# MEMORANDUM FOR RECORD

**SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL TESTED FOR THE FEDERAL QUILLAYUTE O&M NAVIGATION DREDGING PROJECT (CENWS-TS-NS-31 FY: 2010-2015) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR BEACH NOURISHMENT AT DESIGNATED BENEFICIAL USE SITES.**

1. The following summary reflects the consensus suitability determination of the Agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington on testing conducted for the dredging of the U.S. Army Corps of Engineers Federal Quillayute O&M Navigation Project. The Quillayute small boat basin and navigation channel is part of the harbor at La Push, Washington. It provides for an entrance channel maintenance depth of 10 feet, a channel, 75 feet wide, extending about three-quarters of a mile upstream to Smith Slough, and maintenance of a boat basin. The proposed project work consists of evaluating approximately 100,000 cubic yards (cy) of routine maintenance material within the entrance channel and boat basin. Disposal occurs on the ocean side of the spit, to nourish the spit and to nourish Rialto Beach via littoral drift. Disposal also occurs on the Quileute Tribal Reservation in a specified upland location (Figure 1: Vicinity Map (inset), Federal Navigation channel and boat basin dredging areas, and disposal areas).

2. **Table 1** documents the regulatory tracking information and dates for the DMMP testing.

### *Table 1. Regulatory Tracking Information and Dates*

| | |
|---|---|
| Initial SAP submittal date: | September 28, 2010 |
| SAP approval date:<br>(email approval due to short suspense) | September 30, 2010 |
| Sampling date: USACE Corps Vessel NWS-1-16-33 | October 5, 2010<br>(at 15 Ponar grab sample Stations) |
| Characterization Report submittal: | December 6, 2010 |
| Volume Tested (# DMMUs), Sampling Method: | 100,000 cy; (3 DMMUs); Ponar Grab |
| DAIS Tracking Number: | QUILL-1-A-F-301 |
| **Recency Determination Date:**<br>**Moderate/Low** = (5 + 7)/2 = 6 **years** | October 2016 (**Moderate**/**Low**) |

## Background:

3. The proposed project work consists of routine maintenance dredging of approximately 75,000 to 100,000 cubic yards from the entrance channel and the boat basin. Dredging cycles vary, with dredging occurring approximately every two years. Material is deposited primarily on the ocean side of the spit, to nourish the spit and to nourish Rialto Beach via littoral drift. Disposal also occurs on the Quileute Tribal Reservation in a specified upland location (**Figure 1:** Vicinity Map (inset), Federal navigation channel and boat basin dredging areas, and disposal areas).

4. Sand, gravel and cobbles from the outer portion of the entrance channel is proposed to be deposited upland at Site A to provide construction material for Quileute Tribal projects. The Tribe will coordinate with the regulatory agencies on any other prospective deposits of material at Site A. Assurances will be received from the Quileute Tribal Council that material placed at Site A will not be used to fill any water of the United States, including wetlands or flood plains. The Tribe will be required to comply with any conditions in the Water Quality Certification that mandate annual reporting of the fate of the dredged material usage on Tribal land. Any use of the Site A material for Tribal project needs shall comply with all applicable environmental regulations.

5. The Quillayute navigation channel is ranked "low" and the boat basin is ranked "moderate" by the Dredged Material Management Program (DMMP) agencies for concern for potential contamination. The Quillayute navigation project underwent a recency extension determination during 2009. The boat basin was last characterized in 2005, and the navigation channel was previously excluded from testing during 1993. Details from the recency extension, last characterization, and exclusionary testing determination can be found in the following suitability determinations:

   http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/USACE-Quillayute-rec-DY09-SDM.pdf

   http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/Quillayute-SDM.pdf

   http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/USACE-Quillayute-DY94-SDM.pdf

6. The project was ranked **moderate** in the boat basin, and **low** within the navigation channel for this DMMP characterization. The initial SAP was submitted on September 28, 2010, and approved by the DMMP agencies on September 30, 2010 (See **Table 1**).

## Sampling:

7. **Figure 1** depicts the site vicinity and **Figures 2-4** depict the locations for the 15 sampling stations occupied for the 2010 characterization effort within the three DMMUs. The three DMMUs were comprised of composited samples from 3 stations/samples respectively in DMMUs 1 and 3, and 9 stations/samples in DMMU-2 (see **Table 2**). Sampling from the USACE Motor Vessel NWS-1-16-33 on October 5, 2010, consisted of collecting surface samples with a Ponar Grab, in lieu of the Van-Veen grab sampler approved in the SAP. This departure in sampling equipment was coordinated and approved by the DMMP agencies during the sampling effort. The Data Characterization Report was submitted to the DMMP agencies for review on December 6, 2010, and included full data validation on the dioxin testing results. The DMMP agencies concluded, after reviewing the data validation report, that the data was acceptable for decision-making using best professional judgment.

**Table 2. Actual Sediment Sampling Locations (Quillayute Boat Basin & Navigation Channel)**

| DMMU Station ID | Sample Station ID | Latitude* | Longitude* | Date | Time | Water Depth (ft) | Tide (ft. MLLW) | Elevation (ft. MLLW) |
|---|---|---|---|---|---|---|---|---|
| DMMU-1 (boat basin) | DMMU-1A | 47.91237535 | -124.6358789 | 5-Oct-10 | 13:58 | 6.0 | 4.1 | -1.9 |
| | DMMU-1B | 47.91175127 | -124.6363637 | 5-Oct-10 | 14:10 | 8.3 | 3.7 | -4.6 |
| | DMMU-1C | 47.91079127 | -124.6370119 | 5-Oct-10 | 14:20 | 11.1 | 3.6 | -7.49 |
| DMMU-2 (navigation channel) | DMMU-2A | 47.91171271 | -124.6378093 | 5-Oct-10 | 8:20 | 12.0 | 3.8 | -8.2 |
| | DMMU-2B | 47.9117195 | -124.638022 | 5-Oct-10 | 8:56 | 11.5 | 4.7 | -6.8 |
| | DMMU-2C | 47.91141721 | -124.6379578 | 5-Oct-10 | 9:07 | 14.4 | 5.3 | -9.14 |
| | DMMU-2D | 47.91141271 | -124.6383735 | 5-Oct-10 | 9:20 | 11.0 | 5.9 | -5.1 |
| | DMMU-2E | 47.91122 | -124.638353 | 5-Oct-10 | 11:05 | 17.0 | 7.5 | -9.5 |
| | DMMU-2F | 47.91065656 | -124.6392072 | 5-Oct-10 | 10:00 | 11.5 | 6.7 | -4.8 |
| | DMMU-2G | 47.91034504 | -124.6387078 | 5-Oct-10 | 13:00 | 14.0 | 5.4 | -8.59 |
| | DMMU-2H | 47.90991362 | -124.6395036 | 5-Oct-10 | 13:30 | 13.3 | 5.3 | -8.05 |
| | DMMU-2I | 47.90940679 | -124.6404035 | 5-Oct-10 | 13:40 | 15.0 | 4.5 | -10.5 |
| DMMU-3 (navigation channel) | DMMU-3A | 47.90672034 | -124.6436857 | 5-Oct-10 | 11:50 | 16.0 | 7.3 | -8.7 |
| | DMMU-3B | 47.90633948 | -124.6442725 | 5-Oct-10 | 11:40 | 15.0 | 7.4 | -7.61 |
| | DMMU-3C | 47.90608094 | -124.6441856 | 5-Oct-10 | 11:32 | 14.0 | 7.4 | -6.57 |

