ground surface at each proposed location are included in the attached photograph log (Attachment A). As shown in the photograph log, nearly the entire riverbank is covered with large riprap and smaller gravels that are significantly larger than 2 inches in diameter, except for two small areas of the riverbank near locations USMPDI-073 and USMPDI-077. Anchor QEA successfully collected surface (0 to 1 foot) samples at both locations on March 30, 2021. The FSP-identified samples were to be collected as a composite of three grab samples in a triangular pattern with an equidistant spacing of approximately 25 feet around the proposed target location. However, field observations only indicated surface soils less than 2 inches in diameter in an approximately 10-foot-by-10-foot area, so only two grab samples were collected at each location and homogenized into a composite sample for subsequent analysis in accordance with Section 5.2 of the FSP.

Recommended Change
As verbally agreed with EPA oversight personnel during the visual reconnaissance, NW Natural proposes to abandon all riverbank surface soil locations other than USMPDI-073 and USMPDI-077 due to the lack of surface erodible soils, as photograph documented in Attachment A. In addition, due to the small area of potentially erodible solids at locations USMPDI-073 and USMPDI-077, a two-point composite grab sample was homogenized to create the sample at these locations, and the mid-point of the two samples will be used as the sampling location.

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Nik Bacher, Anchor QEA		April 1, 2021
Respondent Field Coordinator (or Designee)	**Signature**	**Date**

Approval:

Ryan Barth, Anchor QEA		April 1, 2021
Respondent Project Lead	**Signature**	**Date**

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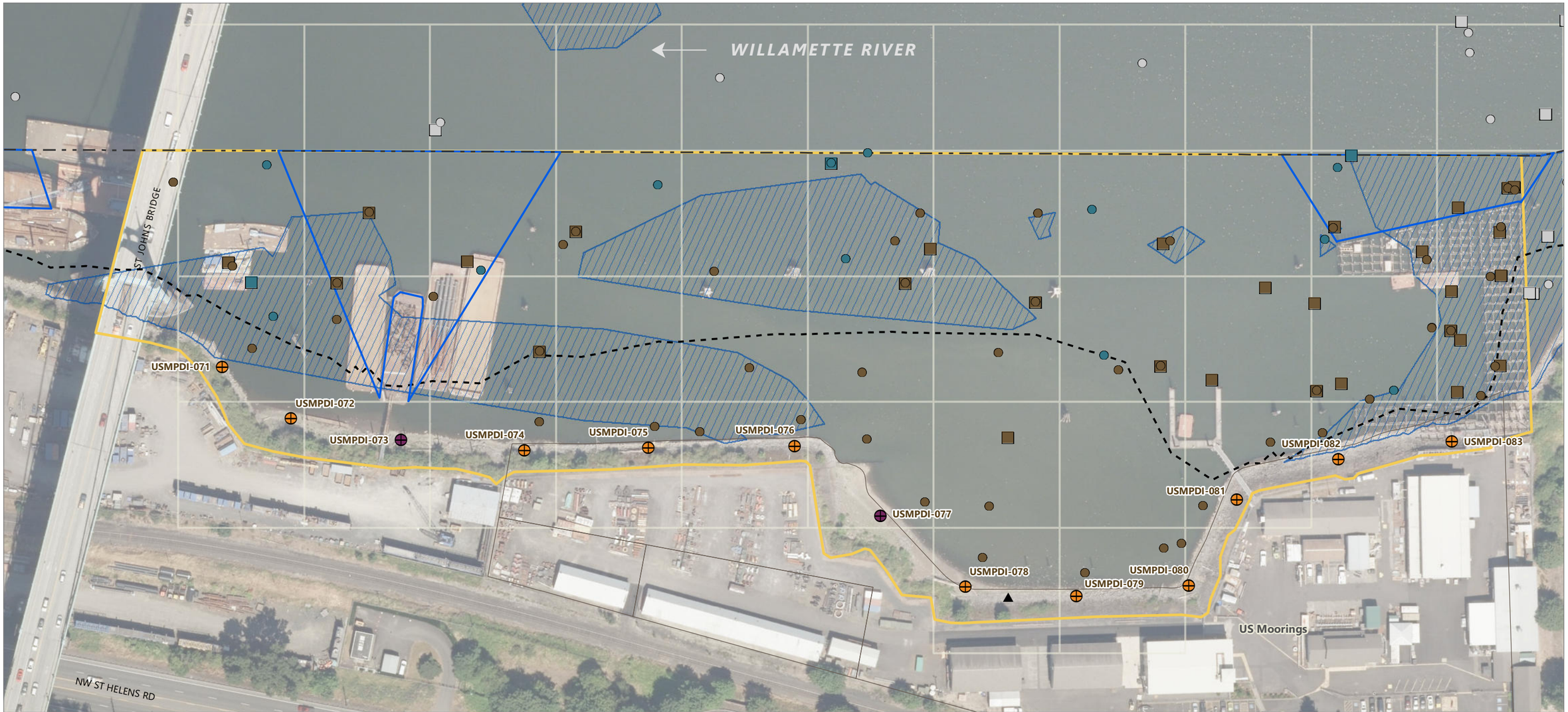
Figure



