Appendix A

Monitoring Plan for Dredging Years 2025-2030, Humboldt Nearshore Placement Pilot Project, Eureka, Humboldt County, California

December 2025

Monitoring Plan for Dredging Years 2025-2030

Humboldt Nearshore Placement Pilot Project
Eureka, Humboldt County, California

December 2025

Contents

1 INTRODUCTION

This document details the U.S. Army Corps of Engineers, San Francisco District's (SPN) plan for monitoring the nearshore placement of dredged material at the Humboldt Nearshore Placement Study Area (HNPSA), ***Figure 1***. The monitoring plan covers proposed annual placements for dredge years 2025 through 2030. During these years, the government dredge *Essayons* will remove up to 1,500,000 cubic yards (CY) of sandy material annually from the Federal Channels and deposit a portion in thin layer placements in the HNPSA, the remainder will be disposed at the Humboldt Open Ocean Disposal Site (HOODS).

Success for the Humboldt Nearshore Placement Pilot Project (HNPPP) is defined by:

1. Increasing our understanding of the potential for nearshore placement to nourish the bar system adjacent to the North Spit.
2. Quantifying changes in benthic species utilization of the HNPSA site post-placement.

2 MONITORING PLAN OBJECTIVE

The Humboldt Nearshore Placement Pilot Project (HNPPP) Monitoring Plan has the following primary objectives:

1. To understand sediment transport pathways within the Eureka littoral cell.
2. To monitor the evolution of dredged material placed in the nearshore environment and quantify the effect of strategic placement on coastal sediment budgets.
3. To monitor potential environmental impacts to benthic habitats resulting from the placement of dredged material.

Figure 1. Humboldt Harbor & Bay Dredged Material Placement Sites.

Note, the Humboldt Nearshore Placement Study Area (HNPSA) has been divided into three placement areas, or "zones", to facilitate rotational placements and analyze sediment dispersal patterns over time. All zones are the same cross-shore width and orientation, but vary in alongshore length.

3 MONITORING PLAN DETAILS

3.1 Year 1 (2025) Placement & Monitoring

In May 2025, SPN conducted an inaugural pilot placement, depositing approximately 315,170 CY of sandy dredged material at the HNPSA: Zone 1 (***Figure 1***).

The U.S. Geological Survey (USGS) is monitoring the sediment migration and potential impact on species through benthic invertebrate analysis, epibenthic invertebrate analysis, and nearshore bathymetric surveys.

Please note, while post-placement data has been collected, the USGS is delayed in its analysis due to the lengthy government shutdown in October and November 2025. As such, the following monitoring summary is incomplete.

3.1.1 Benthic Invertebrate Analysis

The pre-placement survey was conducted in April 2025, followed by the post-placement survey in September 2025, ***Figure 2.*** Samples were collected from the placement area (Zone 1) and a reference site of similar size and orientation to the north, ***Figure 3.***

Figure 2. Benthic Samples collected using a Smith-Mac Grab from the USGS R/V Parke Snavely and Cal Poly Humboldt R/V North Wind.

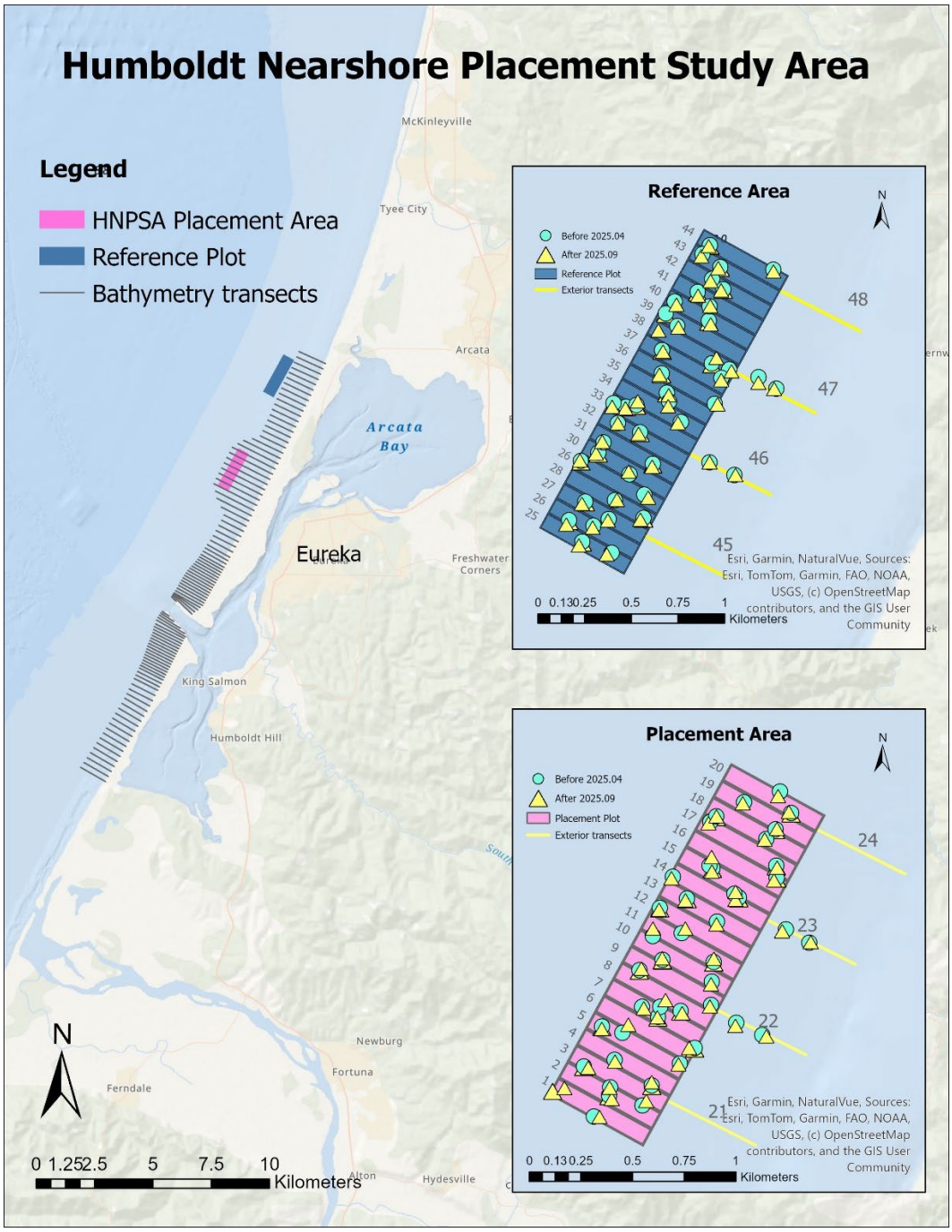

Figure 3. Map showing nearshore (a) Zone 1 Placement and (b) Reference areas in 2025, overlaid with bathymetry transects and benthic grab sample locations before and after placement.

3.1.2 Epibenthic Invertebrate Analysis

The during-placement survey was conducted in May 2025, followed by the post-placement survey in August 2025, ***Figure 4.***

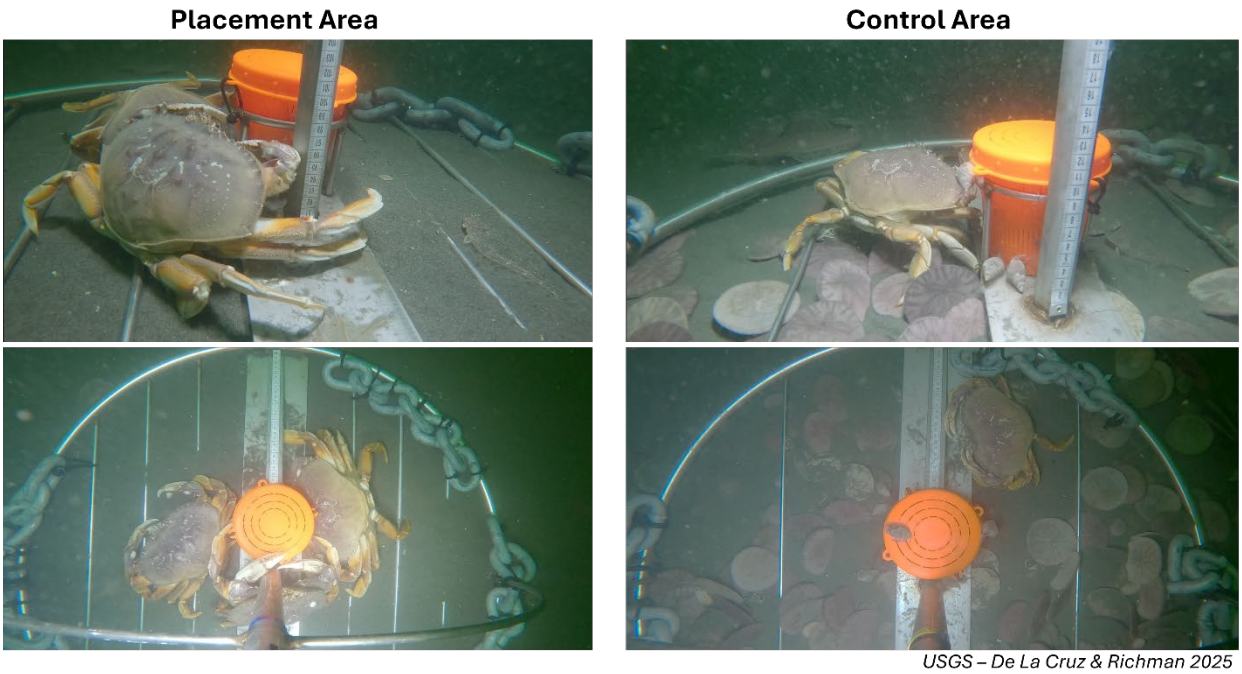

Figure 4. Epibenthic monitoring "After" placement (August 2025) in the HNSPA and Control Area.

3.1.3 Sediment Sampling

The Humboldt Harbor & Bay Federal Channel sediments were analyzed to evaluate suitability of the material to be dredged for placement at the HOODS or HNPSA. The complete Sampling and Analysis Report[1] can be provided upon request. A summary has been provided below:

Tier I confirmatory grain size analysis (***Table 1***) indicated that sediments from the Bar and Entrance Channel (HUM-B&E-2025), the North Bay Channel (HUM-NB-2025), and the Samoa Channel and Turning Basin (HUM-SAM-2025) were >80% sand.

For the Field’s Landing Channel & Turning Basin (HUM-FL-2025), North Bay Channel (HUM-NB-2025), Outer Eureka Channel (HUM-EK1-2025), and Inner Eureka Channel (HUM-EK2-2025) sediments, one or more analyte concentrations were above HOODS and HNPSA reference sediment concentrations. Benthic toxicity testing performed on these sediments indicated that none of the measured compounds in these sediments were biologically available to cause toxicity in the 10-day sediment tests. In addition, the narrative water quality objective (WQO) was met for the sediment elutriate tests performed.

[1] D.R. Reed & Associates. (2025). *Humboldt Harbor and Bay- 2025 Maintenance Dredging Sampling and Analysis Report.*

Table 1. Grain Size Results

	% Gravel *>2.00 mm*	% Sand *0.0625-2.00 mm*	% Silt *0.0039-0.0625 mm*	% Clay *<0.0039 mm*
HOODS *HUM-HOODS-2025*	0.04%	99.96%	0.00%	0.00%
HNPSA *HUM-PROP-2025*	0.35%	97.01%	2.06%	0.58%
Bar & Entrance *HUM-B&E-2025*	0.10%	98.82%	0.82%	0.26%
Samoa *HUM-SAM-2025*	6.75%	91.05%	1.75%	0.45%
Field's Landing *HUM-FL-2025*	0.23%	0.00%	48.02%	51.75%
North Bay *HUM-NB-2025*	2.25%	97.75%	0.00%	0.00%
Eureka Outer *HUM-EK1-2025*	0.59%	92.94%	4.94%	1.53%
Eureka Inner *HUM-EK2-2025*	0.20%	0.00%	51.25%	48.55%

Evaluation of site bioaccumulation test tissues total polycyclic aromatic hydrocarbon (PAH) concentrations and or total dioxins/furans indicated that some site tissue concentrations for these compounds were above the HOODS and HNPSA reference site tissue concentrations; however, they were below available invertebrate “effects” concentrations obtained from the USACE Environmental Residue-Effects Database; the results of these analyses also indicated that the measured tissue total PAH concentrations were below U.S. Food and Drug Administration action levels for food consumption.

Based on these results, sediments from all Federal Channels (the HUM-B&E-2025, HUM-SAM-2025, HUM-NB-2025, HUM-FL-2025, HUM-EK1-2025, and HUM-EK2-2025) should be considered suitable for unconfined aquatic disposal (SUAD) at HOODS and HNPSA.

The USACE received sediment suitability concurrence from the Environmental Protection Agency on January 10, 2025 and the North Coast Regional Water Quality Control Board on February 12, 2025. Agency sediment suitability correspondence can be provided upon request.

3.1.4 Placement Zone and Nearshore Area Bathymetric Surveys

The pre-placement survey was conducted in April 2025, followed by the post-placement survey in September 2025. Preliminary post-placement bathymetry data from September 2025, indicates that approximately 262,000 CY of the placed sediment remains within the HNPSA. The maximum elevation change between the pre-and-post placement surveys is 2.1 feet, ***Figure 5***.

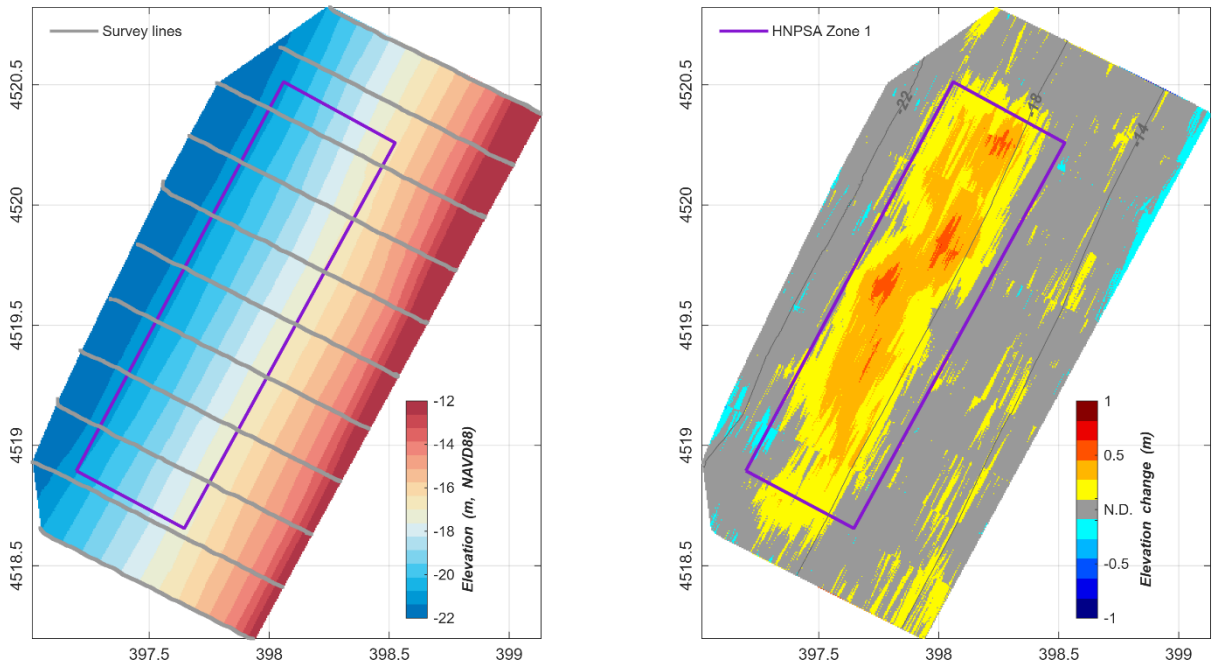

Figure 5. Pre-and-Post Placement Change Analysis Example

The left panel of ***Figure 5*** shows the bathymetric surface from the pre-placement survey and locations of the survey lines. The right panel shows the difference between the pre-and-post placement surveys. For display purposes, elevation changes less than +/- 10 cm were set to zero. The above is an estimate given the sparse coverage of the survey area but suggests that a large portion of the dredged sediment remains within the placement area. Large winter waves are likely needed to disperse the dredged sediment at these water depths.