*NAD83 WA State Plane Coordinates

## Chemical Testing Results:

8. The conventional and DMMP chemical analyses results are summarized in **Table 3,** and the comparative Sediment Management Standards (SMS) evaluation summary is provided in **Table 3**. It demonstrates that for chemicals of concern including dioxin/furan, no chemicals exceeded DMMP screening level guidelines, or bioaccumulation triggers. Evaluation of these data relative to SMS guidelines, indicate that there were no Sediment Quality Standard (SQS) exceedances within boat basin DMMU-1. There were undetected exceedances of SQS for 1,2,4-Trichlorobenzene and Hexachlobenzene for DMMUs 2 and 3 within the navigation channel, primarily due to low TOCs (e.g., 0.53 % and 0.19 %). Likewise there was a detected SQS exceedance for 2-Methyl-Napthalene within DMMU-2, which was attributable to the relatively low TOC (0.53%). After reviewing these exceedances, the DMMP agencies agreed that the use of dry weight values is more appropriate based on best-professional-judgment (BPJ). All three chemicals are below dry weight LAET values.

9. **Table 4** provides a summary of the validated dioxin/furan congener specific testing results for the three DMMUs, which also included a duplicate analysis of DMMU-1. Quantitated toxicity equivalence concentrations (TEQ ½ DL) were low, ranging from a low of 0.11 pptr (DMMU-3) to a high of 0.35 pptr (DMMU-1) for the dioxin testing results.

10. The existing DMMP dioxin guideline in place for Coastal Washington is 15 pptr-TEQ, for interpreting dioxin data. All three DMMUs are quantitated well below the existing guideline of **15.0- pptr-TEQ,** and all the dredged material within the Quillayute dredging project is suitable for beneficial use at beach nourishment sites, including Rialto Beach, or other approved locations.

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## Suitability Determination:

11. In summary, the results of these analyses (including all DMMP COCs and dioxins/furans) after comparison to SMS guidelines, indicate that all 100,000 cy of proposed dredged material are suitable for beneficial use at beach nourishment sites, including Rialto Beach, or other approved locations.

12. This memorandum documents the suitability of material proposed for dredging from the Quillayute Federal maintenance dredging project in La Push, Washington, for disposal at an appropriate beneficial use site. However, this suitability determination does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404(b)(1) of the Clean Water Act.

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Concur:

1/6/2011
Date

David Kendall, Ph.D., Seattle District Corps of Engineers

01/06/2011
Date

Laura Inouye, Ph.D., Washington Department of Ecology

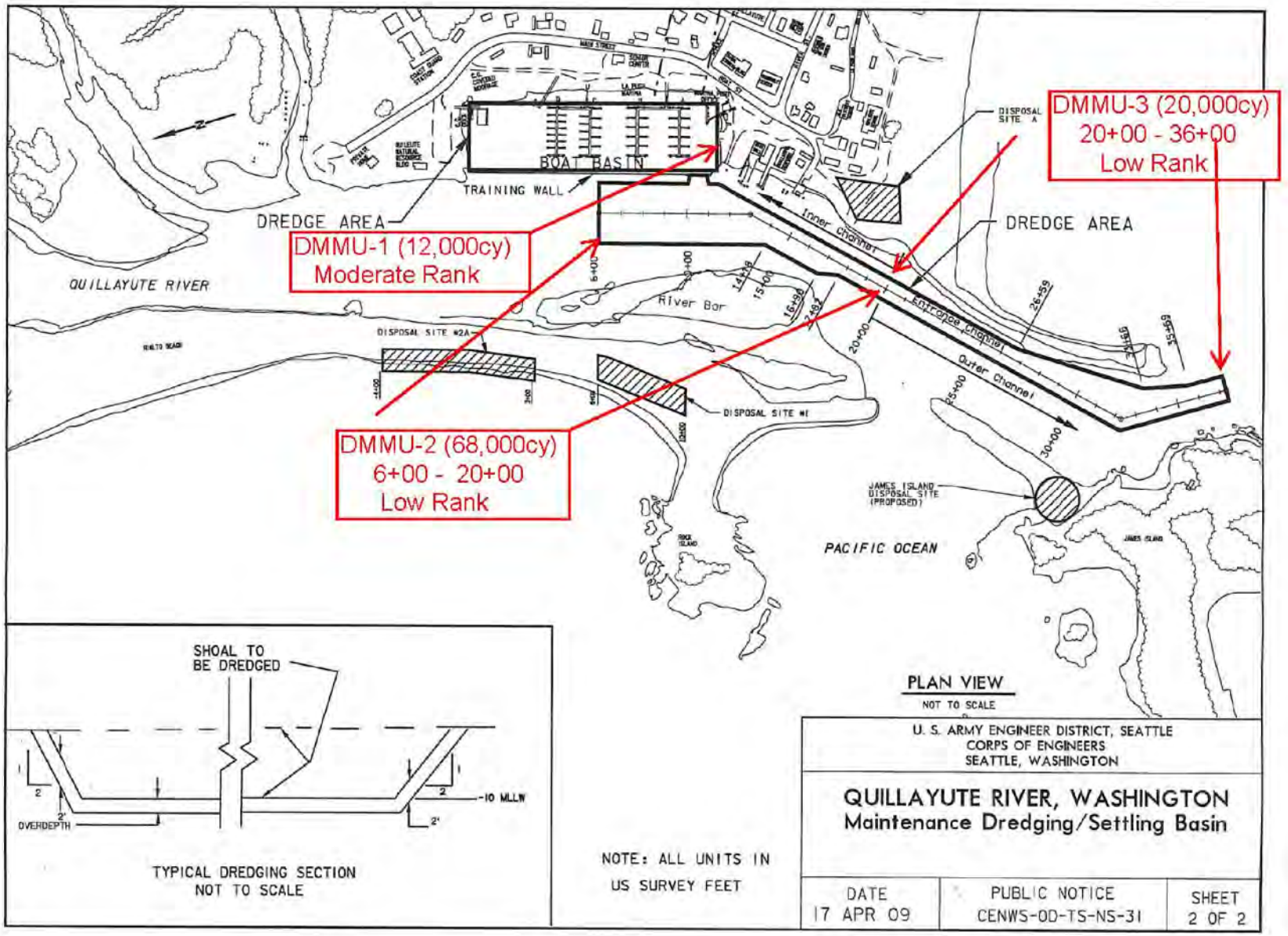
1/6/11
Date

Justine Barton, Environmental Protection Agency, Region 10

01/06/2011
Date

Dave Vagt, Washington Department of Natural Resources

John Pell, Corps Navigation Project Manager
Laura Inouye, Ph.D., Ecology
Justine Barton, EPA
Dave Vagt, DNR
DMMO File



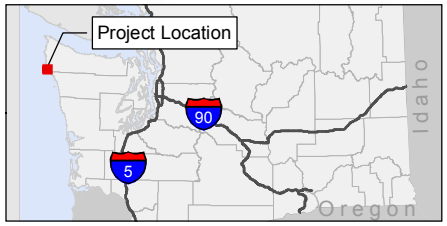
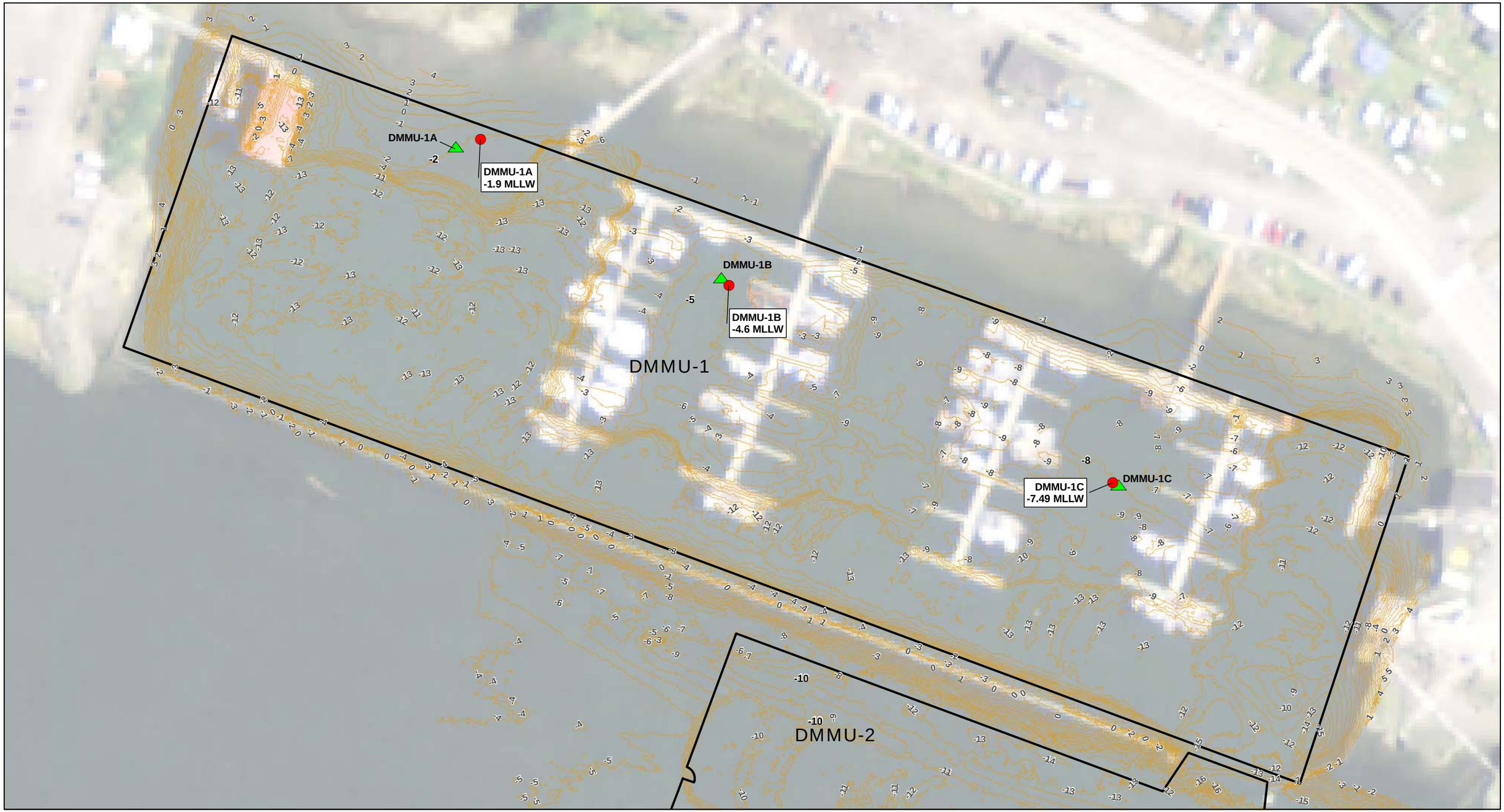




Figure 1. **Project Location Map**

*Sediment Evaluation of Quillayute Navigation Channel and Boat Basin*




Source: NAIP (2009) Aerial Photograph.