LEGEND:

- Project Area Boundary
- Navigation Channel
- US Moorings Property Boundary
- Post-ROD SMAs[5]
- Future Maintenance Dredging Area
- Approximate Shallow/Intermediate Zone Boundary

Locations Outside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

Locations Inside Project Area

Pre-RD Group Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

ROD Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location
- Seep Sample Location

Proposed PDI Sampling Program

- Riverbank Soil Sample (for Erodibility Testing)
- Abandoned River Bank Soil Sample (for Erodibility Testing) Due to Erodible Soils Not Present

NOTES:

1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 91) Oregon State Plane North, International Feet.
3. Vertical datum is City of Portland (COP), Feet.
4. Aerial imagery from City of Portland 2018.
5. Sediment management areas developed consistent with the ROD-identified methods using the post-ROD dataset identified in the Pre-Design Investigation Work Plan.
6. Shown grid is in 150-foot by 150-foot dimensions to support remedial design data density determinations.

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Feet

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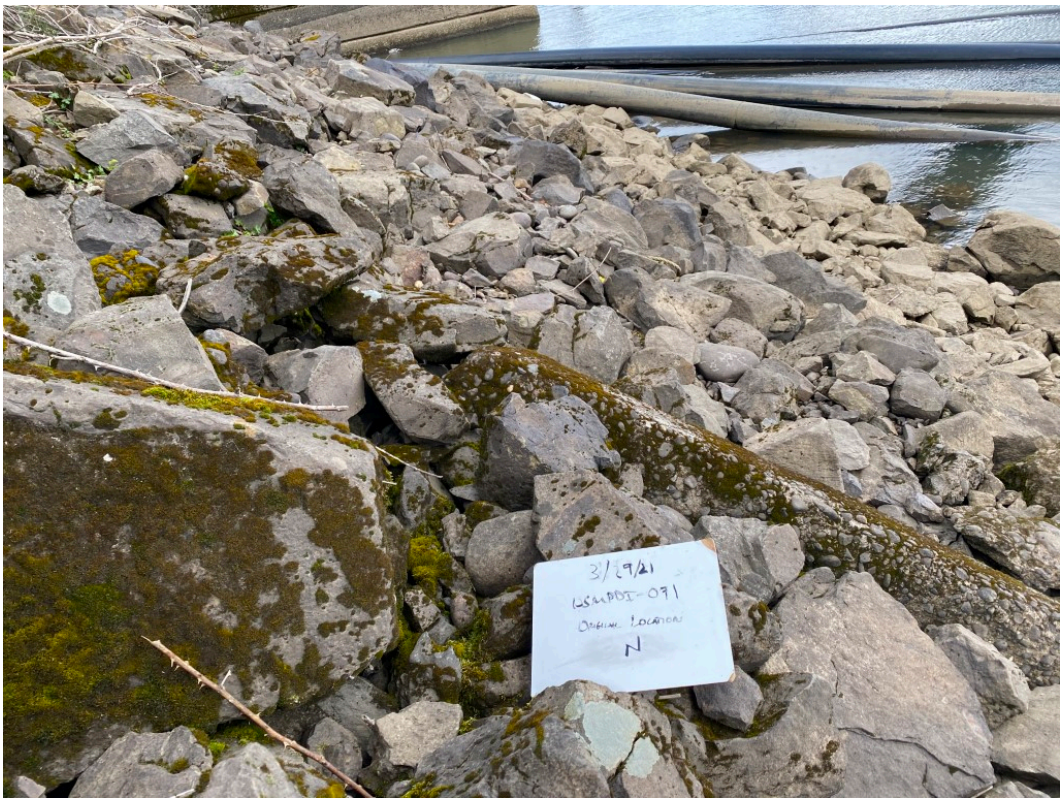
ANCHOR QEA