3.2 Future Years (2026-2030) Monitoring

The goals of the monitoring plan for 2026-2030 largely remain consistent with those of the 2025 plan. However, the monitoring plan has been refined based on lessons learned during the 2025 activities. For instance, inclement weather conditions and equipment/mobilization constraints led to the curtailment of some planned monitoring activities in 2025, such as the monthly multi-beam bathymetric surveys. Further, the wave climate along the Humboldt County coast is characterized by large waves which constrained the nearshore monitoring activities due to safety concerns.

The design of the monitoring plan for 2026-2030 considers the feasibility of various monitoring activities, given the constraints experienced by project and federal resources during 2025. This monitoring plan is designed to be adaptive and will be adjusted and refined as the team gains further insights from the 2025 pilot placement monitoring results and as conditions change.

Table 2. Estimated Monitoring Schedule

	2025			2026			2027			2028			2029			2030		
	Pre-Placement	During Placement	Post-Placement	Pre-Placement	During Placement	Post-Placement	Pre-Placement	During Placement	Post-Placement	Pre-Placement	During Placement	Post-Placement	Pre-Placement	During Placement	Post-Placement	Pre-Placement	During Placement	Post-Placement
Benthic Invertebrate Analysis	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑
Epibenthic Invertebrate Analysis	☐	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sediment Sampling	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐
Bathymetric Survey of Placement Zone	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑
Bathymetric Survey of Nearshore Area	☑	☐	☑	☐	☐	☑	☐	☐	☑	☐	☐	☑	☐	☐	☑	☐	☐	☑
Upper Beach Topography & LiDAR	☑	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☑

3.2.1 Benthic Invertebrate Analysis

Supports Objective 3: To monitor potential environmental impacts to benthic habitats resulting from the placement of dredged material.

To assess the potential impacts of the HNPPP on the benthic community, the HNPSA and a "reference site" will be evaluated using a Before After Control Impact (BACI) framework[2]. The BACI framework is a rigorous approach that helps distinguish the impacts of the placement from natural environmental or seasonal changes[3]. This approach involves intensive benthic sampling in the placement and reference area, as well as along transects extended shoreward from these areas (***Figure 3***) to analyze impacts to the benthic community within the placement area as well as at increasing distance from the placement. The number of benthic samples will be informed by related studies and literature review. Benthic samples will be collected pre-and-post placement for each year of placement at the HNPSA.

The analysis will assess both the structure (e.g., the types and numbers of organisms) and function (e.g., biomass and energy) of the benthic community. While structural metrics are commonly used to assess benthic recovery, they may not reflect the ecological roles of those organisms. Functional metrics provide information on the role benthic macroinvertebrates play in the ecosystem and may recover differently than structural metrics. Therefore, this assessment will integrate both structural and functional metrics to evaluate impacts and recovery of habitat quality after sediment placement. Potential functional methods include the Benthic Resources Assessment Technique (BRAT), which evaluates the benthos in terms of its trophic support for bottom-feeding fishes[4]. The BRAT framework integrates information on consumer foraging ecology and prey profitability and has been used in previous studies[5].

3.2.2 Sediment Sampling

Supports Objective 3: To monitor potential environmental impacts to benthic habitats resulting from the placement of dredged material.

SPN follows a sediment testing schedule based on the established guidelines in the Ocean Testing Manual[6] and the Inland Testing Manual [7] which involve confirmatory physical and chemical testing

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[2] Methratta, E.T. 2021. *Distance-Based Sampling Methods for Assessing the Ecological Effects of Offshore Wind Farms: Synthesis and Application to Fisheries Resource Studies*. Front. Mar. Sci. 8:674594.doi: 10.3389/fmars.2021.674594

[3] McAtee KJ, Thorne KM, Whitcraft CR. 2020. *Short-term impact of sediment addition on plants and invertebrates in a southern California salt marsh*. PLoS ONE 15(11): e0240597. https://doi.org/10.1371/journal.pone.0240597

[4] Lunz, J.D., D.R. Kendall, 1982. *Benthic Resources Assessment Technique: A method for quantifying the effects of benthic community changes on fish resources.* U.S. Army Corps of Engineers, Environmental Impact Research Program.

[5] De La Cruz, S.E.W, I. Woo, L. Hall, A. Flanagan, and H. Mittelstaedt, 2020. *Impacts of periodic dredging on macroinvertebrate prey availability for benthic foraging fishes in central San Francisco Bay, California:* U.S. Geological Survey Open-File Report 2020-1086, 96p.

[6] U.S. Environmental Protection Agency, U.S. Army Corps of Engineers. (1991). *Evaluation of Dredged Material Proposed for Ocean Testing- Testing Manual.* EPA/503/8-91/001. Washington, DC 20460: Office of Water.

[7] U.S. Environmental Protection Agency, U.S. Army Corps of Engineers. (1998). *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.- Testing Manual- Inland Testing Manual.* EPA/823/B/94/002. Washington, DC 20460: Office of Water.

conducted on a five-year cycle for channels with less than eighty percent (80%) sand content, and physical, chemical, and biological testing on a ten-year cycle for channels with less than eighty percent (80%) sand content.

In 2025, the Humboldt Harbor & Bay Federal Channel sediments were analyzed to evaluate suitability of the material to be dredged for placement at the HOODS or HNPSA; the complete Sampling and Analysis Report can be provided upon request. Based on these results, sediments from all Federal Channels were considered suitable for unconfined aquatic disposal (SUAD) at HOODS and HNPSA. The next sediment sampling event will occur in 2030.

3.2.3 Placement Zone and Nearshore Area Bathymetric Surveys

Supports Objective 2: To monitor the evolution of dredged material placed in the nearshore environment.

Repeat bathymetric surveys will be conducted to the north and south of the Humboldt Bay inlet to characterize coastal morphology the summer after each annual placement. These surveys will include shore-normal transects, which are straight survey lines extending perpendicularly from the shoreline out to a water depth of approximately 13 meters (43 feet), originating from an offshore base station to ensure consistent measurement of the seabed profile. Transects will be spaced at intervals of 130 to 250 meters (430 to 820 feet) along the coast.

Change analysis will be performed on the processed survey data to identify areas of bathymetric change and to quantify sediment volume changes in the nearshore zone. These analyses will assess onshore transport of the placed material into the littoral zone and its contribution to the coastal sediment budget. The survey area extends both north and south of the inlet to facilitate comparison between areas with and without nearshore placements. This comparison will enable identification of the dominant longshore transport direction during the study period[8] and help interpret the causes for observed changes in sediment volume.

3.2.4 Upper Beach Topography & LiDAR

Supports Objective 1: To understand sediment transport pathways within the Eureka littoral cell.

LiDAR data will be collected by SPN during the first and last year of the HNPPP; this approach reflects the long-term nature of shoreline trends. Extensive shoreline data already exists for this area, including the Humboldt Shoreline Monitoring Report[9,10,11,12,13], which analyzed topographic surveys from 1992 to 2015. More recent data used to analyze shoreline change along the Humboldt North and South Spit includes 2019 LiDAR and July 2024 ground survey points.

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[8] Stevens, A.W., Ruggiero, P.R., Parker, K.A., Vitousek, S., Gelfenbaum, G., Kaminsky, G.M., 2024. *Climate controls on longshore sediment transport and coastal morphology adjacent to engineered inlets.* Coastal Engineering, 194, 104617. https://doi.org/10.1016/j.coastaleng.2024.104617

[9] USACE, 2007. *The Humboldt Shoreline Monitoring Analysis of Data, 1992 through 2005.*

[10] USACE, 2014. *Humboldt Shoreline Monitoring Data Analysis, 2014 Update.*

[11] USACE, 2016. *Humboldt Shoreline Monitoring Data Analysis: Post 2015-16 El Niño Update.*

[12] USACE, 2018. *Humboldt Shoreline Monitoring Program: Evaluation of Excessive Shoreline Retreat Criteria.*

[13] USACE, 2024. *Humbolt Shoreline Monitoring Data Analysis, December 2024 Update.*

3.2.5 Eureka Littoral Cell Model

Supports Objective 1: To understand sediment transport pathways within the Eureka littoral cell.

SPN, in collaboration with the USACE Engineering Research & Development Center (ERDC), developed a coupled hydrodynamic and sediment transport model (CMS-C2SHORE) for the Eureka littoral cell. Nearshore placement parameters and bathymetric survey data (see ***Section 3.2.3***) will be used to calibrate the model through hindcasting[14] and compare modeled outcomes with observations. These hindcasts will yield deeper insight into sediment transport processes around the HNPSA and surrounding nearshore area post-placement, informing adaptive management recommendations between placements.

4 ENVIRONMENTAL THRESHOLD DEVELOPMENT

A threshold table can be used to establish site capacity, see ***Table 3***. There are physical and biological considerations, further specified as benthic community health and sediment transport processes. This table will be used as a reference to help in decision making as to whether to increase or decrease placement volumes at the HNPSA.

[14] Hindcast: A modeling technique that uses past data to test the accuracy of a model or predict past conditions.

Table 3. Ecological Threshold Considerations

	Normal *Expected or low-impact*	**Cautionary** *Early sign of impact, uncertainty*	**Critical** *Ecological stress, threshold exceeded*
Benthic Community Health	**Observation:** Species richness or abundance maintained or increasing from the annual baseline composition.	**Observation:** Decline in species richness or abundance, or increased dominance of opportunistic species, from the annual baseline composition.	**Observation:** Continued decline in species richness or abundance from the annual baseline composition, or loss of key taxa.
	Action: Continue standard placement and monitoring.	**Action:** Reassess timing, placement volume, and/or monitoring details.	**Action:** Consider pausing placement activities. Reassess timing, placement volume, and/or monitoring details.
Sediment Transport Processes	**Observation:** Sediment disperses after placement, no hazardous navigational conditions are present.		**Observation:** Hazardous navigational conditions are present.
	Action: Continue standard placement and monitoring.		**Action:** Consider pausing placement activities. Reassess timing, placement volume, and/or monitoring details.

5 COMMUNICATIONS

SPN will maintain open communications with the Humboldt Bay Harbor, Recreation, and Conservation District and other stakeholders to ensure that all parties are informed of the HNPPP schedule through 2026-30. SPN will notify resource and regulatory agencies and mariners of the dredge and placement dates, locations of the placement area and monitoring vessels and equipment, and the lanes of transit for the government dredge.

6 REPORTING

SPN will prepare a report summarizing the monitoring observations and outcomes for the annual nearshore placements for 2025 through 2030 and provide adaptive management recommendations for future placements, if appropriate.

7 POINTS OF CONTACT

The following are the key points of contact for the HNPPP:

Name	Role	Email
Peter Mull	Project Manager	peter.mull@usace.army.mil
Ellie Covington	Environmental Navigation Section Chief	ellie.l.covington@usace.army.mil
Janice Lera-Chan	Water Resources Section Chief	janice.m.lera-chan@usace.army.mil

Appendix B

404(b)(1) Analysis

January 2026

Table of Contents

1.0 Introduction

This appendix evaluates compliance of the proposed action, with Clean Water Act (CWA) Section 404(b)(1) Guidelines published at 40 Code of Federal Regulations (CFR) part 230 which requires the US Army Corps of Engineers (USACE) to provide a written evaluation that demonstrates compliance with the substantive criteria used to evaluate discharges of dredged or fill material.

Humboldt Harbors and Bay, along with its Nearshore Placement Study Area, located in the Pacific Ocean out to the 3-mile limit, are waters of the United States pursuant to Section 404 of the CWA. Section 404(b)(1) of the CWA provides procedures for the evaluation of permits for discharge of dredged or fill material into waters of the United States. USACE implements Section 404 of the CWA, and although it does not issue itself permits, USACE must demonstrate compliance with Section 404 of the CWA. The following evaluation is provided in accordance with Section 404(b)(1) of the CWA Guidelines (40 CFR 230).

2.0 Proposed Action and Alternatives

To satisfy the requirements of NEPA and provide the basis for the required 404(b)(1) alternatives analysis, a total of seven alternatives were considered in the Draft Environmental Assessment (EA) for Humboldt Harbor and Bay Operations and Maintenance Dredging 2026 – 2030. After initial consideration only the Proposed Action and the No Action Alternative were analyzed in detail.

The purpose of this analysis is to provide information regarding the identification of the least environmentally-damaging, practicable alternatives to the proposed project that are analyzed in detail in the EA and to summarize the analysis regarding those alternatives that may be considered practicable after preliminary stages of screening. USACE is responsible for making the formal determination of compliance with the 404 (b)(1) guidelines. This alternatives analysis for the proposed project and other available data will provide input to facilitate this decision. USACE proposes to continue maintenance dredging of federal navigation channels in Humboldt Harbor and Bay and the associated disposal of dredged material at the Humboldt Open Ocean Disposal Site (HOODS), located outside of the littoral cell three miles from the Harbor entrance. The Proposed Action also includes placing up to 300,000 cubic yards (cy) of material at the Humboldt Nearshore Placement Study Area (HNPSA), located approximately 3.5 miles north of the entrance channel, for a five-year period beginning in dredging year 2026 and continuing until 2030, to beneficially use dredged material. The Proposed Action will remove up to 1.5 million cy of shoaled material from the Federal Channels to reach authorized project depths. The Government Hopper dredges, Yaquina and Essayons, are typically utilized for this work. Sediment suitability, funding, weather, dredge availability and environmental approvals and permits will determine whether HOODS and/or the HNSPA is used for disposal or placement.

Alternatives evaluated in detail for potential environmental impacts include - Maintenance Dredging, with Disposal at HOODS and/or Placement at HNPSA (Proposed Action), and the No Action Alternative.

2.1 No Action

Under the No Action Alternative, the Federal Channels into and within Humboldt Harbor & Bay would eventually shoal to the point that the safe, efficient passage of commercial deep-draft vessels to the port would not be possible. This situation would discourage shippers from using Humboldt Bay for

commerce because it would require additional vessel trips to accommodate 'light-loaded' vessels (vessels carrying less cargo than their maximum capacity), resulting in increased transportation costs and emissions, decreased vessel safety, and maneuvering problems. In addition, ship groundings caused by unmaintained deep-draft channels could result in oil and fuel spills. Grounding spills could cause serious environmental damage through the release of pollutants. This would subsequently have a long-term adverse effect on the local economy of Humboldt County, compromise the use of the harbor for refuge during storms and the operation of U.S. Coast Guard ships based in the Bay, and impact National Economic Development. Maintaining the navigability of Humboldt Bay supports National Economic Development by facilitating the efficient transport of goods, connecting regional industries to national and international markets, supporting job creation in maritime-related sectors (e.g., fishing, shipping, tourism), and ensuring the reliable delivery of essential commodities.

2.2 Alternative 1 Maintenance Dredging, with Disposal and/or Placement at HOODS and HNPSA (Proposed Action)

This alternative includes the annual maintenance dredging of the Bar and Entrance (B&E) channels, North Bay, Eureka, Samoa, and Field’s Landing Channels and associated turning basins located in Humboldt Harbor & Bay for the 2026-2030 timeframe with disposal at HOODS and/or placement at the HNPSA. The Proposed Action will remove up to 1.5 million cy of shoaled material from the Federal Channels to reach authorized project depths. Table 1 shows recent dredging volumes from the Proposed Action.

Table 1. Historic Dredge Volumes

Year	B&E Channels	Interior Channels	Total
2015	**432,490**		**432,490**
2016	**715,296**	**20,777**	**736,073**
2017	**1,588,906**		**1,588,906**
2018	**1,115,051**		**1,115,051**
2019	**1,181,388**		**1,181,388**
2020	**1,047,669**	**110,834**	**1,158,503**
2021	**1,305,149**		**1,305,149**
2022	**895,063**		**895,063**
2023	**597,470**	**254,425**	**851,895**
2024	**758,903**	**59,925**	**818,828**
2025	**1,361,074**	**60,841**	**1,421,915**
10-year average	**999,860**	**46,073**	**1,045,933**
All values measured in cubic yards			

The Humboldt Harbor and Bay project, located in Humboldt County, California, is comprised of five Federal Channels: Bar and Entrance (B&E), North Bay, Samoa, Eureka, and Fields Landing. Channel specifications are detailed in Table 2. To maintain navigational access, approximately one million cubic yards (cy) of shoaled material is dredged from the Federal Channels annually, of that ninety percent (90%) is sand.