- Actual Sample Location
- Proposed Sample Location
- 1-Foot Contour (Mean Lower Low Water)
- DMMU

N

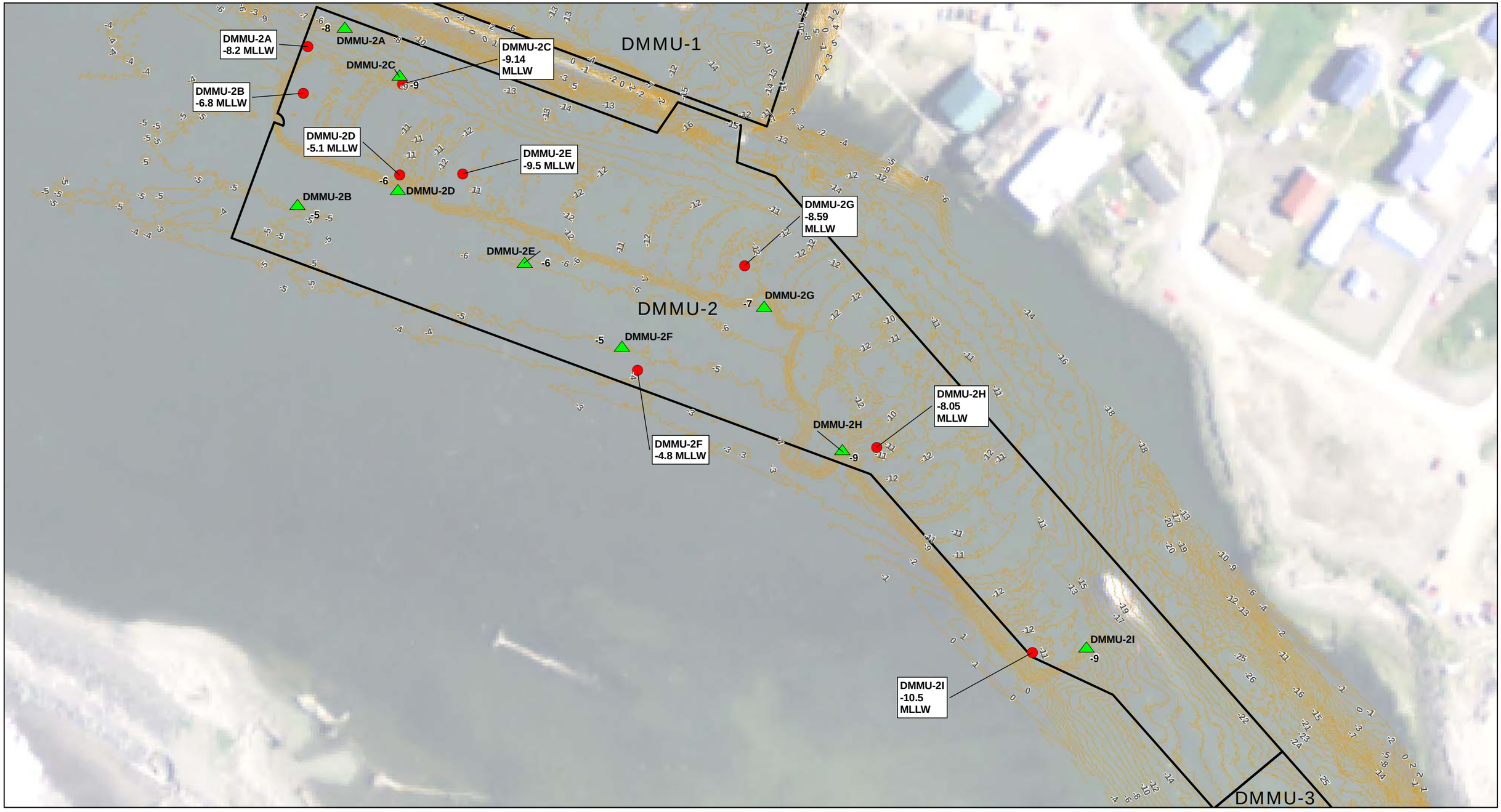
0 200 Feet

Figure 2
**DMMU-1 Sample Locations**

*Sediment Evaluation of Quillayute Navigation Channel and Boat Basin*

\\SIMBA\PROJ\USARMYCORPSOFENGINEE\410174QUILLAYUTESEDE\GIS\MAPFILES\LAPUSH_DMMU_SAMPLESURVEY.MXD RGRABARE 10/29/10 16:00:53

CH2MHILL




Source: NAIP (2009) Aerial Photograph.