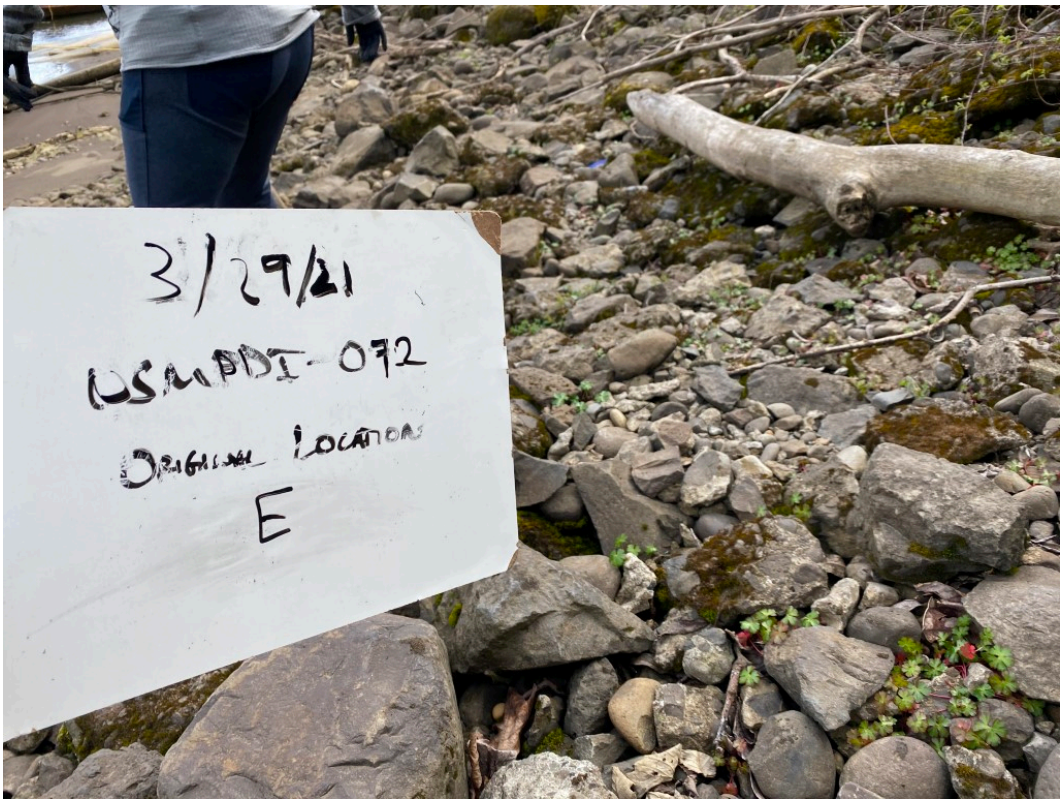
Figure 1
Revised Proposed Riverbank Surface Soil Sampling Locations
Field Change Request No. 3
US Moorings Project Area
USMS0031893

Attachment A
Riverbank Photograph Log

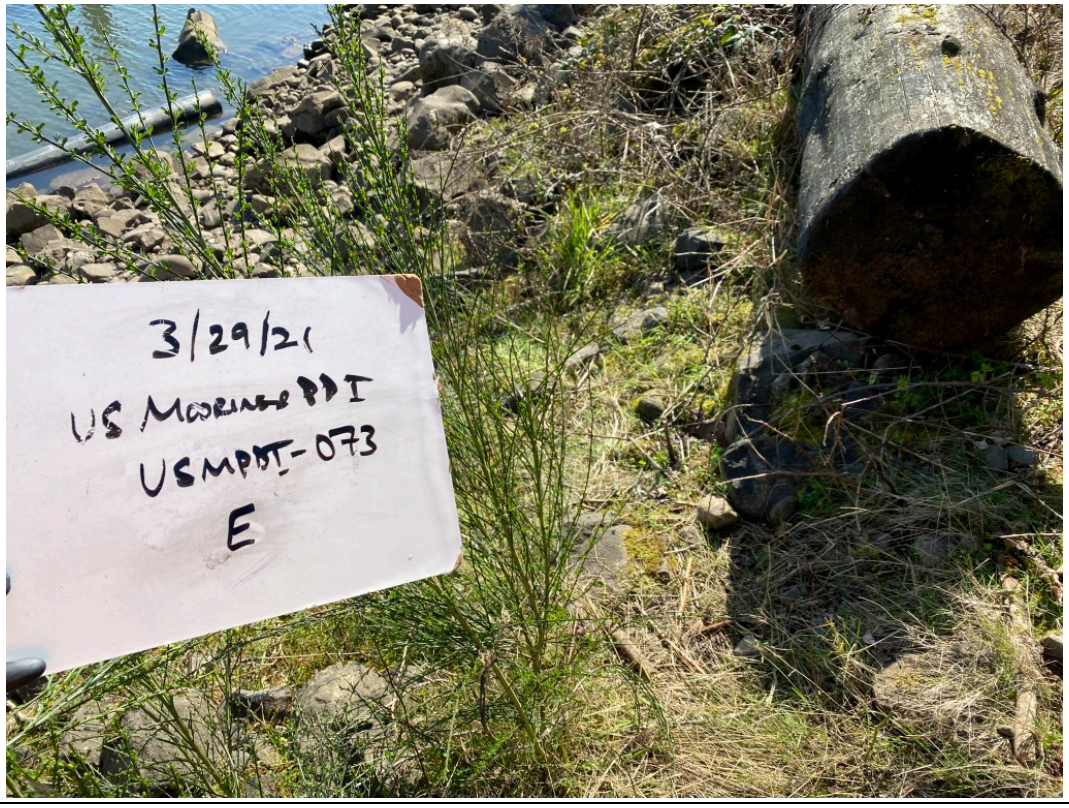
USMPDI-071
Facing North, No Erodible Soils Present