The Proposed Action will remove up to 1.5 million cy of shoaled material from the Federal Channels to achieve project depth. Removing this much volume will require several individual dredging events

(or mobilizations) between April and November; exact dates and duration are highly dependent on funding, weather, and dredge schedule availability.

Table 2. Humboldt Harbor and Bay Federal Channel Specifications

Navigation Channels	Depth	Width	Length	Allowable Overdepth
Bar and Entrance Channel *Stations 0+00-135+00*	48	500-1,600	8,500	3
North Channel *Stations 135+00-309+00*	38	400	18,500	2
Samoa Channel & Turning Basin *Stations 309+00-392+46*	38	400-1,000	1,746-6,600	2
Eureka Channel Outer *Stations 0+00-44+00*	35	400	4,400	2
Eureka Channel Inner *Stations 44+00-89+70*	26	400	4,570	2
Field's Landing Channel & Turning Basin *Stations 0+00-124+36*	26	300-800	735-10,900	2

All specifications are measured in feet, except for depth which uses feet Mean Lower Low Water.
Width and length vary from channel to turning basin.
Stations 0+00-8+00 of the Field's Landing Channel and Stations 124+00-136+00 of the North Bay Channel are considred a part of the Bar and Entrance Channel and are dredged as such.

The Bar and Entrance Channel will be hopper dredged to remove approximately 1,200,000 cy of material; of that, up to 300,000 cy of sandy material will be targeted for placement at the HNPSA and the remainder will be disposed at the HOODS. Concerns for navigational safety in the nearshore environment or limited dredge availability may require that less material be placed at the HNPSA. Additionally, the Interior Channels will be hopper dredged to remove approximately 300,000 cy of material with disposal at HOODS.

Current dredge volumes were estimated in a 2025 condition survey, see Table 3. The total volume of shoaled material, including allowable overdepth, is about 2,000,000 cy. Given funding and scheduling constraints, however, the actual dredged volume is often less. As stated in the Proposed Action above, for this episode it is estimated that:

- 300,000 cy will be dredged from the Interior Channels with disposal at HOODS, and
- 1,200,000 cy will be dredged from the B&E. Of that, up to 300,000 cy may be placed at the HNPSA and the remainder shall be disposed at HOODS.

Table 3. Estimated Volume of Shoaled Material in Navigation Channels

Navigation Channels	Volume of Shoaled Material			Total Estimated Volume
	Project Depth	1st Foot	2nd Foot	
Bar and Entrance Channel *Stations 0+00-135+00*	209,565	249,178	304,231	762,974.00
North Channel *Stations 135+00-309+00*	63,383	61,645	105,913	230,941.00
Samoa Channel & Turning Basin *Stations 309+00-392+46*	138,762	55,408	97,540	291,710.00
Eureka Channel *Stations 0+00-89+70*	461,930	78,736	89,608	630,274.00
Field's Landing Channel & Turning Basin *Stations 0+00-124+36*	65,498	14,293	21,725	101,516.00
			GRAND TOTAL	2,017,415.00

Condition survey from July 2025.
Depth measured in feet Mean Lower Low Water; Volume measured in cubic yards.
1st Foot and 2nd Foot refer to overdepth measurements.
Eureka Channel not divided into Inner and Outer during survey.

Please note, Table 3 shows the volume of shoaled material in the Federal Channels approximately one month after the 2025 maintenance dredging event. Proposed Action quantities are higher than shown in the table to account for the sediment accumulation that will naturally occur over the fall and winter seasons.

3.0 Alternatives Analysis

Section 404 (b)(1) requires an evaluation of alternatives for projects that include the discharge of dredged or fill material into waters of the United States. Under the guidelines, practicability of alternatives is taken into consideration, and no alternative may be permitted if there is a less environmentally damaging practicable alternative (40 CFR 230.5(c)). The least environmentally damaging practicable alternative must:

- Meet the overall project purpose.
- Be practicable with respect to cost, technology, and logistics.
- Avoid and minimize discharge of dredged or fill material into waters of the United States.
- Not entail significant impacts to other non-aquatic environmental resources.

Alternatives 1 is identified as the least environmentally damaging practicable alternatives, consistent with section 404(b)(1) of the Clean Water Act.

3.1 Overall Project Purpose

USACE is mandated by Congress to maintain the navigability of federal navigation channels. Accumulation of sediment in these channels can present navigation safety hazards. Maintenance

dredging removes this sediment and returns the channels to authorized depths. As described in Section 2 of the draft EA, the overall project purpose is to maintain the congressionally authorized depths of the Federal Channels within Humboldt Harbor & Bay, and continued operation of the U.S. Coast Guard, through annual maintenance dredging. This also ensures the harbor's continued availability as a safe refuge during storms. Maintenance dredging is critical to the U.S. Coast Guard's ability to effectively respond to emergencies and conduct search and rescue operations, allowing for unimpeded passage of their vessels during all tidal conditions. The basic purpose is water dependent as defined by 40 CFR Part 230 since it cannot be fulfilled outside of an aquatic environment.

3.2 Practicability

The act of dredging is not specifically regulated under Section 404 of the CWA; however, the type of dredge equipment used factors into the placement process (i.e., the discharge of dredged and fill material). The dredge equipment type determines technologically viable placement site options as well as the cost of dredged material placement and therefore is a practicability consideration in this Section 404(b)(1) evaluation.

The proposed action, alternative 1, involves dredging the federal channels with a hopper dredge and placing the dredged material at an approved placement site, either HOODS or the HNSPA. Alternative 1 is the only practicable alternative carried forward for analysis in the EA and this 404(b)(1) evaluation. For information on other action alternatives considered but not analyzed in detail see Section 4 of the draft EA.

3.3 Impacts to Waters of the United States

USACE, as mandated by Congress, is responsible for maintaining the navigability of federal navigation channels to their authorized depth. The amount of material to be dredged and consequently placed would be dependent on the extent of sediment accumulation in the federal navigation channels. The potential effects on water quality (e.g., increased suspended particles and turbidity) would be the less than significant under alternative 1, as described in Section 5 of the draft EA.

4.0 Technical Evaluation/Potential Impacts of the Proposed Action

USACE’s maintenance dredging and dredged material placement must comply with the regulations set forth in 33 CFR Part 335-338, which define the “Federal Standard.” The Federal Standard, also known as the Base Plan, is defined by USACE regulations as the least costly dredging and dredged material disposal or placement alternative identified by USACE that is consistent with sound engineering practices and meets all federal environmental requirements including those established under Section 404 of the CWA; the Marine, Protection, Research and Sanctuaries Act; and the Coastal Zone Management Act.

The proposed action and potential impacts of the maintenance of the federal navigation channels in Humboldt Harbor and Bay by USACE were analyzed in the draft EA, which incorporates analysis from previous environmental review documents.

This section evaluates the significance of potential adverse impacts resulting from the continuation of historically authorized maintenance dredging of the federal navigation channels and the placement of dredged materials at the placement sites under the proposed action pursuant to Subpart C though Subpart F of the Section 404(b)(1) Guidelines (Table 4). References are included to the section(s) of the draft EA where the analysis relevant to each applicable evaluation factor is presented.

Table 4. Technical Evaluation of Proposed Action Implementation

Technical Evaluation Factors for the Proposed Action	Evaluation	Impact Level
Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)		
Substrate Section 5.1.2	Effects would be localized and short-term. Possible beneficial effects due to augmenting the local supply of sediment available to support accretion of eroding shoreline.	Not significant
Suspended particles/turbidity Section 5.1.4	Effects from dredging would be minor, localized, and temporary. Disposal and/or placement of sediment may create short-term increases in turbidity but have potential to create long-term beneficial increases in sediment retention and shoreline stabilization.	Not significant
Water Quality Section 5.2.1	Based on studies by USACE dredging activities and placement of dredged material do not cause substantial changes to salinity, temperature, or pH, and any associated minor changes would be localized and short-lived.	Not significant
Current patterns and water circulation Section 5.2.1	The amount of dredging to be conducted is negligible in relationship to the volume of water and the tidal forces present in Humboldt Harbor and Bay. The amount of material disposed or placed is likewise negligible in relationship to the volume of water and tidal forces present in Humboldt Harbor and Bay.	Not significant
Normal water fluctuations Section 5.2.1	The amount of dredging to be conducted is negligible in relationship to the volume of water and the tidal forces present in Humboldt Harbor and Bay. The amount of material disposed or placed is likewise negligible in relationship to the volume of water and tidal forces present in Humboldt Harbor and Bay.	Not significant

Salinity gradients Section 5.2.1	Based on studies by USACE, dredging activities and placement of dredged material do not cause substantial changes to salinity, temperature, or pH, and any associated minor changes would be localized and short-lived.	Not significant
Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D) (Section 230.30-230.32)		
Threatened and endangered species Section 5.3.5	Impacts on salmonids or green sturgeon and EFH are negligible due to the small disposal area relative to the overall large amount of habitat available. Removal of prey and other effects to habitat are expected to be localized and temporary. USACE will adhere to the NMFS BiOP for dredged material windows and other standard practices intended to minimize any potential impacts to listed species. Beneficial use of the dredged material may provide habitat and foraging opportunities for aquatic species. USACE has requested informal consultation concurrence with the USFWS that the proposed action may affect but is not likely to adversely affect the threatened marbled murrelet.	Not significant

Technical Evaluation Factors for the Proposed Action	**Evaluation**	**Impact Level**
Fish, crustaceans, mollusks, and other aquatic organisms in the food web Section 5.3	None of the commercially or recreationally important fish would be significantly affected by the proposed maintenance dredging. Temporary affects to food supply and foraging success would be minor, and there would be no significant long-term effects to pelagic-based food resources because of the rapid recovery predicted in these communities, the small area affected, and the brief time in which they would be affected.	Not significant
Other wildlife Section 5.3	Impacts on avian roosting, nesting, and foraging caused by dredging activities would be less than significant. Temporary increases in noise levels from dredging could constitute harassment of marine mammals. However, levels would be similar to ambient noise associated with commercial shipping and recreational boating within the study area, and there would be no adverse impacts on wildlife.	Not significant
Potential Impacts on Special Aquatic Sites (Subpart E) (Section 230.40-230.45)		

Sanctuaries and refuges Section 5.2.2	The Samoa State Marine Conservation Area is located outside of the area affected by disposal or placement of dredged material, therefore there would be no adverse impact.	Not significant
Ocean Shoreline 5.1.1	Placement at HNSPA could result in long-term beneficial effects by augmenting the local supply of sediment available to support accretion and reduce erosion of the shoreline.	Not significant
Sandy Bottoms 5.1.2	Activities related to disposal and/or placement and dredging for maintenance would not result in the loss or change of sandy bottom substrate.	Not significant
Technical Evaluation Factors for the Proposed Action	**Evaluation**	**Impact Level**
Coral reefs	The resource is not present or there would be no adverse impact.	Not applicable
Riffle and pool complexes	The resource is not present or there would be no adverse impact.	Not applicable
Potential Effects on Human Use Characteristics (Subpart F) (Section 230.50-230.55)		
Municipal and private water supplies	The resource is not present or there would be no adverse impact.	Not applicable
Recreational and commercial fisheries Section 5.6.1	Impacts on fisheries would be considered less than significant through the implementation of the NMFS BiOP for dredging windows and other standard practices intended to reduce potential adverse impacts on species and the aquatic environment.	Not significant
Water-related recreation Section 5.6.5	The project alternatives may occasionally delay or temporarily impede recreational watercraft during dredging and placement activities. In most locations, there would be sufficient room for recreational vessels to maneuver around dredge equipment, and therefore, impacts are expected to be negligible.	Not significant
Aesthetics	The temporary presence of the dredge would have no significant impacts on the visual aesthetics.	Not significant

Cultural Resources Section 5.5	Although historical dredging has occurred in the navigation channels, there is the potential that cultural resources could be inadvertently uncovered by project activities. The Western end of the Bar & Entrance Channel contains one magnetic anomaly that may represent debris from a shipwreck, objects lost from a vessel, or materials from the initial construction of the North Jetty. Outside of the channels, a known World War I-era shipwreck, the semi-armored Naval cruiser USS *Milwaukee* (CA-HUM-1751H), went aground on January 13, 1917. Its remains are visible at low tide near Samoa Beach. If an inadvertent discovery of historical resources or unique archaeological resources occurs, all ground-disturbing activities would stop and a USACE archaeologist would consult with SHPO for management recommendations.	Not significant

4.1 Evaluation and Testing

This section evaluates the potential biological availability of possible contaminants in dredged material pursuant to Subpart G of the Section 404(b)(1) Guidelines. This analysis is based on past sediment testing results for the federal navigation channels and known sources of contamination in or near the channels. Section 5.1.3 of the draft EA provides a description of the sediment testing requirements.

The Humboldt Habor and Bay Federal channels are on a 10-year cycle for full Tier III sampling and testing for contaminants and biological toxicity and on a five-year cycle for Tier 1 confirmatory grain size analysis. A Tier III analysis was performed in 2025 for sediment suitability for placement at HOODS and the HNSPA. The 2025 analysis demonstrated all sediment was suitable for disposal at HOODS or placement at the HNSPA. The draft EA concluded that potential impacts and benefits of placing dredged material at HOODS and/or the HNPSA would have no impact on the environment related to sediment quality.

This evaluation addresses maintenance dredging of the federal channels for a period of five years. Therefore, Tier 1 sediment testing will be conducted in this period, pursuant to the Section 404(b)(1) sediment testing guidelines (Subpart G), per approved sediment sampling and analysis plans.

4.2 Actions Taken to Minimize Potential Impacts

Proposed measures to minimize potential impacts include the coordination of dredging windows, standard dredging practices designed to reduce impacts to aquatic species and habitats, and placing materiel at the HNSPA site. USACE will comply with the terms and conditions of the 2021 – 2025 National Marine Fisheries Biological Opinion for maintenance dredging Humboldt Harbor and Bay and disposal/placement at HOODS and the HNSPA. USACE will monitor the duration of overflow dredging and monitor and report annually the dredging activity, as required in the NMFS BiOP. In May 2025, USACE placed material at the HNSPA for the first time. A monitoring and adaptive management plan was developed to analyze results of the nearshore placement on sediment

transport and potential impacts to benthic communities. The monitoring plan is included as an appendix to the EA. Monitoring of the HNSPA is planned for each year placement occurs.

4.2. Compliance with Applicable Water Quality Standards

The Proposed Action would be implemented in accordance with all applicable federal and California water quality standards. The following measures are part of the Proposed Action and would help ensure compliance with these standards:

- Implementation of the Spill Prevention, Containment, and Cleanup Plan for USACE.
- Adherence to dredging work windows and other standard dredging mitigation practices to reduce impacts as detailed in the draft EA and 401 Water Quality Certification for this action.
- Monitoring to ensure compliance with water quality certification/waste discharge requirement permit conditions, with adaptive management to address any in-water conditions that approach permit conditions.
- USACE continued participation in North Coast Working Groups related to dredging, beneficial use, aquatic sciences, and ecosystem restoration.

4.3 Determination of Cumulative Effects on the Aquatic Environment

Cumulative impacts of the proposed annual maintenance dredging of Humboldt Bay's navigation channels, including disposal and/or placement activity, would be conducted during the annual spring (March-May) and, possibly, summer (June-July) months. The harbor has numerous recreational and commercial activities and repairs, and the federal navigation channels experience constant disturbance by movement of commercial and deep draft vessels. Annual maintenance dredging of Humboldt Bay's navigation channels has occurred for over 130 years, and the project area is expected to experience this change to maintain the congressionally authorized depths for the foreseeable future. The nearshore environment undergoes continuing flux where factors such as winds, waves, and sediment supply are variable. The natural processes of wind and wave actions are expected to naturally move the sediment and distribute towards the north spit of the harbor. Although this movement would vary from year-to-year, the longer-term trend of sediment movement through the nearshore area would be towards the North Spit, where it is currently experiencing severe erosion.

Cumulative and indirect impacts to biological resources associated with annual maintenance dredging within Humboldt Bay are localized with short-term. Impacts are described in Section 5 of the draft EA. Benthic organisms in the immediate vicinity of dredging and placement activities could be temporarily removed or disturbed; however, the community within the navigation channels and HOODS is a high-energy environment, and this habitat undergoes continuous flux and can recover from disturbances. Any disturbance to locally occurring species may affect the food chain; however, the dredging area is considered small relative to the adjacent coast and the bay. Therefore, cumulative and indirect impacts of the proposed action with respect to biological resources are minor.