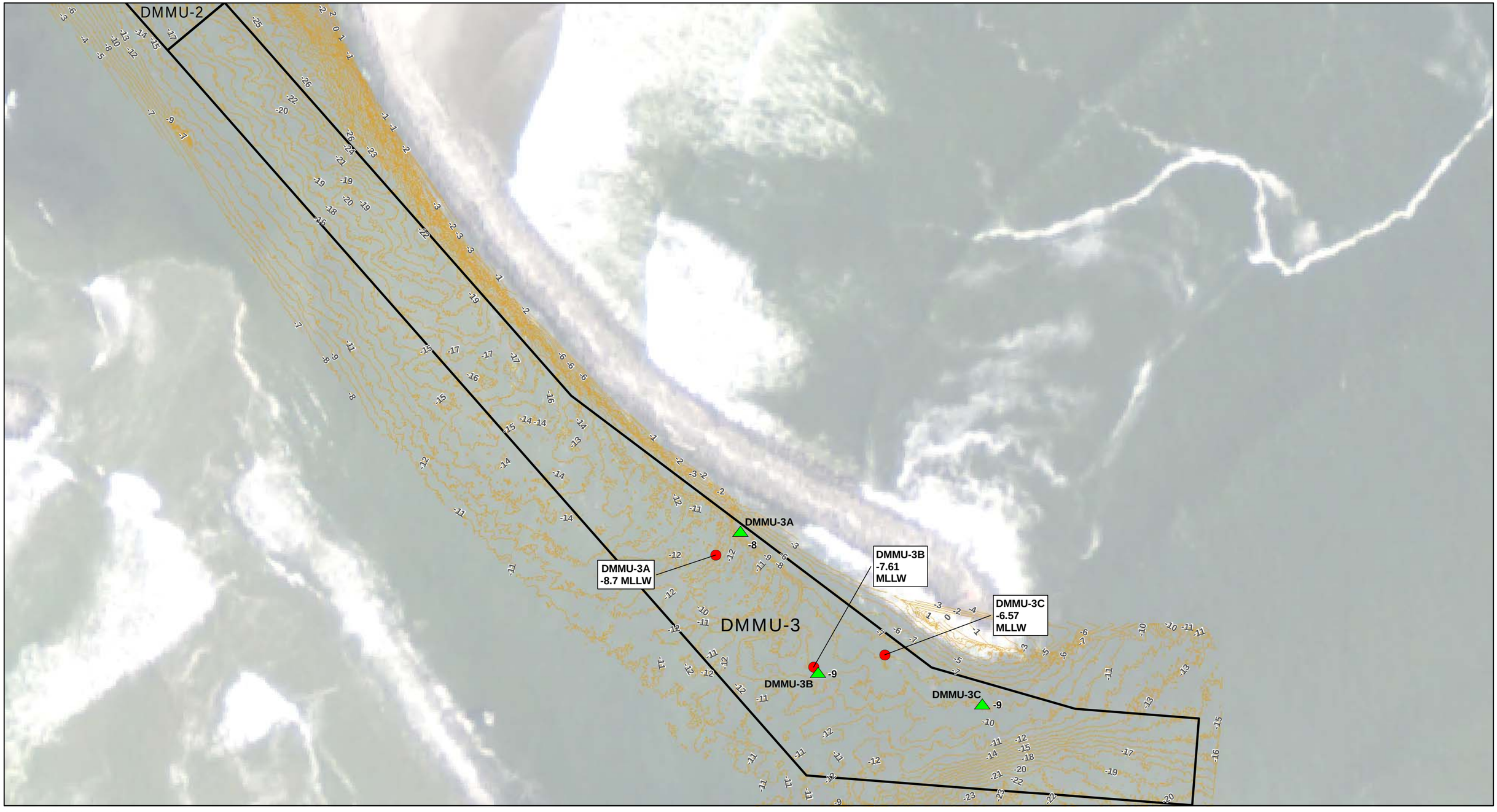
- Actual Sample Location
- Proposed Sample Location
- 1-Foot Contour (Mean Lower Low Water)
- DMMU

N

0 200 Feet

Figure 3
**DMMU-2 Sample Locations**

*Sediment Evaluation of Quillayute Navigation Channel and Boat Basin*




Source: NAIP (2009) Aerial Photograph.

- Actual Sample Location
- Proposed Sample Location
- 1-Foot Contour (Mean Lower Low Water)
- DMMU