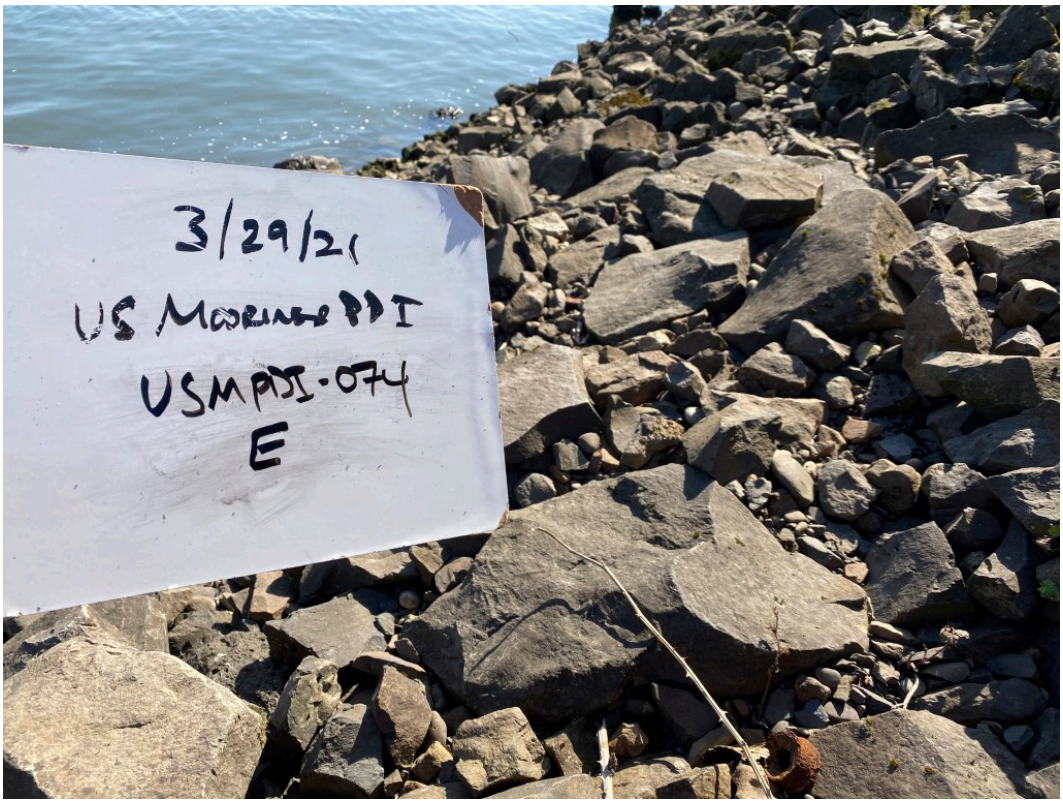
USMPDI-072
Facing East, No Erodible Soils Present



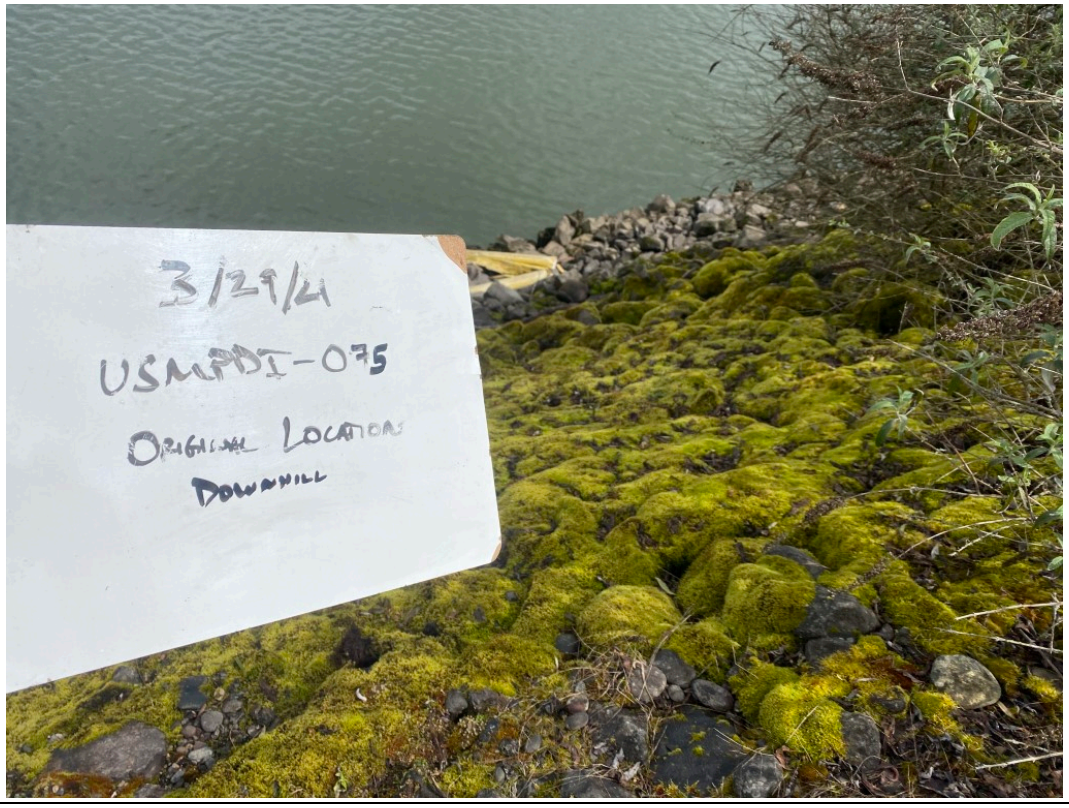
USMPDI-073
Facing East, Erodible Soils Present