The proposed action coupled with any future development in or around the bay would not lead to cumulative impacts greater than those that currently exist within the proposed action area since

effectively foreseeable actions within and around the bay in the future would be consistent with current activities (i.e., annual maintenance dredging). Neither the Proposed Action or the No Action Alternative are expected to result in significant cumulative effects on any aquatic ecosystem or aquatic species.

5.0 Findings

The following evaluation is undertaken to demonstrate compliance with the Section 404(b)(1) guidelines (restrictions on discharge, 40 CFR 230.10). No adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation. USACE has determined that there are no other available practicable alternatives that would have less adverse impact on the aquatic ecosystem that do not involve discharges into waters of the United States or at other locations within these waters.

Based on the technical evaluation as provided above, under the proposed action there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:

Physical substrate	YES
Water circulation, fluctuation, and salinity	YES
Suspended particulates/turbidity	YES
Contaminant availability	YES
Aquatic ecosystem structure, function, and organisms	YES
Proposed placement site	YES
Cumulative effects on the aquatic ecosystem	YES
Secondary effects on the aquatic ecosystem	YES

5.1 Special Restrictions

The proposed action will not violate state water quality or toxic effluent standards, jeopardize endangered or threatened species or critical habitat, or violate standards set by the Department of Commerce to protect marine sanctuaries. There are no known contaminated areas within the action area.

5.1.1 Water Quality Standards

Will the discharge:

Violate state water quality standards?	NO
Violate toxic effluent standards (under Section 307 of the CWA)?	NO
Jeopardize endangered or threatened species or their critical habitat?	NO

Violate standards set by the Department of Commerce to protect marine sanctuaries?	NO

5.1.2 Contamination and Sediment Testing

Evaluation of the information in Section 5.1.3 of the draft EA indicates that the proposed discharge material meets testing criteria for suitable disposal at HOODS and/or placement at the HNSPA.

The complete results are detailed in the *2025 Sampling and Analysis Report* (D.R. Reed & Associates, 2025). A summary of the key findings is provided below:

- **Grain Size Analysis:** Confirmatory testing showed that sediments from the Bar & Entrance Channel, the North Bay Channel, Samoa Channel & Turning Basins, and Eureka Outer were all greater than 80% sand.

- **Chemical and Biological Testing**: For finer-grain sediments from the Field's Landing and Eureka Inner, additional testing was performed.

    - While initial chemical screening found that one or more analyte[1] concentrations were above reference levels, subsequent benthic toxicity testing confirmed that none of these compounds were biologically available to cause toxicity in the 10-day sediment tests.

    - Further bioaccumulation tests indicated that while some tissue concentrations for compounds like total polycyclic aromatic hydrocarbons (PAHs) were above reference levels, they remained well below established invertebrate "effects" concentrations and below U.S. Food and Drug Administration action levels for safe food consumption.

    - Sediment elutriate tests[2] also met the narrative water quality objectives[3].

Based on this comprehensive testing regime, sediments from all Federal Channels were determined to be Suitable for Unconfined Aquatic Disposal (SUAD). This finding received formal concurrence from the U.S. Environmental Protection Agency (EPA) on January 10, 2025, and the North Coast Regional Water Quality Control Board (NCRWQCB) on February 12, 2025.

5.1.3 Other Restrictions

Will the discharge contribute to significant degradation of waters of the United States through adverse impacts to:

Human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites?	NO
Life states of aquatic life and other wildlife?	NO

[1] An analyte is a chemical substance that is the subject of a chemical analysis.
[2] An elutriate test is a laboratory procedure designed to simulate the short-term release of contaminants from dredged sediment into the water column during disposal.
[3] A water quality objective is a target for the physical, chemical, and biological characteristics of a body of water, established to protect its designated uses like drinking, swimming, or supporting aquatic life.

Diversity, productivity and stability of the aquatic ecosystem, such as the loss of fish or wildlife habitat, or loss of capacity of wetland to assimilate nutrients, purify water, or reduce wave energy?	NO
Recreational, aesthetic or economic values?	NO

5.2 Findings of Compliance or Non-Compliance

The proposed maintenance dredging of federal navigation channels in Humboldt Harbor and Bay and the associated disposal/placement of dredged material for a roughly 5-year period complies with the Section 404(b)(1) guidelines.	YES

DATE

DISTRICT COMMANDER

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Appendix C

Humboldt Harbor and Bay- 2025 Maintenance Dredging Sampling and Analysis Report

March 2025

HUMBOLDT HARBOR AND BAY – 2025 MAINTENANCE DREDGING SAMPLING AND ANALYSIS REPORT

March 2025

Prepared for	Prepared by	Prepared by
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List of Acronyms

ASTM	American Society for Testing and Materials
Humboldt Harbor	Humboldt Harbor and Bay
COC	Chain-of-custody
DDT	dichlorodiphenyltrichloroethane
DR Reed	DR Reed and Associates, Inc.
ER-L	Effect range-low
Eurofins	Eurofins Calscience
ft	foot
GPS	Global positioning system
HDPE	high-density polyethylene
HOODS	Humboldt Open Ocean Disposal Site
KEI	Kinnetic Environmental, Inc.
LC	lethal concentration (e.g., LC_{50})
LOEC	lowest observed-effect consentration
LOED	lowest observed-effect dose
MDL	method detection limit
MET	Modified Elutriate Test
mg/kg	milligram/kilogram
MLLW	Mean lower low water
MRL	method reporting limits
MS	Matrix Spike
MSD	Matrix Spike Duplicate
mWET	modified waste extraction test
ng/kg	nanogram per kilogram
O&M	Operations and Maintenance
OCI	organochlorine
OTM	Ocean Testing Manual
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PER	Pacific EcoRisk
PROP	Proposed Nearshore Disposal Zone
QA/QC	quality assurance/quality control

List of Acronyms (continued)

RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SEF	Sediment Evaluation Framework
SET	sediment elutriate test
SOP	Standard Operating Procedures
SPP	Suspended particulate phase
SUAD	Suitable for unconfined aquatic disposal
TEF	Toxicity equivalency factors
TEQ	Toxicity equivalency quotients
TRV	Toxicity reference values
USACE	U.S. Army Corps of Engineers
USEPA	United Stated Environmental Protection Agency
WAAS	Wide Angle Augmentation System
WHO	World Health Organization
yd^3	Cubic yards

1. INTRODUCTION

The United States Army Corps of Engineers (USACE) San Francisco District is planning to dredge the Humboldt Harbor and Bay (Humboldt Harbor) as part of its O&M Dredging Program (Figures 1-1 through 1-3). In order to provide the physical and chemical characterization needed to obtain a suitability determination for this dredging, the USACE has contracted DR Reed and Associates Inc. (DR Reed) and Pacific EcoRisk (PER) to perform sediment characterization of Humboldt Harbor and Bay sediments as per regional and federal guidance. DR Reed and PER conducted sampling and analyses of these sediments in accordance with the *Humboldt Harbor and Bay 2025 Maintenance Dredging Sampling & Analysis Plan, Tier III Evaluation* (SAP [USACE 2024]), *Master Sampling and Analysis Plan USACE SF-District O&M Dredging* (USACE 2021), Ocean Testing Manual (OTM [USEPA/USACE 1991]), and Inland Testing Manual (ITM [USEPA/USACE 1998]).

This sampling and analyses covered agency requirements for unconfined aquatic disposal of dredged material at the Proposed Nearshore Disposal Zone (PROP) and the Humboldt Open Ocean Disposal Site (HOODS), or possible future beach placement.

1.1 Project Description

Humboldt Harbor and Bay is located in Humboldt County and includes the Bar and Entrance Channel and Interior Channels (Figures 1-2 and 1-3). The channel serves deep draft commercial vessels en route to the Humboldt Harbor and Bay area.

There are currently five federally constructed and maintained navigation channels at Humboldt Harbor and Bay (Figure 1-3). The Bar and Entrance Channel has a project depth of -48.0 feet mean lower low water (MLLW) + 3.0 ft allowable over-depth; the North Bay Channel and Samoa Channel and Turning Basin have a project depth of -38.0 ft MLLW + 2.0 ft allowable over-depth; the Outer Eureka Channel has a project depth of -35 ft MLLW + 2.0 ft allowable over-depth, while the Inner Eureka Channel has a project depth of -26 ft channel MLLW + 2.0 ft allowable over-depth as well as the Field's Landing Channel and Turning Basin. The channels were sampled and tested to the project depth plus allowable over-depth. In addition, "Z-layer" samples consisting of the top 6 inches of the post-dredged mudline project depth were collected at -0.5 ft below project depth plus allowable over-depth.

The current volume estimates based on the condition survey completed in April of 2024 are shown in Table 1-1. The survey indicates that removing shoaled material to project depth would result in dredging 1,649,811 yd^3. In order to achieve project depth there is an allowable over-depth of two feet. The first foot of over-depth contains 464,815 yd^3. The second foot of over-depth also contains 464,815 yd^3 of material. This over-depth brings the total current dredge volume to 2,579,441 yd^3.