N

0 200 Feet

Figure 4
**DMMU-3 Sample Locations**

*Sediment Evaluation of Quillayute Navigation Channel and Boat Basin*

# Table 3. Quillayute Operations and Maintenance Project: DMMP Characterization Summary

| CHEMICAL NAME | Units | DMMP SL | DMMP BT | DMMP ML | Units | SMS SQS | SMS CSL | Sample ID: DMMU-1 / DMMU ID: C1 / Depth (ft MLLW): 0-10 cm MLLW | | | Sample ID: DMMU-2 / DMMU ID: C2 / Depth (ft MLLW): 0-10 cm MLLW | | | Sample ID: DMMU-3 / DMMU ID: C3 / Depth (ft MLLW): 0-10 cm MLLW | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | mg/kg-dry wgt | mg/kg-OC | VQ | mg/kg-dry wgt | mg/kg-OC | VQ | mg/kg-dry wgt | mg/kg-OC | VQ |
| | | | | | | | | DMMP | SMS | | DMMP | SMS | | DMMP | SMS | |
| Antimony | | 150 | | 200 | | | | 4.6 | | UJ | 4.2 | | UJ | 3.1 | | UJ |
| Arsenic | mg/kg | 57 | 507.1 | 700 | mg/kg | 57 | 93 | **5.1** | | | **3.3** | | J | **2.4** | | J |
| Cadmium | mg/kg | 5.1 | 11.3 | 14 | mg/kg | 5.1 | 6.7 | 0.77 | | UJ | 0.70 | | UJ | 0.52 | | UJ |
| Chromium | mg/kg | (2) | 267 | (2) | mg/kg | 260 | 270 | **25.0** | | | **19.0** | | | **12.0** | | |
| Copper | mg/kg | 390 | 1,027 | 1,300 | mg/kg | 390 | 390 | **24.0** | | | **18.0** | | | **13.0** | | |
| Lead | mg/kg | 450 | 975 | 1,200 | mg/kg | 450 | 530 | **6.5** | | | **4.2** | | | **2.7** | | |
| Mercury | mg/kg | 0.41 | 1.5 | 2.3 | mg/kg | 0.41 | 0.59 | **0.07** | | | **0.03** | | | **0.02** | | |
| Nickel | mg/kg | 140 | 370 | 370 | mg/kg | -- | -- | **23.0** | | | **19.0** | | | **13.0** | | |
| Selenium | mg/kg | (2) | **3** | (2) | mg/kg | -- | -- | **0.77** | | | **0.7** | | | **0.5** | | |
| Silver | mg/kg | 6.1 | 6.1 | 8.4 | mg/kg | 6.1 | 6.1 | **1.5** | | | **1.4** | | | **1.0** | | |
| Zinc | mg/kg | 410 | 2,783 | 3,800 | mg/kg | 410 | 960 | **66.0** | | | **50.0** | | | **32.0** | | |
| **ORGANIC CHEMICALS** | | | | | | | | | | | | | | | | |
| **Total LPAH** | ug/kg | 5,200 | | 29,000 | mg/kg-OC | 370 | 780 | **239.0** | **17.1** | | **316.0** | **59.6** | | **55.7** | **29.3** | |
| Naphthalene | ug/kg | 2,100 | | 2,400 | mg/kg-OC | 99 | 170 | **47.0** | **3.4** | | **160.0** | **30.2** | | **10.0** | 5.26 | |
| Acenaphthylene | ug/kg | 560 | | 2,000 | mg/kg-OC | 66 | 66 | **3.5** | 0.25 | U | 2.9 | 0.55 | U | 0.62 | 0.33 | U |
| Acenaphthene | ug/kg | 500 | | 2,000 | mg/kg-OC | 16 | 57 | **15.0** | **1.1** | | 2.9 | 0.55 | U | **1.7** | **0.89** | |
| Fluorene | ug/kg | 540 | | 3,600 | mg/kg-OC | 23 | 79 | **26.0** | **1.9** | | **16.0** | **3.02** | | **6.0** | **3.16** | |
| Phenanthrene | ug/kg | 1,500 | | 2,100 | mg/kg-OC | 100 | 480 | **140.0** | **10.0** | | **140.0** | **26.4** | | **38.0** | **20.0** | |
| Anthracene | ug/kg | 560 | | 13,000 | mg/kg-OC | 220 | 1,200 | **11.0** | **0.8** | | 2.9 | 0.55 | U | 0.62 | 0.33 | U |
| 2-Methylnapthalene | ug/kg | 670 | | 1,900 | mg/kg-OC | 38 | 64 | **110.0** | **7.9** | | **240.0** | **45.3** | | **29.0** | **15.3** | |
| **Total HPAH** | ug/kg | 12,000 | | 69,000 | mg/kg-OC | 960 | 5,300 | **285.4** | **20.4** | J | **53.0** | **10.0** | J | **23.8** | **12.5** | J |
| Fluoranthene | ug/kg | 1,700 | 4,600 | 30,000 | mg/kg-OC | 160 | 1,200 | **120.0** | **8.6** | | **15.0** | **2.83** | | **5.2** | **2.74** | |
| Pyrene | ug/kg | 2,600 | 11,980 | 16,000 | mg/kg-OC | 1,000 | 1,400 | **78.0** | **5.6** | | **9.1** | **1.72** | | **5.1** | **2.68** | |
| Benzo(a)anthracene | ug/kg | 1,300 | | 5,100 | mg/kg-OC | 110 | 270 | **13.0** | **0.9** | | **4.6** | **0.87** | | **1.0** | **0.51** | |
| Chrysene | ug/kg | 1,400 | | 21,000 | mg/kg-OC | 110 | 460 | **34.0** | **2.4** | | **14.0** | **2.64** | | **6.5** | **3.42** | |
| Total Benzo(b+k)fluoranthenes | ug/kg | 3,200 | | 9,900 | mg/kg/OC | 230 | 450 | **25.0** | **1.8** | | **6.7** | **1.26** | | **2.9** | **1.53** | |
| Benzo(a)pyrene | ug/kg | 1,600 | | 3,600 | mg/kg-OC | 99 | 210 | **8.0** | **0.6** | | **3.6** | **0.68** | **J** | **1.1** | **0.58** | |
| Indeno(1,2,3-cd)pyrene | ug/kg | 600 | | 4,400 | mg/kg-OC | 34 | 88 | **3.9** | **0.3** | **J** | 5.8 | 1.09 | U | **0.5** | **0.26** | J |
| Dibenzo(a,h)anthracene | ug/kg | 230 | | 1,900 | mg/kg-OC | 12 | 33 | 7.0 | 0.50 | U | 3.6 | 0.68 | U | **0.59** | **0.31** | J |
| Benzo(g,h,I)perylene | ug/kg | 670 | | 3,200 | mg/kg-OC | 31 | 78 | **3.5** | **0.3** | **J** | 3.6 | 0.68 | U | 0.92 | **0.48** | |
| 1,3-Dichlorobenzene | ug/kg | 170 | | | mg/kg-OC | -- | -- | 8.8 | 0.6 | UJ | 7.2 | 1.36 | UJ | 1.5 | 0.79 | UJ |
| 1,4-Dichlorobenzene | ug/kg | 110 | | 120 | mg/kg-OC | 3.1 | 9.0 | 8.8 | 0.63 | U | 7.2 | 1.36 | U | 1.5 | 0.79 | U |
| 1,2-Dichlorobenzene | ug/kg | 35 | | 110 | mg/kg-OC | 2.3 | 2.3 | 8.8 | 0.63 | U | 7.2 | 1.36 | U | 1.5 | 0.79 | U |
| 1,2,4-Trichlorobenzene | ug/kg | 31 | | 64 | mg/kg-OC | 0.81 | 1.8 | 8.8 | 0.63 | U | 7.2 | 1.36 | U | 1.5 | 0.79 | U |
| Hexachlorobenzne (HCB) | ug/kg | 22 | 168 | 230 | mg/kg-OC | 0.38 | 2.3 | 8.8 | 0.63 | U | 7.2 | 1.36 | U | 1.5 | 0.79 | U |
| Dimethylphthalate | ug/kg | 71 | | 1,400 | mg/kg-OC | 53.0 | 53.0 | 18.0 | 1.29 | U | **16.0** | **3.02** | | 3.1 | 1.63 | U |
| Diethylphthalate | ug/kg | 200 | | 1,200 | mg/kg-OC | 61 | 110 | **26.0** | **1.86** | **B** | **2.7** | **0.51** | **J** | 3.1 | 1.63 | U |
| Di-n-butylphthalate | ug/kg | 1,400 | | 5,100 | mg/kg-OC | 220 | 1,700 | 35.0 | 2.50 | U | 29.0 | 5.47 | U | **1.4** | **0.74** | JB |
| Butylbenzylphthalate | ug/kg | 63 | | 970 | mg/kg-OC | 4.9 | 64 | 18.0 | 1.29 | U | 14.0 | 2.64 | U | 3.1 | 1.63 | U |
| Bis(2-ethylhexyl)phthalate | ug/kg | 1,300 | | 8,300 | mg/kg-OC | 47 | 78 | 260.0 | 18.6 | U | **11.0** | **2.08** | **JB** | **2.8** | **1.47** | JB |
| Di-n-octylphthalate | ug/kg | 6,200 | | 6,200 | mg/kg-OC | 58 | 4,500 | 35.0 | 2.50 | U | 29.0 | 5.47 | U | 6.2 | 3.26 | U |
| Phenol | ug/kg | 420 | | 1,200 | ug/kg | 420 | 1,200 | 18.0 | | UJ | 14.0 | | UJ | 3.1 | | UJ |
| 2-Methylphenol | ug/kg | 63 | | 77 | ug/kg | 63 | 63 | 18.0 | | U | 14.0 | | U | 3.1 | | U |
| 4-Methylphenol | ug/kg | 670 | | 3,600 | ug/kg | 670 | 670 | **10.0** | | **J** | **16.0** | | **J** | 6.2 | | U |
| 2,4-Dimethylphenol | ug/kg | 29 | | 210 | ug/kg | 29 | 29 | 18.0 | | U | 14.0 | | U | 3.1 | | U |
| Pentachlorophenol | ug/kg | 400 | | 690 | ug/kg | 360 | 690 | 18.0 | | U | 14.0 | | U | 3.1 | | U |
| Benzyl alcohol | ug/kg | 57 | | 87 | ug/kg | 57 | 73 | 18.0 | | U | 14.0 | | U | 3.1 | | U |
| Benzoic acid | ug/kg | 650 | | 760 | ug/kg | 650 | 650 | 440.0 | | U | 360.0 | | U | 77.0 | | U |
| Dibenzofuran | ug/kg | 540 | | 1,700 | mg/kg-OC | 15 | 58 | **28.0** | **2.0** | | **32.0** | **6.04** | | **6.0** | **3.16** | |
| Hexachloroethane | ug/kg | 600 | | 1,600 | mg/kg-OC | -- | -- | 18.0 | 1.29 | UJ | **14.0** | 2.64 | UJ | **3.1** | 1.63 | UJ |
| Hexachlorobutadiene | ug/kg | 29 | | 270 | mg/kg-OC | 3.9 | 6.2 | 8.8 | | U | 7.2 | 1.36 | UJ | 1.5 | 0.79 | U |
| N-Nitrosodiphenylamine | ug/kg | 28 | | 130 | mg/kg-OC | 11 | 11 | 8.8 | 0.63 | U | 7.2 | 1.36 | UJ | 1.5 | 0.79 | U |