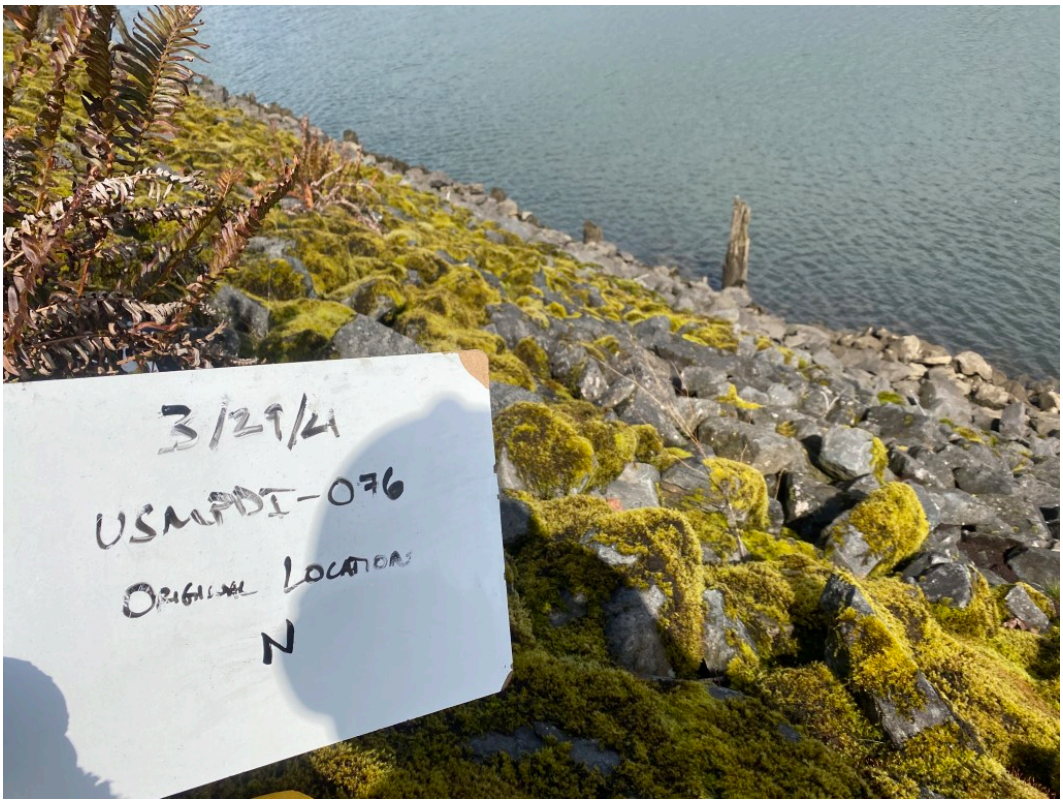
USMPDI-074
Facing East, No Erodible Soils Present



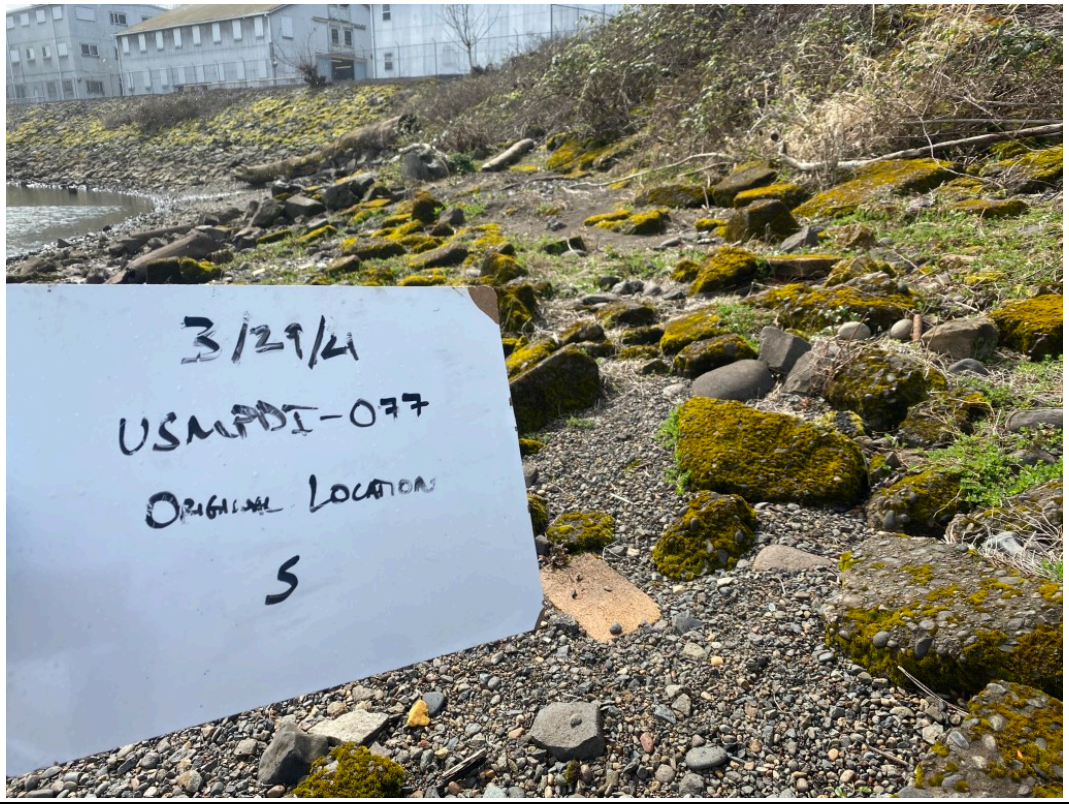
USMPDI-075
Facing North, No Erodible Soils Present