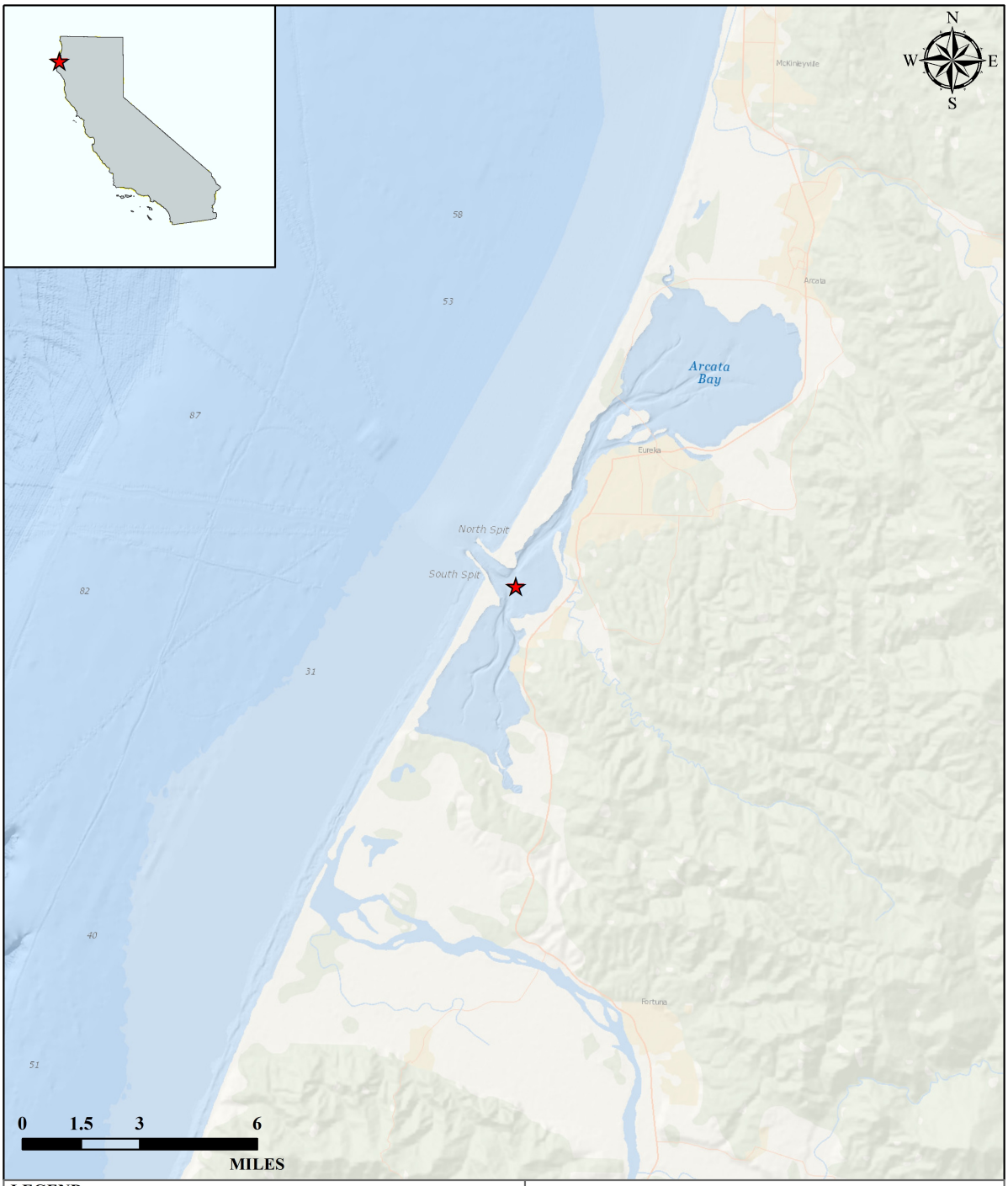


FIGURE 1-1.
LOCATION MAP:
HUMBOLDT HARBOR

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

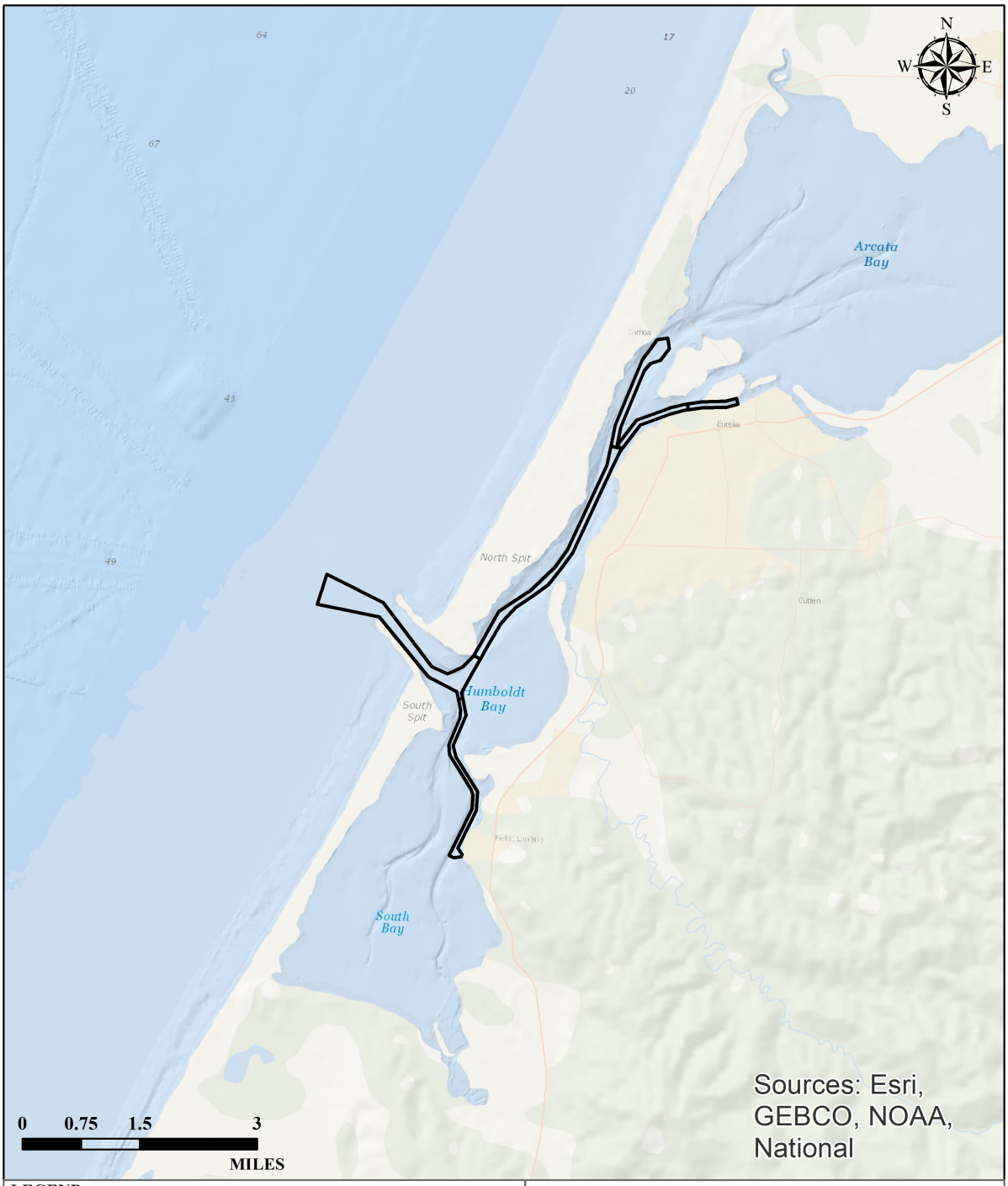
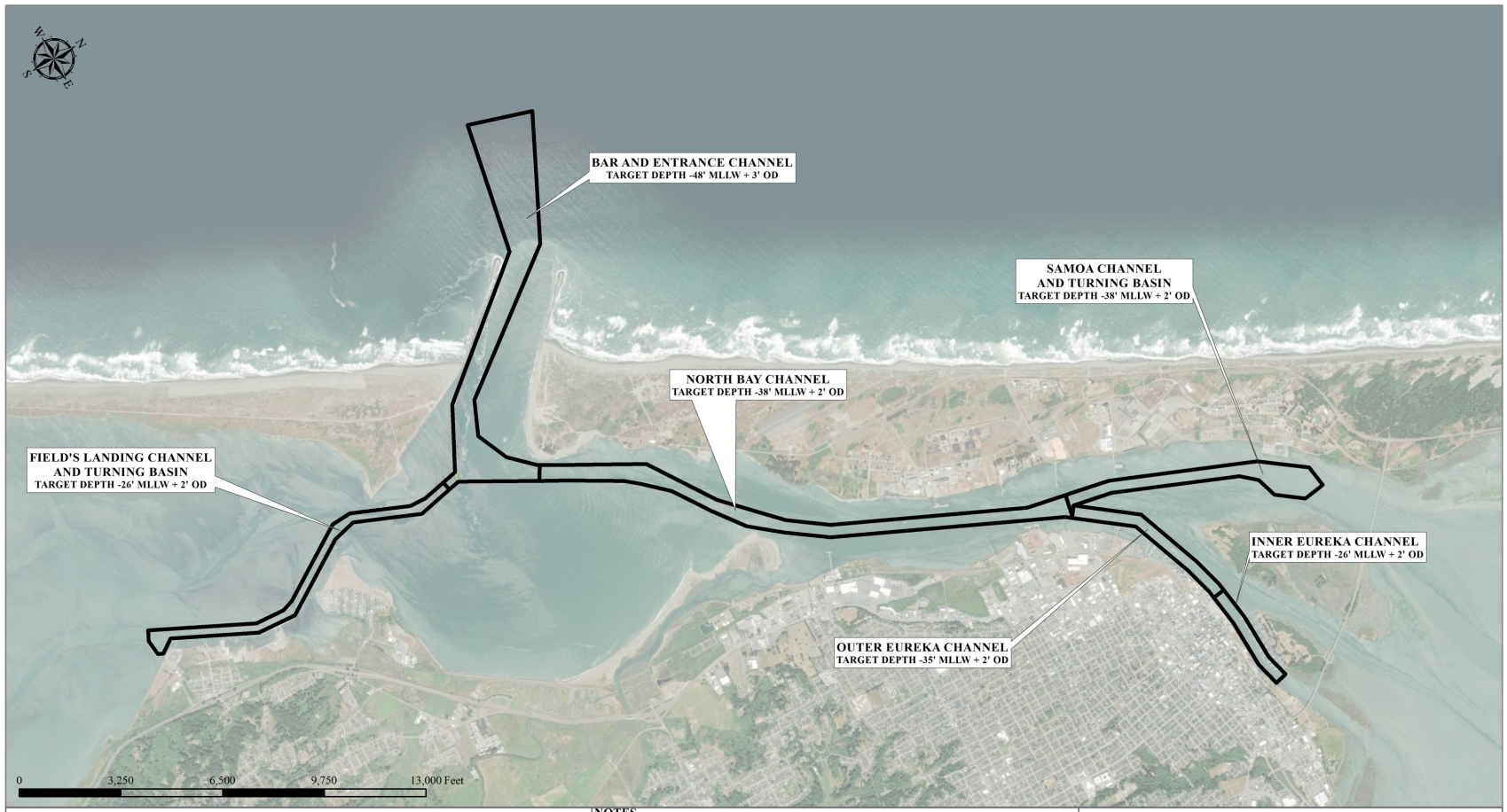


FIGURE 1-2.
VICINITY MAP:
HUMBOLDT HARBOR

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

SAMPLE AREA BOUNDARY

NOTES

1. SURVEY DATA COLLECTED IN SEPTEMBER 2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. MAP PREPARED BY PACIFIC ECORISK 9/26/2024.

FIGURE 1-3.

PROJECT OVERVIEW
HUMBOLDT HARBOR AND BAY, CA.

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

Table 1-1. Proposed Maintenance Dredging for Humboldt Harbor and Bay.

Sampling Area	Volume (yd^3) of Shoaled Material			Total Estimated Volume (yd^3)	Depth (ft MLLW)	Allowable Over-depth (ft)
	Project Depth	1st ft Overdepth	2nd ft Overdepth			
Bar and Entrance Channel (0+00-136+00)	788,356	267,912	267,912	1,324,180	48	3
North Bay Channel (136+00-309+00)	105,541	54,806	54,806	215,253	38	2
Samoa Channel and Turning Basin (309+00-392+46)	121,168	48,300	48,300	217,768	38	2
Eureka Channel (0+00-89+70)	579,136	81,587	81,587	742,310	35[A]/26[B]	2
Field's Landing Channel and Turning Basin (8+00-124+35)	55,510	12,210	12,210	79,930	26	2
Total Volume =	**1,649,811**	**464,815**	**464,815**	**2,579,441**		

MLLW - Mean Lower Low Water yd^3- Cubic Yards ft - feet
A – Outer Eureka Channel
B – Inner Eureka Channel

1.2 Objectives of the Sediment Investigation

The objective of the current sampling and testing is to evaluate the proposed dredged material to determine whether any potential adverse impacts may occur during removal operations and/or placement at the permitted disposal site. The procedures for sediment sample collection, sample processing and preparation, physical and chemical analyses, and data analyses were presented in a previously approved SAP (USACE 2024) and approved Master SAP *"Master Sampling and Analysis Plan USACE SF-District O&M Dredging* (USACE 2021). The specific objectives of the SAP scope-of-work are listed below:

1. Collect core samples from within the designated sampling areas following field protocol detailed in the SAP;
2. Conduct physical (e.g., grain size), limited chemical (ammonia, sulfides, and metals), and limited biological (MET toxicity testing) analyses on the "sandy" Bar and Entrance Channel and Samoa Channel and Turning Basin sediments;
3. Conduct physical, chemical, and biological analyses of the North Bay Channel, Eureka Channel, and Field's Landing Channel and Turning Basin sediments; and
4. Determine the suitability of the material for unconfined aquatic disposal at PROP and HOODS, or potentially future beach placement.

1.3 Organization of this Document

Sample collection and handling procedures are discussed in Sections 2 and 3 of this report. Results of physical and chemical analyses and biological toxicity testing are provided in Sections 4-6. Section 7 discusses quality control (QC) and Section 8 presents the conclusions regarding suitability of the material for unconfined aquatic disposal at PROP and HOODS, or potentially future beach placement.

2. FIELD SEDIMENT SAMPLE COLLECTION

2.1 Collection of Humboldt Harbor and Bay Sediment Cores

All sediments were collected in accordance with guidelines and procedures outlined in the SAP (USACE 2024). All field sampling activities were performed October 7 - 10, 2024, under the direction of Mr. Jeffrey Cotsifas (of PER). Kinnetic Environmental, Inc. (KEI) provided the sampling vessel, on-board positioning system, and sampling equipment. PER provided a Field Scientist to assist in sediment core collection and collection of site water. Sediment cores were collected from 36 designated sites (Figures 2-1 through 2-7); Table 2-1 lists site identifiers, GPS coordinates, mudline elevations, and core penetration depths for all sites. Final site positions were determined with a global positioning system (GPS) that uses U.S. Government Wide Angle Augmentation System (WAAS) differential correction data to identify each sampling location.

Sediment was also collected from HOODS and PROP for use as reference sediments in the bioassay testing (Figure 2-1). Table 2-2 lists site identifiers and GPS coordinates for the reference sediment sites.

2.1.1 Field Equipment Decontamination Procedure

The deck of the vessel was rinsed clean with site water between stations. All sampling equipment coming in contact with collected sediments was decontaminated between stations using the following procedures:

1. Rinse with site water and wash with scrub brush until free of sediment;
2. Wash with phosphate-free biodegradable soap solution; and
3. Rinse with site water taken from 3 ft. below the surface.

Sampling equipment that could not be cleaned was not used for subsequent sampling activities.

2.1.2 On-Board Sample Processing and Labeling

All sediment cores were collected using an appropriate coring device to the project depth plus over-depth, or until refusal was met. For each core, an additional 0.5 ft core section was collected from immediately below the project depth plus over-depth and was designated the 'Z-layer'. The individual sediment cores were extruded on board the sampling vessel and the 'Z-layer' section of sediment was removed from each core and stored in a separate container. All core sections were placed into food-grade polyethylene bags. Samples were stored on ice within insulated coolers until transport to the laboratory in Fairfield, CA.

2.2 Deviations from the Sampling and Analysis Plan

There were no unusual circumstances encountered during the fieldwork, and no major deviations from the SAP (USACE 2024). The proposed and actual station locations are presented in Figures 2-1 through 2-7. The Core Collection Forms are presented in Appendix A.

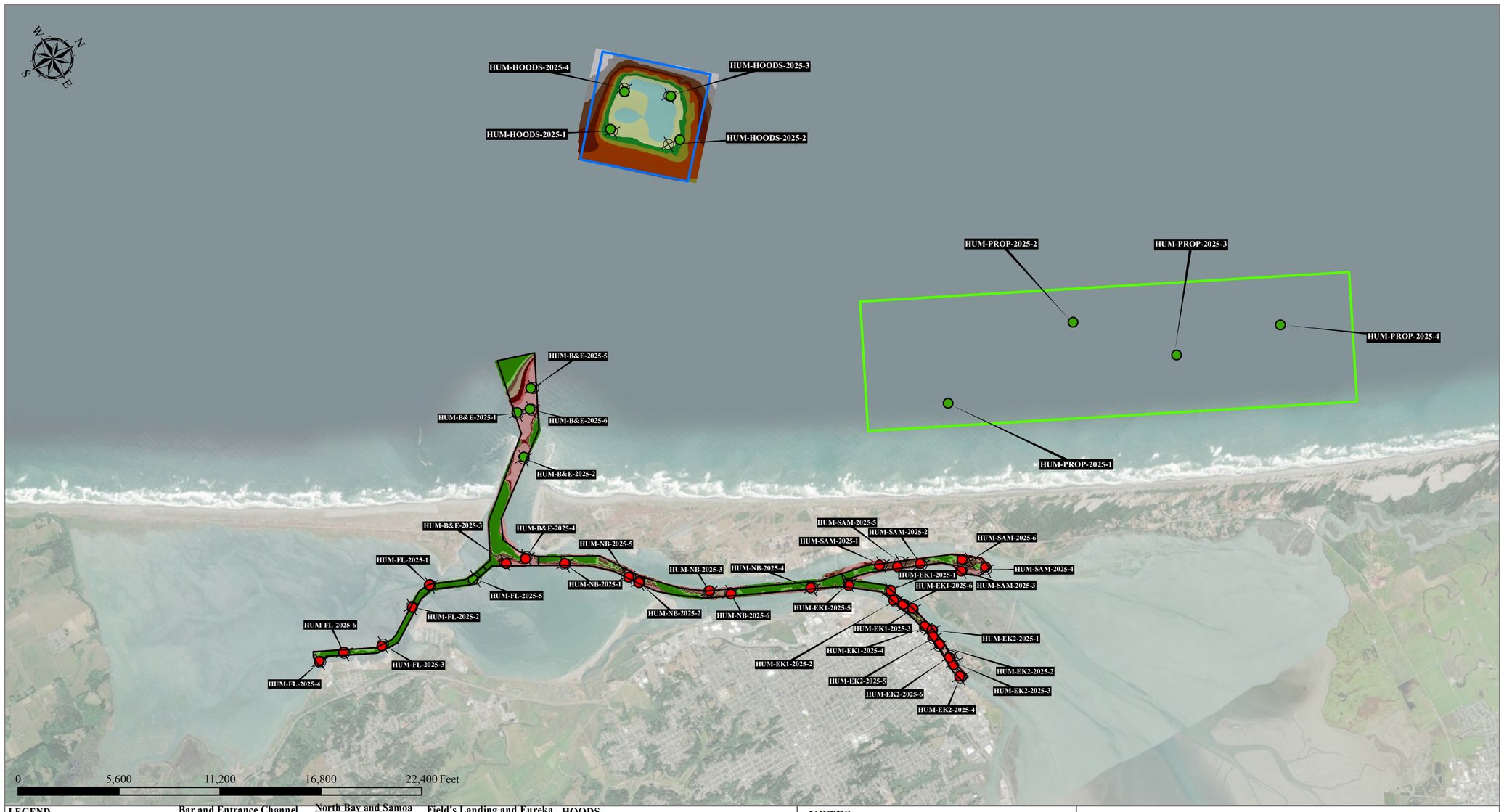
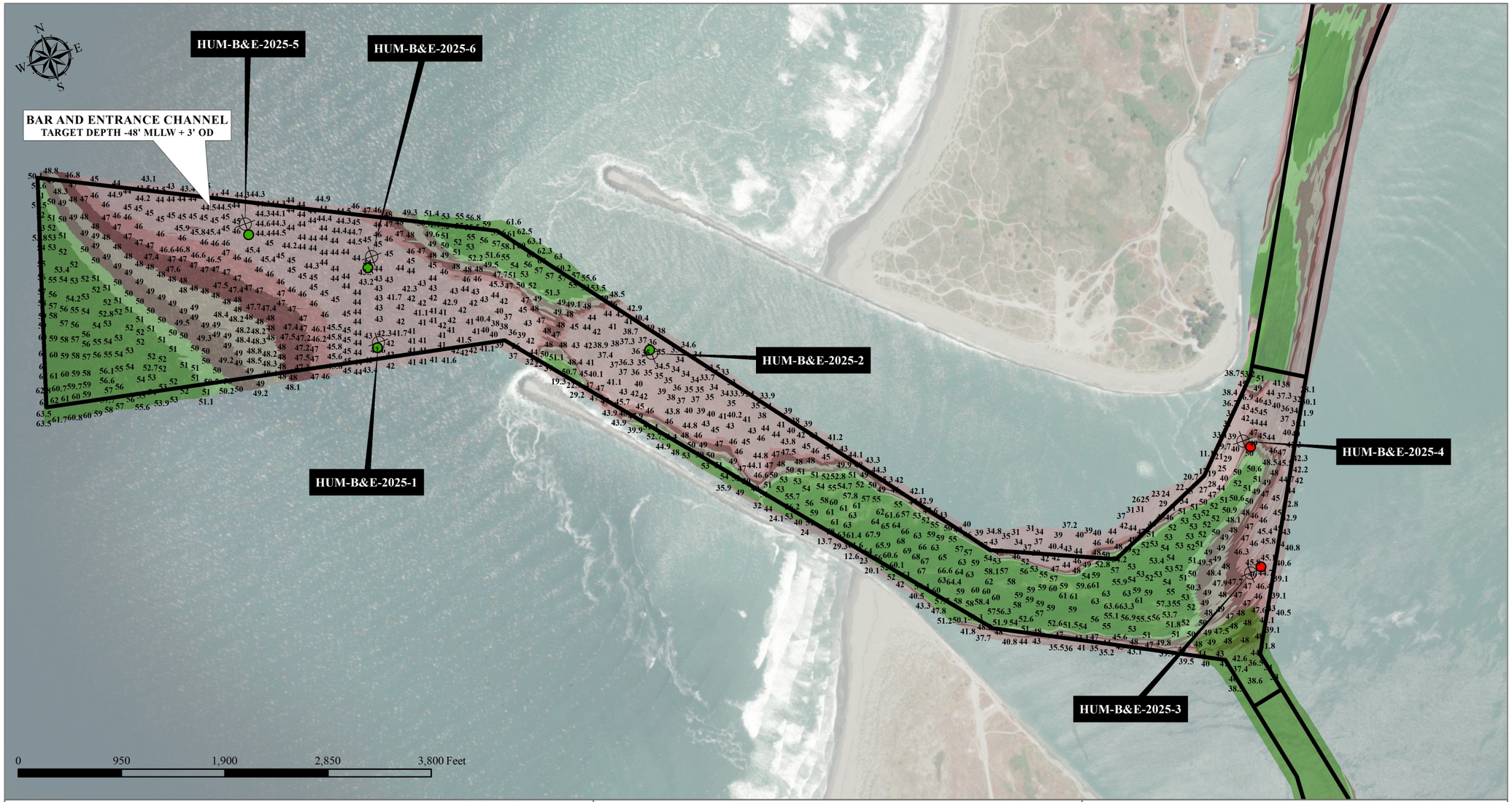