# Table 3. Quillayute Operations and Maintenance Project: DMMP Characterization Summary

| | | | | | | Sample ID: | | DMMU-1 | | | DMMU-2 | | | DMMU-3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | DMMU ID: | | C1 | | | C2 | | | C3 | | |
| | | | | | | Depth (ft MLLW) | | 0-10 cm MLLW | | | 0-10 cm MLLW | | | 0-10 cm MLLW | | |
| | | DMMP | | | | SMS | | mg/kg-dry wgt | mg/kg-OC | VQ | mg/kg-dry wgt | mg/kg-OC | VQ | mg/kg-dry wgt | mg/kg-OC | VQ |
| CHEMICAL NAME | Units | SL | BT | ML | Units | SQS | CSL | DMMP | SMS | | DMMP | SMS | | DMMP | SMS | |
| **Total DDT (sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT)** | ug/kg | 6.9 | 50 | 69 | | -- | -- | **0.44** | | J | 0.28 | | UJ | 0.25 | | UJ |
| Aldrin | ug/kg | 10 | | | | -- | -- | **0.042** | | J | 0.14 | | UJ | 0.13 | | U |
| Chlordane | ug/kg | 10 | | | | -- | -- | **0.80** | | J | **0.049** | | **J** | **0.45** | | J |
| Dieldrin | ug/kg | 10 | 37 | | | -- | -- | **0.072** | | J | 0.28 | | UJ | **0.021** | | J |
| Heptachlor | ug/kg | 10 | | | | -- | -- | 0.18 | | U | 0.14 | | UJ | 0.13 | | U |
| Alpha-BHC | ug/kg | 10 | | | | -- | -- | | | | | | | | | |
| Gamma-BHC (Lindane) | ug/kg | 10 | 10 | | | -- | -- | **1.2** | | | 0.14 | | U | **0.33** | | |
| **Total PCBs** | ug/kg | 130 | | 3,100 | | -- | -- | 1.8 | | U | 1.4 | | U | 1.3 | | U |
| **Total PCBs (TOC-normalized)** | **ug/kg** | | 38*** | | **mg/kg/OC** | **12.0** | **65.0** | 0.1 | | U | 0.26 | | U | 0.7 | | U |
| **Dioxin (TEQ: see Table 5 for detailed results)** | **mg/kg** | | | | | | | **0.35** | | | **0.20** | | | **0.11** | | |
| Total Solids | ng/kg | | | | | | | **58.0** | | | **70.0** | | J | **0.11** | | J |
| Total Volatile Solids | % | | | | | | | **1.6** | | J | **1.4** | | J | **0.51** | | |
| Total Organic Carbon | % | | | | | | | **1.4** | | J | **0.53** | | | **0.19** | | |
| Total Ammonia | % | | | | | | | **24.0** | | | **19.0** | | U | **20.0** | | U |
| Total Sulfides | mg/kg | | | | | | | **31.0** | | | **3.4** | | UJ | **6.2** | | UJ |
| Gravel | mg/kg | | | | | | | **0.1** | | | **5.1** | | | **0.2** | | |
| Sand | % | | | | | | | **22.0** | | | **84.0** | | | **98.0** | | |
| Silt | % | | | | | | | **71.0** | | | **8.1** | | | **0.8** | | |
| Clay | % | | | | | | | **7.0** | | | **2.4** | | | **1.0** | | |
| Fines (percent silt + clay) | % | | | | | | | **78.0** | | | **10.5** | | | **1.8** | | |
| Bioassay Determination: **(P/F)** | % | | | | | | | **NA** | | | **NA** | | | **NA** | | |
| BTs exceeded: | | | | | | | | **No** | | | **No** | | | **No** | | |
| Bioaccumulation conducted: | | | | | | | | **No** | | | **No** | | | **No** | | |
| Bioaccumulation Determination: **(P/F)** | | | | | | | | NA | | | NA | | | NA | | |
| ML Rule exceeded: | | | | | | | | **No** | | | **No** | | | **No** | | |
| **PSDDA Determination:** | | | | | | | | **PASS** | | | **PASS (BPJ)** | | | **PASS (BPJ)** | | |
| **DMMU Volume:** | | | | | | | | **12,000** | | | **68,000** | | | **20,000** | | |
| Rank (Low = L, Moderate = M, Low-Moderate =LM, High = H) | | | | | | | | **M** | | | **L** | | | **L** | | |
| Mean Grab sampling depth (cm) | cm | | | | | | | **10.0** | | | **10.0** | | | **10.0** | | |
| Maximum sampling depth (mudline) (with Z-sample) | na | | | | | | | **na** | | | **na** | | | **na** | | |
| **DMMU ID:** | | | | | | | | **DMMU-C1** | | | **DMMU-C2** | | | **DMMU-C3** | | |