USMPDI-076
Facing North, No Erodible Soils Present



USMPDI-077
Facing South, Erodible Soils Present



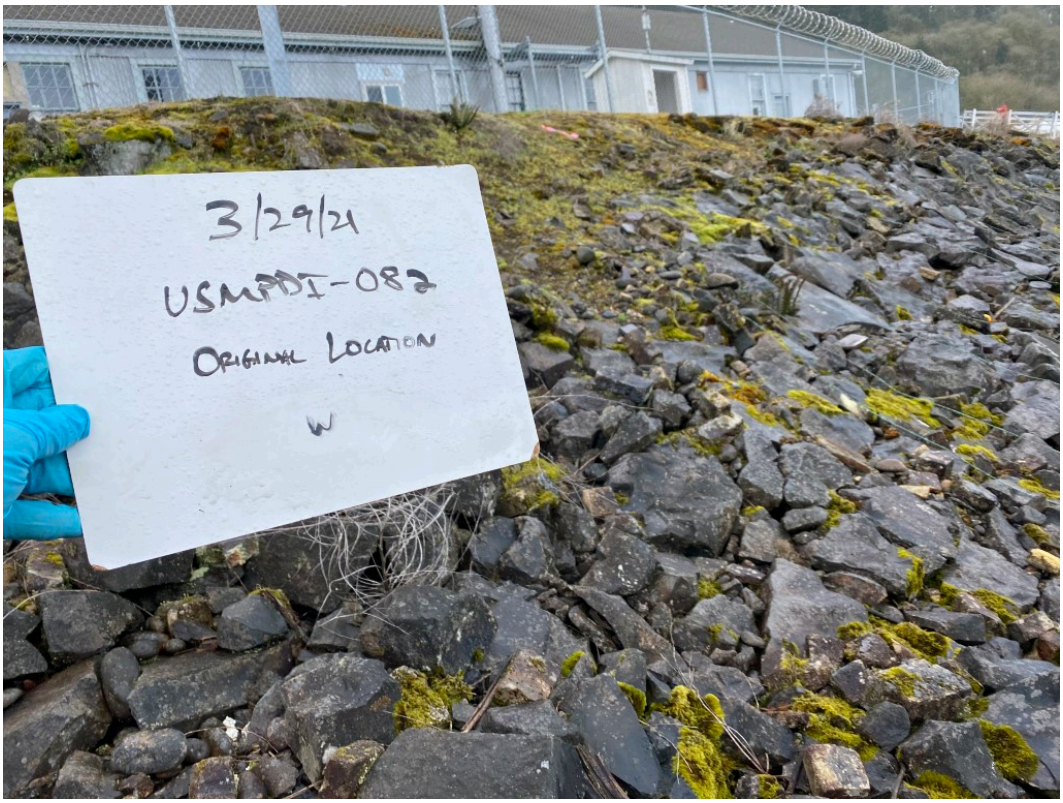
USMPDI-078
Facing East, No Erodible Soils Present

USMPDI-079
Facing East, No Erodible Soils Present

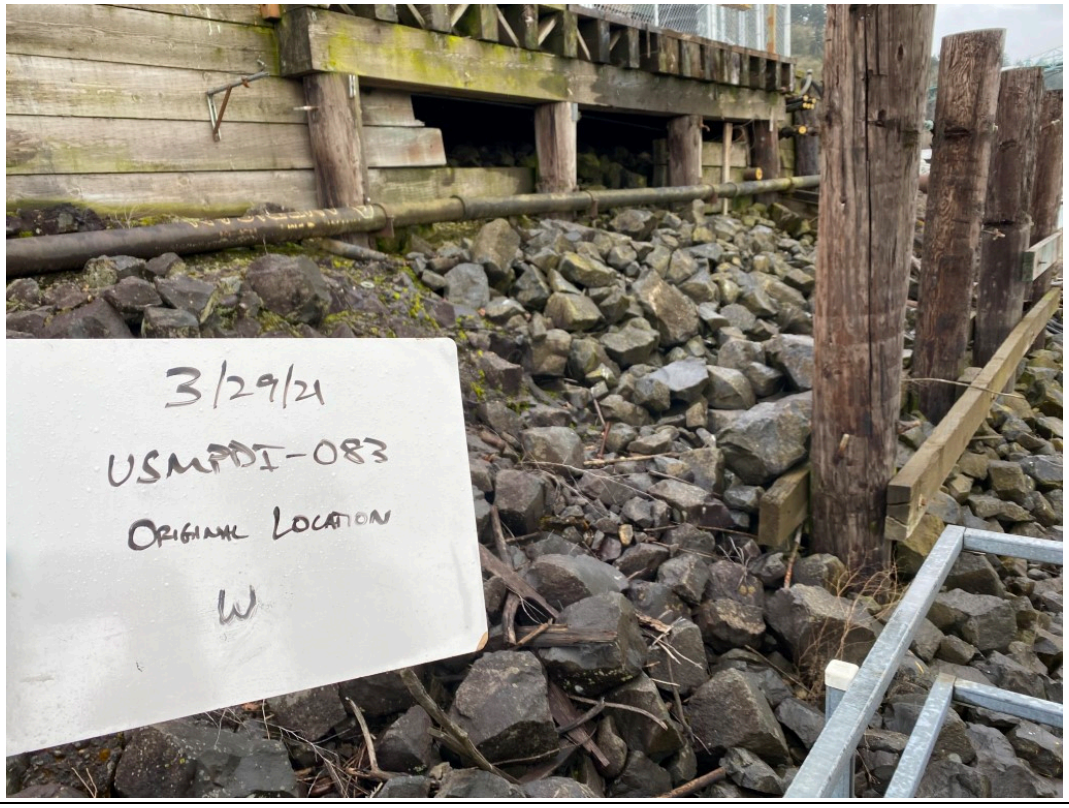
USMPDI-080
Facing South, No Erodible Soils Present