FIGURE 2-1.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY
HOODS AND PROPOSED NEARSHORE DISPOSAL ZONE

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

- PROPOSED SAMPLING LOCATIONS

ACTUAL SAMPLE LOCATIONS

- BUCKET DREDGE
- VIBRACORE
- SAMPLE AREA BOUNDARY

Bar and Entrance Channel Feet in MLLW	North Bay and Samoa Feet in MLLW	Field's Landing and Eureka Feet in MLLW
-46' and Above	-36' and Above	-24' and Above
-46' to -47'	-36' to -37'	-24' to -25'
-47' to -48'	-37' to -38'	-25' to -26'
-48' to -49'	-38' to -39'	-26' to -27'
-49' to -50'	-39' to -40'	-27' to -28'
-50' to -51'	-40' to -41'	-28' to -29'
51' and Below	-41' and Below	-29' and Below

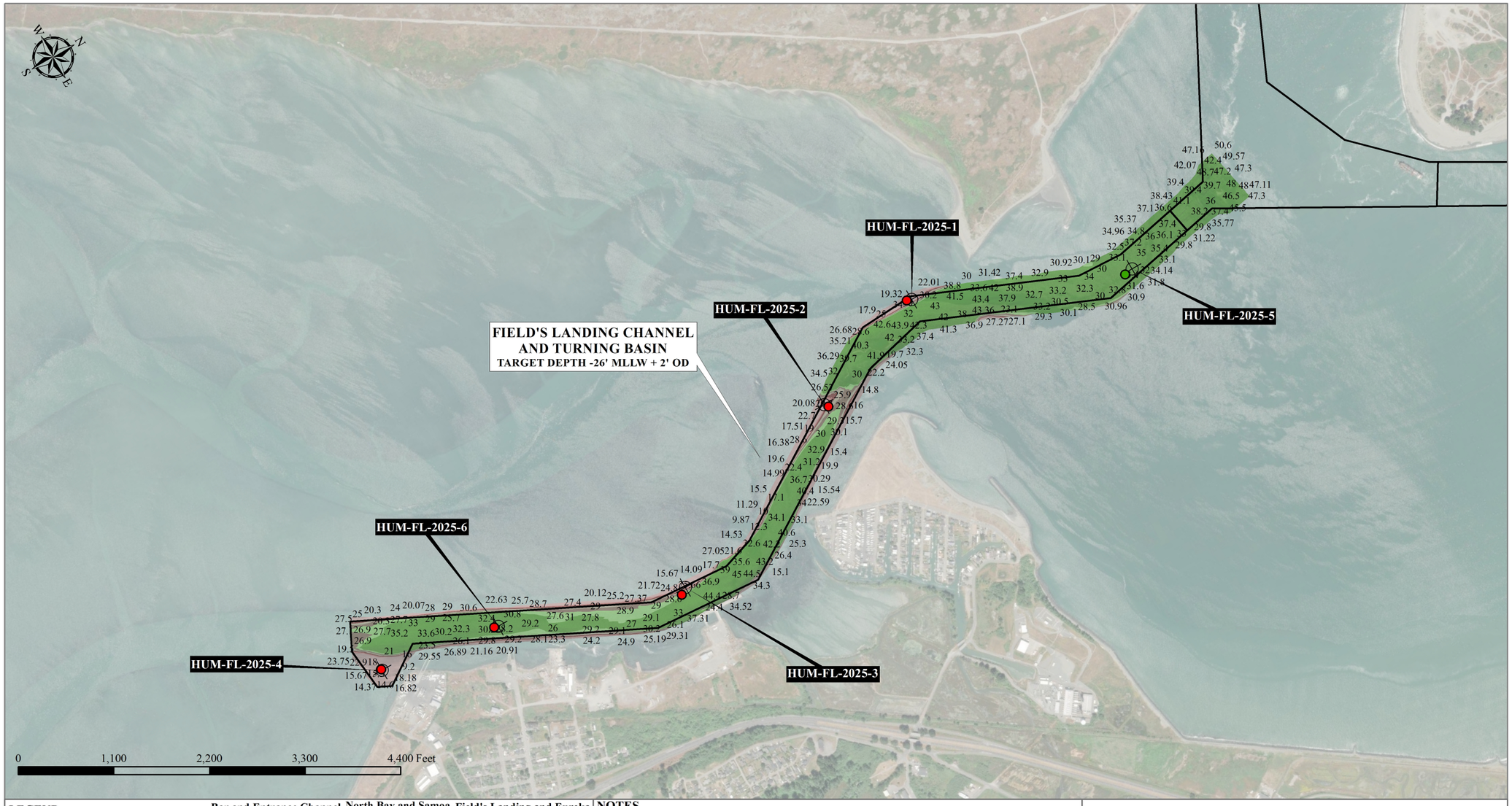
NOTES

1. SURVEY DATA COLLECTED ON APRIL 10,2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. MAP PREPARED BY PACIFIC ECORISK 10/15/2024.

FIGURE 2-2.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
BAR AND ENTRANCE CHANNEL

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

- PROPOSED SAMPLE LOCATIONS

ACTUAL SAMPLE POINTS

- BUCKET DREDGE
- VIBRACORE
- SAMPLE AREA BOUNDARY

Bar and Entrance Channel Feet in MLLW	North Bay and Samoa Feet in MLLW	Field's Landing and Eureka Feet in MLLW
-46' and Above	-36' and Above	-24' and Above
-46' to -47'	-36' to -37'	-24' to -25'
-47' to -48'	-37' to -38'	-25' to -26'
-48' to -49'	-38' to -39'	-26' to -27'
-49' to -50'	-39' to -40'	-27' to -28'
-50' to -51'	-40' to -41'	-28' to -29'
51' and Below	-41' and Below	-29' and Below

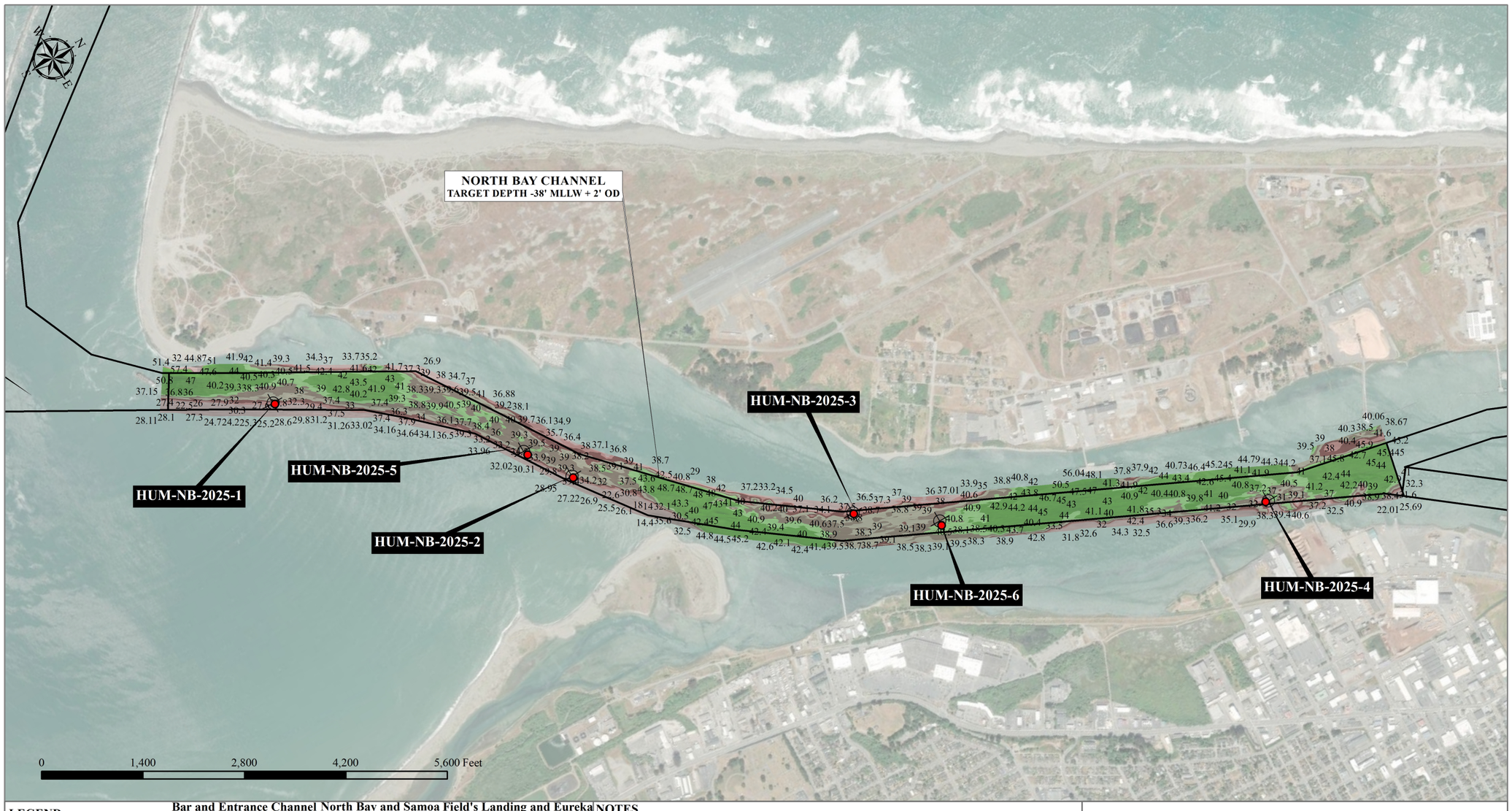
NOTES

1. SURVEY DATA COLLECTED ON APRIL 10,2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. HUM-FL-2025-5 COLLECTED W/ BUCKET GRAB. SAMPLE AREA DEEPER THAN PROJECT DEPTH, REPRESENTATIVE SAMPLE COLLECTED.
6. MAP PREPARED BY PACIFIC ECORISK 10/15/2024.

FIGURE 2-3.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
FIELD'S LANDING

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

- PROPOSED SAMPLE LOCATIONS

ACTUAL SAMPLE LOCATIONS

- VIBRACORE
- SAMPLE AREA BOUNDARY

Bar and Entrance Channel Feet in MLLW	North Bay and Samoa Feet in MLLW	Field's Landing and Eureka Feet in MLLW
-46' and Above	-36' and Above	-24' and Above
-46' to -47'	-36' to -37'	-24' to -25'
-47' to -48'	-37' to -38'	-25' to -26'
-48' to -49'	-38' to -39'	-26' to -27'
-49' to -50'	-39' to -40'	-27' to -28'
-50' to -51'	-40' to -41'	-28' to -29'
51' and Below	-41' and Below	-29' and Below

NOTES

1. SURVEY DATA COLLECTED ON APRIL 10,2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. MAP PREPARED BY PACIFIC ECORISK 10/15/2024.

FIGURE 2-4.

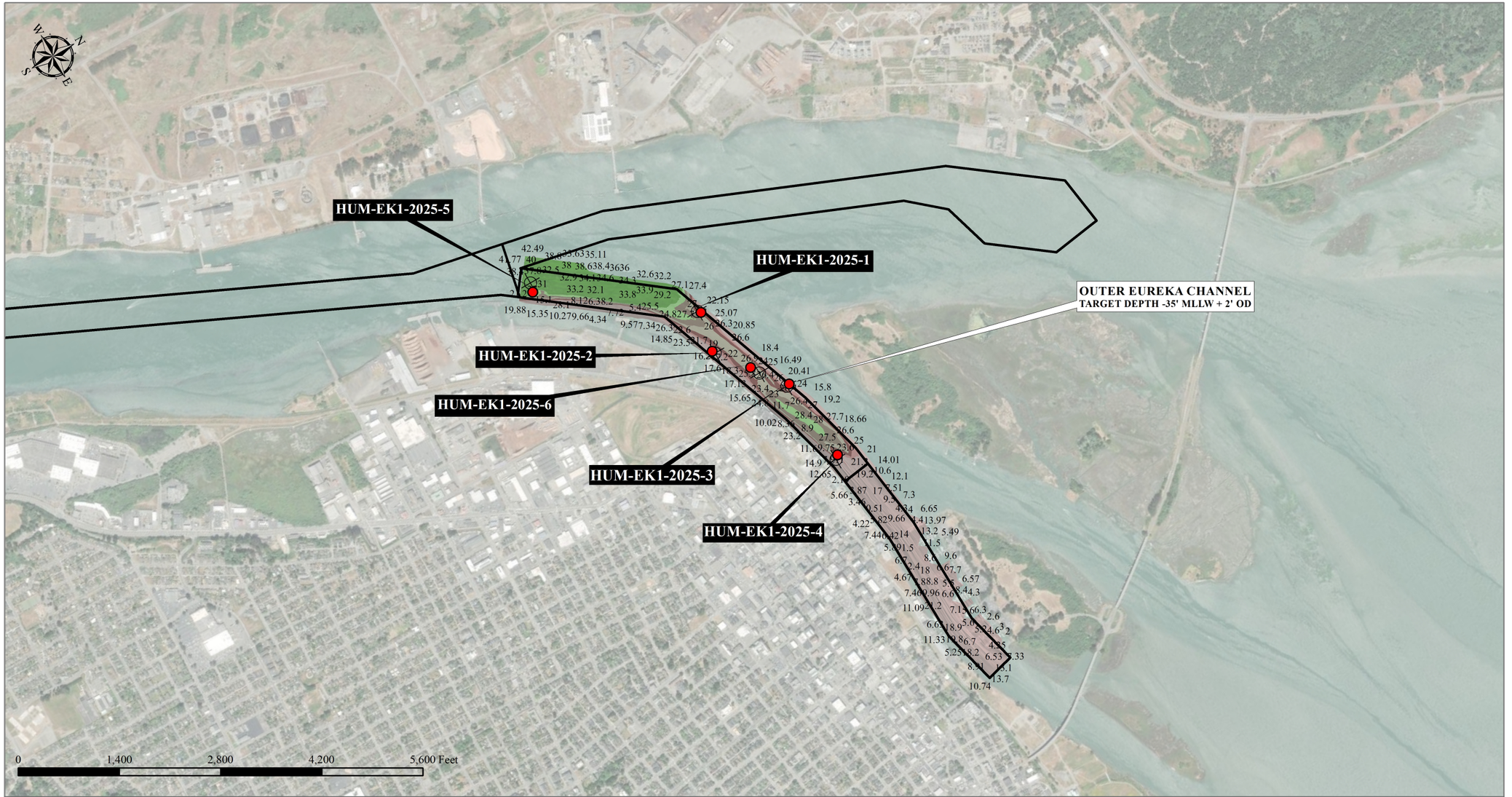
PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
NORTH BAY CHANNEL

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

FIGURE 2-5.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
SAMOA CHANNEL AND TURNING BASIN

PACIFIC ECORISK | ENVIRONMENTAL CONSULTING & TESTING



LEGEND

PROPOSED SAMPLING LOCATIONS

ACTUAL SAMPLE LOCATIONS

VIBRACORE

SAMPLE AREA

Bar and Entrance Channel Feet in MLLW	North Bay and Samoa Feet in MLLW	Field's Landing and Eureka Feet in MLLW
-46' and Above	-36' and Above	-24' and Above
-46' to -47'	-36' to -37'	-24' to -25'
-47' to -48'	-37' to -38'	-25' to -26'
-48' to -49'	-38' to -39'	-26' to -27'
-49' to -50'	-39' to -40'	-27' to -28'
-50' to -51'	-40' to -41'	-28' to -29'
51' and Below	-41' and Below	-29' and Below