**P = Pass (BPJ: Suitable for Beneficial Use)**
**SQS = Sediment Quality Standards exceedance (SMS)**
**VQ = Validation Qualifier**
**UCOWD = Unconfined open-water disposal**
**NA = Not applicable**
**U = undetected at the reporting limit**
**UJ = result undetected at the estimated reporting limit shown**
**J = Estimated Concentration (< reporting limit)**
**B = Analyte detected in sample and method blank, sample results reported without blank correction**

# Table 4. Quillayute Federal Navigation Dredging Project Dioxin Testing Results Summary

| Dioxin/furan | WHO (05) TEF | DMMU ID | DMMU-C1 | | | DMMU-C1 (Duplicate) | | | DMMU-C2 | | | DMMU-C3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Depth | 0-10 cm MLLW | | | 0-10 cm MLLW | | | 0-10 cm MLLW | | | 0-10 cm MLLW | | |
| | | UNIT | DMMU-C1 | VQ | TEQ | DMMU-C1 | VQ | TEQ | DMMU-C2 | VQ | TEQ | DMMU-C3 | VQ | TEQ |
| 2,3,7,8-TCDD | 1 | ng/kg dw | 0.051 | UJ | 0.0255 | 0.044 | UJ | 0.022 | 0.066 | UJ | 0.033 | 0.05 | UJ | 0.025 |
| 1,2,3,7,8-PeCDD | 1 | ng/kg dw | 0.13 | UJ | 0.065 | 0.091 | UJ | 0.0455 | 0.11 | UJ | 0.055 | 0.076 | UJ | 0.038 |
| 1,2,3,7,8,9-HxCDD | 0.1 | ng/kg dw | **0.094** | **JQ** | **0.0094** | **0.3** | **JQ** | **0.03** | 0.055 | UJ | 0.00275 | 0.052 | UJ | 0.0026 |
| 1,2,3,6,7,8-HxCDD | 0.1 | ng/kg dw | **0.28** | **JQ** | **0.028** | **0.25** | **J** | **0.025** | 0.055 | UJ | 0.00275 | 0.054 | UJ | 0.0027 |
| 1,2,3,4,7,8-HxCDD | 0.1 | ng/kg dw | **0.089** | **JQ** | **0.0089** | 0.038 | UJ | 0.0019 | 0.06 | UJ | 0.003 | 0.055 | UJ | 0.00275 |
| 1,2,3,4,6,7,8-HpCDD | 0.01 | ng/kg dw | **9.1** | | **0.091** | **8.1** | | **0.081** | **2** | **J** | **0.02** | **0.4** | **J** | **0.004** |
| OCDD | 0.0003 | ng/kg dw | **91** | **B** | **0.0273** | **91** | **B** | **0.0273** | **17** | **JB** | **0.0051** | **1.8** | **JB** | **0.00054** |
| 2,3,7,8-TCDF | 0.1 | ng/kg dw | **0.41** | **J** | **0.041** | **0.32** | **J** | **0.032** | **0.47** | **JQ** | **0.047** | **0.097** | **JQ** | **0.0097** |
| 2,3,4,7,8-PeCDF | 0.3 | ng/kg dw | 0.081 | UJ | 0.01215 | 0.063 | UJ | 0.00945 | 0.085 | UJ | 0.01275 | 0.07 | UJ | 0.0105 |
| 2,3,4,6,7,8-HxCDF | 0.1 | ng/kg dw | 0.048 | UJ | 0.0024 | 0.045 | UJ | 0.00225 | 0.064 | UJ | 0.0032 | 0.04 | UJ | 0.002 |
| 1,2,3,7,8-PeCDF | 0.03 | ng/kg dw | **0.17** | **J** | **0.0051** | 0.055 | UJ | 0.000825 | 0.073 | UJ | 0.001095 | 0.061 | UJ | 0.000915 |
| 1,2,3,7,8,9-HxCDF | 0.1 | ng/kg dw | 0.053 | UJ | 0.00265 | 0.051 | UJ | 0.00255 | 0.071 | UJ | 0.00355 | 0.045 | UJ | 0.00225 |
| 1,2,3,6,7,8-HxCDF | 0.1 | ng/kg dw | 0.048 | UJ | 0.0024 | **0.055** | **JQ** | **0.0055** | 0.063 | UJ | 0.00315 | 0.043 | UJ | 0.00215 |
| 1,2,3,4,7,8-HxCDF | 0.1 | ng/kg dw | **0.15** | **J** | **0.015** | **0.13** | **J** | **0.013** | 0.076 | UJ | 0.0038 | 0.05 | UJ | 0.0025 |
| 1,2,3,4,7,8,9-HpCDF | 0.01 | ng/kg dw | 0.13 | UJ | 0.00065 | 0.08 | UJ | 0.0004 | 0.11 | UJ | 0.00055 | 0.12 | UJ | 0.0006 |
| 1,2,3,4,6,7,8-HpCDF | 0.01 | ng/kg dw | **0.82** | **JQ** | **0.0082** | **0.68** | **JQ** | **0.0068** | **0.43** | **J** | **0.0043** | 0.1 | UJ | 0.0005 |
| OCDF | 0.0003 | ng/kg dw | **2.8** | **J** | **0.00084** | **3.2** | **J** | **0.00096** | **0.9** | **J** | **0.00027** | 0.074 | UJ | 0.0000111 |
| Total TEQ: (U = 1/2) | | | | | **0.35** | | | **0.31** | | | **0.20** | | | **0.11** |
| Total TEQ: (U = 0) | | | | | **0.23** | | | **0.22** | | | **0.077** | | | **0.014** |
| Total TOC, %: | | | | | **1.4** | | | **1.4** | | | **0.53** | | | **0.19** |

Validation Qualifiers (VQ):
U = The analyte analyzed was not detectedm the sample is at or below the sample-specific estimated detection limit (EDL)
J = Reported result below associated Quantitation limit but above EDL
B = Analyte detected in sample and method blank. Reported value without blank correction.
Q = Estimated maximum possible concentration when the ion abundance ration associated with particular compound are outside the QC limits.