USMPDI-081
Facing North, No Erodible Soils Present

USMPDI-082
Facing West, No Erodible Soils Present



USMPDI-083
Facing West, No Erodible Soils Present



NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Project Name: US Moorings Project Area **Subconsultant:** Anchor QEA, LLC

Field Activity: Surface and Subsurface Sediment Sampling **Request Number:** 4

To: Hunter Young, U.S. Environmental Protection Agency **Date:** May 4, 2021

Field Change Request (FCR) Title: Surface and Subsurface Station Abandonment and Modified Coring Approach for Remaining Shallow Stations

Description
Starting in September 2020 and continuing to date, NW Natural has been conducting pre-design investigation (PDI) activities in the US Moorings Project Area (Project Area) in accordance with the U.S. Environmental Protection Agency (EPA)-approved *Revised Final Pre-Design Investigation Work Plan* (PDIWP). As discussed in Section 3.3 of the PDIWP, the surface sediment grabs are being collected and analyzed to refine the sediment management areas within the Project Area based on exceedances of the Record of Decision (ROD) Table 21 remedial action levels and principal threat waste-highly toxic thresholds. As shown in Figure 1, proposed station USMPDI-032 is in an area surrounded by stations USMPDI-026, USMPDI-033, USMPDI-037, USMPDI-029, and USMPDI-025. All of those stations are within 150 feet of their nearest neighbor, so the remedial design data density data quality objective in this area has been achieved. Therefore, NW Natural proposes to remove both surface and subsurface sampling at station USMPDI-032 from the PDI sampling program. As discussed in Section 6.2 of the PDIWP, NW Natural proposed to collect cores to a maximum depth of 16 feet below mudline (bml) or to refusal in the shallow region. Based on current and forecasted river surface water elevations and information gathered during the sampling over the last 2 weeks, four stations (USMPDI-028, USMPDI-030, USMPDI-031, and USMPDI-035; Figure 1) are located in the shallow embayment with insufficient river surface water elevations to allow collection of 16-foot subsurface cores using the PDI coring equipment. The sampling contractor's smaller boat is able to access this shallow area, but this boat is only capable of collecting cores to a maximum depth of 8 feet bml. Based on existing information from core stations collected during this PDI (e.g., USMPDI-005, USMPDI-015, and USMPDI-008) in similar nearshore locations but with greater water depth, it is unlikely that these four locations will have more than 8 feet of recoverable sediment before hitting a gravel/riprap layer that prevents deeper sampling. In addition, there is a single historical core collected from this area that was sampled down to 6 feet by the same marine contractor in 2008 with no identified sediment quality exceedances, and the current remedial technology identified in this area by the ROD is monitored natural recovery because no exceedances have been detected. For these reasons, NW Natural believes the feasible shorter core depth will achieve the necessary data quality objectives to complete remedial design in this area.

Recommended Change
NW Natural proposes to remove station USMPDI-032 from the PDI sampling program due to sufficient data density in this area and to use an 8-foot coring assembly to collect stations USMPDI-028, USMPDI-030, USMPDI-031, and USMPDI-035 due to anticipated shallow refusal and insufficient river water surface elevations to collect the proposed 16-foot cores.