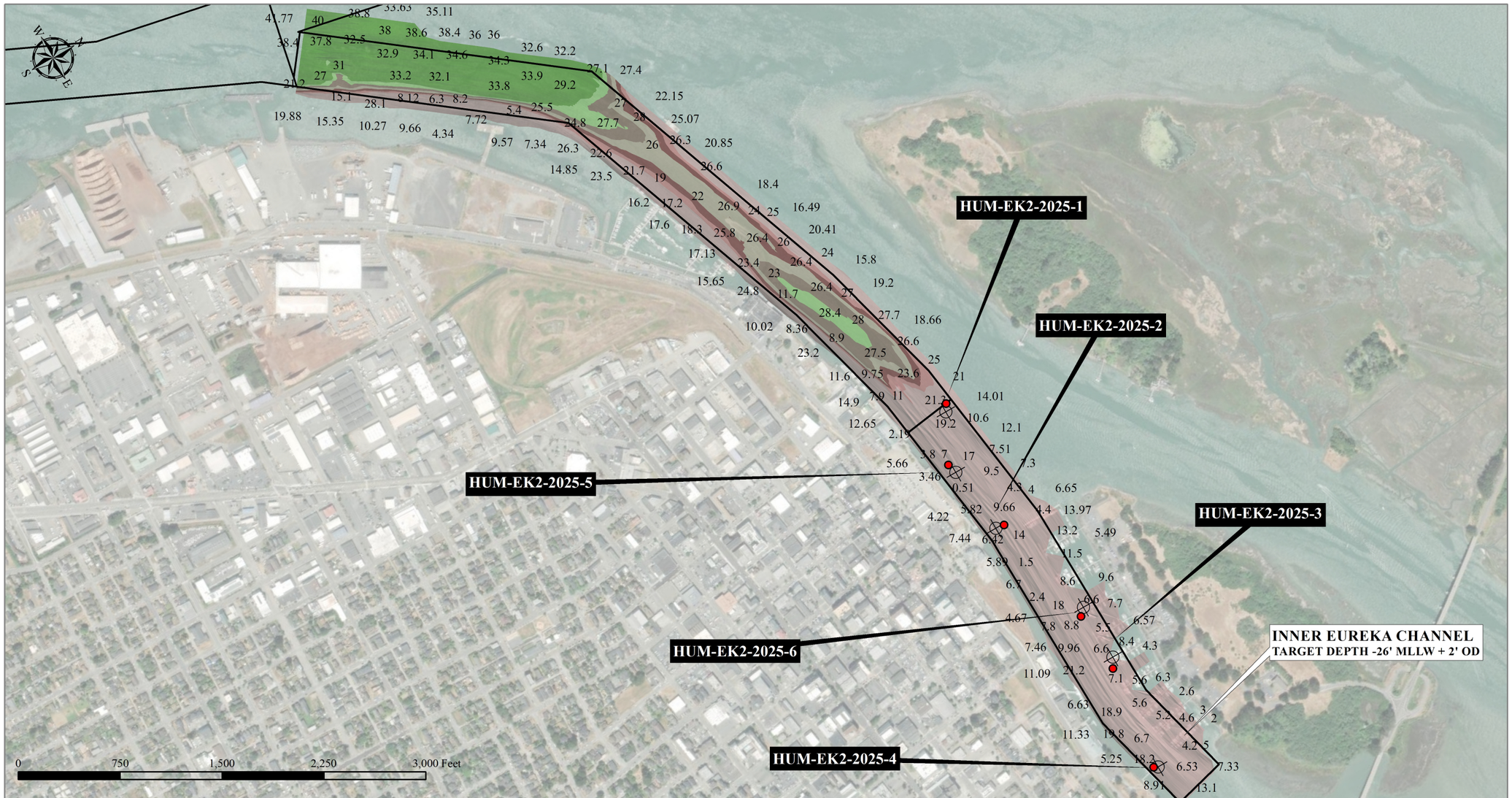
NOTES

1. SURVEY DATA COLLECTED ON APRIL 10,2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. MAP PREPARED BY PACIFIC ECORISK 10/15/2024.

FIGURE 2-6.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
OUTER EUREKA CHANNEL

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING



LEGEND

- PROPOSED SAMPLE LOCATIONS
- ACTUAL SAMPLE LOCATIONS
- VIBRACORE
- SAMPLE AREA BOUNDARY

Bar and Entrance Channel Feet in MLLW	North Bay and Samoa Feet in MLLW	Field's Landing and Eureka Feet in MLLW
-46' and Above	-36' and Above	-24' and Above
-46' to -47'	-36' to -37'	-24' to -25'
-47' to -48'	-37' to -38'	-25' to -26'
-48' to -49'	-38' to -39'	-26' to -27'
-49' to -50'	-39' to -40'	-27' to -28'
-50' to -51'	-40' to -41'	-28' to -29'
51' and Below	-41' and Below	-29' and Below

NOTES

1. SURVEY DATA COLLECTED ON APRIL 10,2024
2. HORIZONTAL DATUM/PROJECTION: NAD83 (2011), SPCS CALIFORNIA ZONE 01 - U.S. SURVEY FEET
3. VERTICAL DATUM: MLLW, U.S. SURVEY FEET
4. THIS SURVEY REPRESENTS GENERAL CONDITIONS AT THE TIME OF THE SURVEY.
5. MAP PREPARED BY PACIFIC ECORISK 10/15/2024.

FIGURE 2-7.

PROPOSED AND ACTUAL SAMPLING LOCATIONS
HUMBOLDT HARBOR AND BAY, CA.
INNER EUREKA CHANNEL

PACIFIC ECORISK ENVIRONMENTAL CONSULTING & TESTING

Table 2-1. Humboldt Harbor and Bay Sampling Station Locations and Core Depths Achieved.

SAMPLE ID	Sample Date	Latitude (decimal-deg)[A]	Longitude (decimal-deg)[A]	Mudline Elevation (ft MLLW)[B]	Core Penetration Depth Including Z-Layer (ft)	Total Core Depth (ft MLLW)
Bar and Entrance Channel						
HUM-B&E-2025-1	10/10/24	40.76684°	-124.24833°	-41.8	1.0[C]	-42.8
HUM-B&E-2025-2	10/10/24	40.76460°	-124.23978°	-42.3	1.0[C]	-43.3
HUM-B&E-2025-3	10/9/24	40.75449°	-124.22281°	-46.2	5.4	-51.6
HUM-B&E-2025-4	10/9/24	40.75745°	-124.22187°	-46.2	5.3	-51.5
HUM-B&E-2025-5	10/10/24	40.77058°	-124.25120°	-46.8	1.0[C]	-47.8
HUM-B&E-2025-6	10/10/24	40.76883°	-124.24779°	-42.9	1.0[C]	-43.9
North Bay Channel						
HUM-NB-2025-1	10/9/24	40.76234°	-124.21709°	-37.7	2.8	-40.5
HUM-NB-2025-2	10/9/24	40.77094°	-124.20676°	-36.9	3.6	-40.5
HUM-NB-2025-3	10/9/24	40.77963°	-124.19848°	-36.0	4.5	-40.5
HUM-NB-2025-4	10/9/24	40.79356°	-124.18919°	-35.2	5.3	-40.5
HUM-NB-2025-5	10/9/24	40.76984°	-124.20885°	-37.3	3.2	-40.5[D]
HUM-NB-2025-6	10/9/24	40.78234°	-124.19588°	-39.0	1.5	-40.5
Samoa Channel and Turning Basin						
HUM-SAM-2025-1	10/9/24	40.80448°	-124.18677°	-35.6	4.9	-40.5
HUM-SAM-2025-2	10/10/24	40.80989°	-124.18294°	-36.0	4.5	-40.5
HUM-SAM-2025-3	10/10/24	40.81495°	-124.17799°	-34.3	6.2	-40.5
HUM-SAM-2025-4	10/8/24	40.81836°	-124.17609°	-34.8	5.7	-40.5
HUM-SAM-2025-5	10/10/24	40.80674°	-124.18471°	-37.2	3.3	-40.5
HUM-SAM-2025-6	10/8/24	40.81577°	-124.17977°	-36.5	4.0	-40.5[E]

NOTES:
A - State Plane Coordinate System, California Zone 3, NAD 83.
B - Mudline elevations were determined using a lead-line.
C - Conditions unsafe to deploy vibracore. Bucket dredge sample collected for representative material of area.
D - Moved sample location to shallower location to achieve project depth + overdepth + Z-Layer.
E - Sampling location moved for safety.

Table 2-1. (*cont*). Humboldt Harbor and Bay Sampling Station Locations and Core Depths Achieved.

SAMPLE ID	Sample Date	Latitude (decimal-deg)[A]	Longitude (decimal-deg)[A]	Mudline Elevation (ft MLLW)[B]	Core Penetration Depth Including Z-Layer (ft)	Total Core Depth (ft MLLW)
Outer Eureka Channel						
HUM-EK1-2025-1	10/9/24	40.80591º	-124.18124º	-26.9	11.6	-38.5
HUM-EK1-2025-2	10/9/24	40.80377º	-124.17912º	-22.7	15.8	-38.5
HUM-EK1-2025-3	10/8/24	40.80557º	-124.17585º	-22.3	13.5	-35.8[D]
HUM-EK1-2025-4	10/8/24	40.80591º	-124.17161º	-26.0	11.0	-37.0[E]
HUM-EK1-2025-5	10/9/24	40.79874º	-124.18606º	-32.8	5.7	-38.5
HUM-EK1-2025-6	10/9/24	40.80485º	-124.17757º	-26.5	12.0	-38.5
Inner Eureka Channel						
HUM-EK2-2025-1	10/8/24	40.80673º	-124.17047º	-21.5	7.0	-28.5
HUM-EK2-2025-2	10/8/24	40.80659º	-124.16690º	-19.9	8.6	-28.5
HUM-EK2-2025-3	10/8/24	40.80713º	-124.16216º	-9.0	19.5	-28.5[F]
HUM-EK2-2025-4	10/8/24	40.80690º	-124.15934º	-16.6	11.9	-28.5
HUM-EK2-2025-5	10/8/24	40.80618º	-124.16901º	-16.2	12.3	-28.5
HUM-EK2-2025-6	10/8/24	40.80707º	-124.16378º	-9.0	19.5	-28.5
Field's Landing Channel and Turning Basin						
HUM-FL-2025-1	10/9/24	40.74255º	-124.22646º	-22.2	6.3	-28.5
HUM-FL-2025-2	10/7/24	40.73877º	-124.22414º	-24.5	4.0	-28.5
HUM-FL-2025-3	10/7/24	40.73186º	-124.22018º	-24.0	4.5	-28.5
HUM-FL-2025-4	10/7/24	40.72239º	-124.22342º	-13.0	14.2	-27.2[G]
HUM-FL-2025-5	10/10/24	40.74900º	-124.22307º	-34.8	1.0[C]	-35.8
HUM-FL-2025-6	10/7/24	40.72616º	-124.22272º	-25.4	3.1	-28.5

NOTES:
A - State Plane Coordinate System, California Zone 3, NAD 83.
B - Mudline elevations were determined using a lead-line.
C - Bucket dredge sample collected for representative material of area. Per communications with USACE, this sample was excluded from the composite and any further analysis as no shoaling was observed in the area above project depth + overdepth + Z-Layer.
D - Refusal at -35.8 ft. Bottom 0.2 ft kept for Z-Layer.
E - Refusal at -37.0 ft. Bottom 0.2 ft kept for Z-Layer.
F - Sampling location moved for safety.
G - Refusal at -27 ft. Bottom 0.5 ft of core kept as Z-Layer.

Table 2-2 Humboldt Harbor and Bay Reference Sediment Sampling Station Locations.

SAMPLE ID	Sample Date	Latitude (decimal-deg)[A]	Longitude (decimal-deg)[A]
Humboldt Open Ocean Disposal Site			
HUM-HOODS-2025-1	10/7/24	40.80862º	-124.28090º
HUM-HOODS-2025-2	10/7/24	40.81047º	-124.28928º
HUM-HOODS-2025-3	10/7/24	40.80482º	-124.29464º
HUM-HOODS-2025-4	10/7/24	40.80015º	-124.28947º
Proposed Nearshore and Beach Placement Site			
HUM-PROP-2025-1	10/7/24	40.82543º	-124.20882º
HUM-PROP-2025-2	10/7/24	40.84798º	-124.21110º
HUM-PROP-2025-3	10/7/24	40.85961º	-124.19538º
HUM-PROP-2025-4	10/7/24	40.87564º	-124.19073º

NOTES:
A - State Plane Coordinate System, California Zone 3, NAD 83.

3. SAMPLE PROCESSING

3.1 Homogenization and Compositing of Sediments

Each core was divided into project dredge depth sections (including over-dredge) and Z-layer sections aboard the sampling vessel. Homogenization and compositing of individual sediment core sections was performed at the PER laboratory facility in Fairfield, CA. The project dredge depth section from each core was individually homogenized in a stainless-steel bowl or high-density polyethylene (HDPE) container. A 500-mL sub-sample of the resulting homogenized sediment was archived to allow for additional chemical analyses, if necessary; archived samples are being stored frozen at ≤-20˚C for up to one [1] year after sample collection.

Proportionate amounts of the homogenized sediment from the Bar and Entrance Channel project depth sediment core sections were composited and homogenized to form the "HUM-B&E-2025" composite sediment. The North Bay Channel, Samoa Channel and Turning Basin, Outer Eureka Channel, Inner Eureka Channel, and Field's Landing Channel and Turning Basin area project depth sediment core sections were similarly processed to form the "HUM-NB-2025", "HUM-SAM-2025", "HUM-EK1-2025", "HUM-EK2-2025", and "HUM-FL-2025" composite sediments. Sub-samples of the composited sediments were frozen for archival storage as described above. Samples of the composited project dredge depth sediments were submitted for chemical and conventional analyses.

The Z-layer samples were similarly processed, with each individual Z-layer core section being individually homogenized and archived. Representative amounts of the homogenized Z-layer sediment for each individual core for the Bar and Entrance Channel were composited to form a homogenized Z-layer composite sample designated "HUM-B&E-2025 Z-Layer". The North Bay Channel, Samoa Channel and Turning Basin, Outer Eureka Channel, Inner Eureka Channel, and Field's Landing Channel and Turning Basin area Z-layers samples were similarly processed to form the "HUM-NB-2025 Z-Layer", "HUM-SAM-2025 Z-Layer", "HUM-EK1-2025 Z-Layer", "HUM-EK2-2025 Z-Layer", and "HUM-FL-2025 Z-Layer" sediments. The homogenized Z-layer composite and individual core samples were frozen for archival storage as described above.

3.2 Shipping of Sediment Samples to the Analytical Laboratories

Prior to shipping to the analytical laboratory, sample containers were wrapped in bubble wrap and securely packed inside a cooler with ice packs or crushed ice. A temperature blank was included in each cooler. The original signed chain-of-custody (COC) forms were placed inside the lid of each cooler and packaging tape was wrapped completely around each cooler. *This Side*

Up arrow labels and a *Glass-Handle with Care* label were attached on each side and to the top of each cooler, respectively. Each cooler was then sealed with custody seals on both the front and the back lid seams.

The sediment samples were shipped by overnight delivery. The sub-contracting analytical laboratories have been instructed to not dispose of any samples for this project unless notified by PER in writing.

3.2.1 Chain-of-Custody Protocol

Chain-of-custody (COC) procedures were followed for all samples throughout the collection, handling, and analyses activities. The Sampling and Analysis Project Manager, or a designee, was responsible for all sample tracking and COC procedures. This person was responsible for final sample inventory, maintenance of sample custody documentation, and completion of COC forms prior to transferring samples to the analytical laboratory. A COC form accompanied each cooler of samples to the respective analytical laboratories. Each custodian of the samples signed the COC form; copies of the COC forms are retained in the project file.

3.3 Deviations from the Sampling and Analysis Plan

No deviations from the SAP occurred for sample processing.

4. RESULTS OF LABORATORY ANALYSES

Sediment physical and chemical characteristics provide information about chemicals of concern present in the sediment and their potential bioavailability, and about non-chemical factors that could affect toxicity.