NW Natural Pre-Remedial Design Data Gaps Sampling
US Moorings Project Area – Spring 2021
Field Change Request Form

Nik Bacher, Anchor QEA		May 4, 2021
Respondent Field Coordinator (or Designee)	**Signature**	**Date**

Approval:

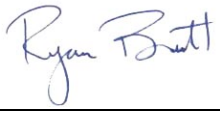
Ryan Barth, Anchor QEA		May 4, 2021
Respondent Project Lead	**Signature**	**Date**

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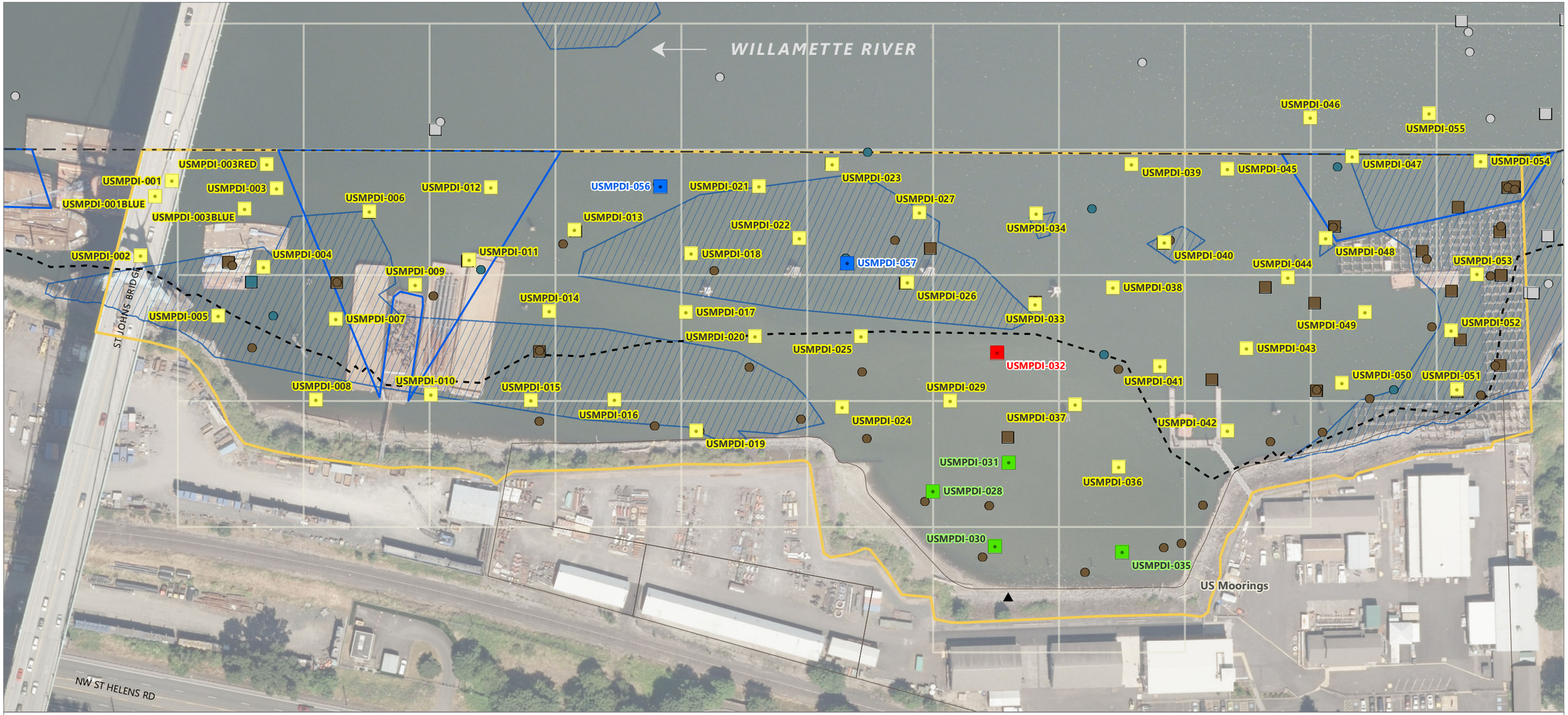
Figure



LEGEND:

- Project Area Boundary
- Navigation Channel
- US Moorings Property Boundary
- Post-ROD SMAs[5]
- Future Maintenance Dredging Area
- Approximate Shallow/Intermediate Zone Boundary

Locations Outside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

Locations Inside Project Area

Pre-RD Group Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location

ROD Data Inside Project Area

- Surface Sediment Location
- Subsurface Sediment Location
- Seep Sample Location

Proposed PDI Sampling Program

- Subsurface Sediment Core (DOC and Capping Evaluation)
- Co-located Surface and Subsurface Sediment Grab and Core (SMA Refinement, DOC, and Capping Evaluation) Dependent on Sampling Location in Relation to the Shallow/Intermediate Zone Boundary, Collected Using Either 20-ft or 16-ft Core Assembly
- Co-located Surface and Subsurface Sediment Grab and Core (SMA Refinement, DOC, and Capping Evaluation) Collected Using 8-ft Core Assembly
- Co-located Surface and Subsurface Sediment Grab and Core (SMA Refinement, DOC, and Capping Evaluation); Station removed from sampling program due to sufficient data density to meet data quality objectives in this area

NOTES:

1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 91) Oregon State Plane North, International Feet.
3. Vertical datum is City of Portland (COP), Feet.
4. Aerial imagery from City of Portland 2018.
5. Sediment management areas developed consistent with the ROD-identified methods using the post-ROD dataset identified in the Revised Final Pre-Design Investigation Work Plan.
6. Shown grid is in 150-foot by 150-foot dimensions to support remedial design data density determinations.

0 150
Feet

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ANCHOR QEA

Figure 1
Revised Surface and Subsurface Sediment Sampling Locations
Field Change Request No. 4
US Moorings Project Area
USMS0031905