The Humboldt Harbor and Bay sediments collected from the Bar and Entrance Channel (HUM-B&E-2025) and Samoa Channel and Turning Basin (HUM-SAM-2025) were submitted to Eurofins Calscience (Eurofins located in Tustin, CA) for conventional parameters (total solids, TOC, and grain size) and limited chemical analyses (trace metals, sulfides, and ammonia) as specified in the SAP (USACE 2024). The results of these analyses are presented below in Table 4-1. The full Data Reports submitted by Eurofins for these bulk sediment analyses are provided in Appendix B.

The Humboldt Harbor and Bay sediments collected from the North Bay Channel (HUM-NB-2025), Outer Eureka Harbor Channel (HUM-EK1-2025), Inner Eureka Harbor Channel (HUM-EK2-2025), and Field's Landing Channel and Turning Basin (HUM-FL-2025) areas were submitted to Eurofins for conventional parameters (total solids, TOC, and grain size) and chemical analyses including trace metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), organochlorine (OCl) pesticides, butyltins (also referred to as organotins), chlorinated hydrocarbons, phthalates, phenols, dioxins/furans, and miscellaneous extractables as specified in the SAP (USACE 2024). The results of these analyses are presented below in Table 4-1. The full Data Reports submitted by Eurofins for these bulk sediment analyses are provided in Appendix B.

To support future beach placement, a modified waste extraction test (mWET) was performed for the Humboldt Harbor and Bay composite samples from North Bay Channel, Outer Eureka Harbor Channel, Inner Eureka Harbor Channel, and Field's Landing Channel and Turning Basin; the results of these mWET analyses are presented in Table 4-2. The full Data Report submitted by Eurofins for the mWET analyses is provided in Appendix C.

To support future beach placement, a Modified Elutriate Test (MET) samples were prepared for the Humboldt Harbor and Bay composite samples from the North Bay Channel, Outer Eureka Harbor Channel, Inner Eureka Harbor Channel, and Field's Landing Channel and Turning Basin and were submitted to Eurofins for chemical analyses; the results of these MET analyses are presented in Table 4-3. The full Data Report submitted by Eurofins for the MET analyses is provided in Appendix D. The MET elutriates were also evaluated for toxicity; the results of those analyses are presented in Section 5.

Table 4-1. Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-B&E-2025	HUM-SAM-2025	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	HUM-PROP-2025	HUM-HOODS-2025	SEF[1]	ER-L[2]
Grain Size (%, dry wt)										
Gravel (>2.00 mm)	0.10	6.75	0.23	2.25	0.59	0.20	0.35	0.04	-	-
Sand (0.0625-2.00 mm)	98.82	91.05	0	97.75	92.94	0	97.01	99.96	-	-
Silt (0.0039-0.0625 mm)	0.82	1.75	48.02	0	4.94	51.25	2.06	0	-	-
Clay (< 0.0039 mm)	0.27	0.46	51.75	0	1.53	48.56	0.58	0	-	-
Percent fines (Silt+Clay)	1.09	2.21	99.77	0	6.47	99.80	2.64	0	-	-
% Solids	84.6	81.7	66.2	77.7	74.8	61.0	84.8	78.0	-	-
TOC (%)	0.122	0.277	0.761	0.153	0.539	1.37	0.150	0.147	-	-
Total Sulfides (mg/kg)	7.27[A,B]	36.2[A,B]	47.7[A,B]	1.29[A,B]	103[A,B]	560[A,B]	0.584	0.255 J	-	-
Ammonia (mg/kg)	<53.1	<55.0	110 J[A,B]	<57.8	112 J[A,B]	129 J[A,B]	<53.0	<57.6	-	-
Metals (mg/kg, dry wt)										
Antimony	0.246 J[A,B]	<0.155	0.215 J[A,B]	0.271 J[A,B]	<0.171	0.223 J[A,B]	0.156 J	0.172 J	150	-
Arsenic	5.23 J[B]	5.16 [B]	7.91[A,B]	4.13	7.34[A,B]	10.3[A,B,C]	4.78	5.52	57	8.2
Barium	41.9[A]	28.8	75.0[A]	14.1	51.3[A]	101[A]	137	32.7	-	-
Beryllium	0.274 J	0.251 J	0.411 J[A,B]	0.261 J	0.341 J[A]	0.608[A,B]	0.360 J	0.289 J	-	-
Cadmium	0.022 J[A]	0.042 J[A,B]	0.143[A,B]	0.024 J[A]	0.069[A,B]	0.181[A,B]	0.032 J	<0.051	5.1	1.2
Chromium	61.9	50.4	90.9[A,C]	46.4	71.2[A]	112[A,B,C]	106	62.2	260	81
Cobalt	9.85	8.84	14.3[A,B]	7.67	11.9[A]	18.7[A,B]	12.1	10.1	-	-
Copper	11.5[A,B]	9.23	26.5[A,B]	6.18	19.5[A,B]	45.3[A,B,C]	9.26	10.1	390	34
Lead	4.75	3.86	8.01[A,B]	3.75	8.11[A,B]	16.0[A,B]	5.43	5.03	450	46.7
Mercury	0.0432 J[A,B]	0.0318 J[A,B]	0.0676 J[A,B]	<0.0279	0.0432 J[A,B]	0.155 [A,B,C]	<0.0256	0.0306 J	0.41	0.15
Molybdenum	0.287 J[B]	0.417 J[A,B]	0.859 J[A,B]	0.278 J[B]	0.744 J[A,B]	0.916 J[A,B]	0.237 J	0.299 J	-	-
Nickel	70.9[C]	54.2[C]	103[A,B,C]	49.8[C]	79.4[A,C]	135[A,B,C]	87.1	71.1	-	20.9
Selenium	<0.101	0.091 J[A,B]	0.196 J[A,B]	<0.099	0.121 J[A,B]	0.301[A,B]	<0.092	<0.216	-	-
Silver	<0.027	<0.024	0.069 J[A,B]	<0.026	0.041 J[A,B]	0.153[A,B]	<0.024	<0.057	6.1	1.0
Thallium	<0.0706	<0.0731	0.153 J[A,B]	0.0960 J[A,B]	0.101 J[A,B]	0.159 J[A,B]	<0.0722	<0.0762	-	-
Vanadium	37.0	32.4	52.9[A]	29.7	43.6[A]	70.0[A,B]	54.2	38.9	-	-
Zinc	43.5	34.1	74.6[A,B]	33.1	58.5[A,B]	113[A,B]	52.0	45.3	410	150
Butyltins (µg/kg, dry wt)										
Tetrabutyltin	-	-	<2.4	<2.1	<2.1	<2.6	<1.9	<2.1	-	-
Tributyltin	-	-	<2.1	<1.8	<1.8	<2.3	<1.6	<1.8	73[3]	-
Dibutyltin	-	-	<1.9	<1.6	<1.7	<2.1	<1.5	<1.6	-	-
Monobutyltin	-	-	0.91 J[A]	0.75 J[A]	0.72 J[A]	21[A,B]	16	<0.68	-	-
∑ detected Butylins	-	-	**0.91 J[A]**	**0.75 J[A]**	**0.72 J[A]**	**21[A,B]**	**16**	**0**	-	-

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site.
C - Value exceeds ER-L

Table 4-1 (*continued*). Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	HUM-PROP-2025	HUM-HOODS-2025	SEF[1]	ER-L[2]
PCBs (µg/kg, dry wt)								
PCB 005/008	<0.17	<0.15	<0.15	<0.19	<0.13	<0.15	-	-
PCB 018	<0.14	<0.12	<0.13	<0.15	<0.11	<0.12	-	-
PCB 028	<0.15	<0.13	0.32	<0.16	<0.12	<0.13	-	-
PCB 031	<0.13	<0.11	0.21 J	<0.14	<0.10	<0.11	-	-
PCB 033	<0.071	<0.061	0.16 J	<0.077	<0.055	<0.060	-	-
PCB 044	<0.18	<0.15	0.17 J	<0.19	<0.14	<0.15	-	-
PCB 049	<0.16	<0.14	<0.15	<0.18	<0.13	<0.14	-	-
PCB 052	<0.12	<0.10	0.23 J	0.36	<0.093	<0.10	-	-
PCB 056	<0.071	<0.061	0.099 J	<0.077	<0.055	<0.060	-	-
PCB 060	<0.19	<0.17	<0.17	<0.21	<0.15	<0.16	-	-
PCB 066	<0.17	<0.14	0.36	<0.18	<0.13	<0.14	-	-
PCB 070	<0.14	<0.12	0.44	0.40	<0.11	<0.12	-	-
PCB 074	<0.16	<0.13	0.20 J	<0.17	<0.12	<0.13	-	-
PCB 087	<0.19	<0.16	<0.16	<0.20	<0.15	<0.16	-	-
PCB 095	<0.10	<0.085	<0.088	0.27 J	<0.078	<0.085	-	-
PCB 097	<0.21	<0.18	<0.19	<0.23	<0.16	<0.18	-	-
PCB 099	<0.13	<0.11	<0.11	0.40	<0.10	<0.11	-	-
PCB 101	<0.16	<0.14	<0.14	0.55	<0.13	<0.14	-	-
PCB 105	<0.16	<0.14	<0.14	<0.17	<0.12	<0.13	-	-
PCB 110	<0.13	<0.11	0.12 J	0.57	<0.10	<0.11	-	-
PCB 118	<0.12	<0.10	<0.11	0.43	<0.094	<0.10	-	-
PCB 128	<0.21	<0.18	<0.18	<0.22	<0.16	<0.18	-	-
PCB 132/153	<0.36	<0.31	<0.32	0.47 J	<0.28	<0.31	-	-
PCB 138/158	<0.37	<0.31	<0.32	<0.40	<0.28	<0.31	-	-
PCB 141	<0.10	<0.085	<0.088	<0.11	<0.078	<0.085	-	-
PCB 149	<0.16	<0.14	<0.14	0.37	<0.13	<0.14	-	-
PCB 151	<0.14	<0.12	<0.12	<0.15	<0.11	<0.12	-	-
PCB 156	<0.14	<0.12	<0.13	<0.15	<0.11	<0.12	-	-
PCB 170	<0.16	<0.13	<0.14	<0.17	<0.12	<0.13	-	-
PCB 174	<0.086	<0.073	<0.076	<0.093	<0.067	<0.073	-	-
PCB 177	<0.14	<0.12	<0.13	<0.15	<0.11	<0.12	-	-
PCB 180	<0.12	<0.11	<0.11	0.28 J	<0.097	<0.11	-	-
PCB 183	<0.18	<0.16	<0.16	<0.20	<0.14	<0.16	-	-
PCB 187	<0.13	<0.11	<0.12	<0.15	<0.10	<0.11	-	-
PCB 194	<0.17	<0.14	<0.15	<0.18	<0.13	<0.14	-	-
PCB 195	<0.094	<0.080	<0.083	<0.10	<0.073	<0.080	-	-
PCB 201	<0.21	<0.18	<0.18	<0.23	<0.16	<0.18	-	-
PCB 203	<0.10	<0.089	<0.093	<0.11	<0.082	<0.089	-	-
∑ detected PCBs	**0**	**0**	**2.31[A,B]**	**4.1[A,B]**	**0**	**0**	**130**	**22.7**

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site

Table 4-1 (*continued*). Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	HUM-PROP-2025	HUM-HOODS-2025	SEF[1]	ER-L[2]
Organochlorine Pesticides (µg/kg, dry wt)								
Aldrin	<0.55	<0.47	<0.49	<0.60	<0.43	<0.47	9.5	-
alpha-BHC	<0.12	<0.10	<0.11	<0.13	<0.094	<0.10	-	-
beta-BHC	<0.29	<0.25	<0.25	<0.31	<0.23	<0.24	-	-
delta-BHC	<0.23	<0.19	<0.20	<0.25	<0.18	<0.19	-	-
gamma-BHC (lindane)	<0.16	<0.14	<0.14	<0.17	<0.12	<0.14	-	-
∑ BHCs	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**
Chlordane (technical)	<1.1	<0.92	<0.95	<1.2	<0.84	<0.91	2.8	-
Cis-nonachlor	<0.071	<0.061	<0.063	<0.077	<0.056	<0.060	-	-
alpha-Chlordane	<0.15	<0.13	<0.14	<0.17	<0.12	<0.13	-	-
gamma-Chlordane	<0.53	<0.45	<0.47	<0.57	<0.41	<0.45	-	-
Trans-nonachlor	<0.17	<0.14	<0.15	<0.18	<0.13	<0.14	-	-
Heptachlor	<0.090	<0.077	<0.079	<0.097	<0.070	<0.076	1.5	-
Heptachlor epoxide	<0.13	<0.11	<0.11	<0.14	<0.10	<0.11	-	-
Methoxylchlor	<0.25	<0.21	<0.22	<0.27	<0.19	<0.21	-	-
∑ Chlordane[4]	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**
Dieldrin	<0.10	<0.085	<0.088	<0.11	<0.078	<0.085	1.9	-
Endosulfan I	<0.18	<0.15	<0.16	<0.19	<0.14	<0.15	-	-
Endosulfan II	<0.34	<0.29	<0.30	<0.37	<0.27	<0.29	-	-
Endosulfan sulfate	<0.16	<0.14	<0.14	<0.18	<0.13	<0.14	-	-
Endrin	<0.29	<0.24	<0.25	<0.31	<0.22	<0.24	-	-
Endrin aldehyde	<1.5	<1.3	<1.3	<1.6	<1.2	<1.2	-	-
Endrin ketone	<0.29	<0.25	<0.25	<0.31	<0.22	<0.24	-	-
Toxaphene	<1.5	<1.3	<1.3	<1.6	<1.2	<1.3	-	-
2,4'-DDD	<0.097	<0.082	<0.085	<0.10	<0.075	<0.082	-	-
2,4'-DDE	<1.6	<1.3	<1.4	<1.7	<1.2	<1.3	-	-
2,4'-DDT	<0.14	<0.12	<0.12	<0.15	<0.11	<0.12	-	-
4,4'-DDD	<0.75	<0.64	<0.67	<0.82	<0.59	<0.64	16	-
4,4'-DDE	<0.41	<0.35	<0.36	0.59 J[A,B]	<0.32	<0.35	9	2.2
4,4'-DDT	<0.46	<0.40	<0.41	<0.50	<0.36	<0.39	12	-
∑ detected DDTs	**0**	**0**	**0**	**0.59 J[A,B]**	**0**	**0**	**50[3]**	**1.58**

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
3 - DMMP User Manual (DMMP 2021) and SF-Bay (SFEI 2024) Bioaccumulation Trigger.
4 - Total Chlordane is the sum of: alpha Chlordane, gamma Chlordane, Cis-nonachlor, Trans-nonachlor, Methoxylchlor, Heptachlor, and Heptachlor epoxide.
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site.

Table 4-1 (*continued*). Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	HUM-PROP-2025	HUM-HOODS-2025	SEF[1]	ER-L[2]
PAHs (µg/kg, dry wt)								
1-Methylnaphthalene (LPAH)	29[A,B]	<2.7	12 J[A,B]	43[A,B]	3.6 J	4.0 J	-	-
1-Methylphenanthrene (LPAH)	28[A,B]	<1.9	14[A,B]	51[A,B]	4.6 J	5.1 J	-	-
1,6,7-Trimethylnaphthalene (LPAH)	13 J[A,B]	<1.7	5.9 J[A,B]	24[A,B]	1.5 J	1.9 J	-	-
2,6-Dimethylnaphthalene (LPAH)	52[A,B]	<1.8	19[A,B]	73[A,B]	5.5 J	6.0 J	-	-
2-Methylnaphthalene (LPAH)	50[A,B]	3.5 J	23[A,B]	81[A,B,C]	6.0 J	7.5 J	670	70
Acenaphthene (LPAH)	6.1 J[A,B]	<4.8	5.4 J[A,B]	12 J[A,B]	<4.4	<4.8	500	16
Acenaphthylene (LPAH)	<2.7	<2.3	3.5 J[A,B]	7.3 J[A,B]	<2.1	<2.3	560	44
Anthracene (LPAH)	7.6 J[A,B]	<2.5	6.6 J[A,B]	24[A,B]	<2.3	<2.5	960	85.3
Benzo(a)anthracene (HPAH)	10 J[A,B]	<4.0	8.4 J[A,B]	25[A,B]	<3.6	<4.0	1,300	261
Benzo(a)pyrene (HPAH)	11 J[A,B]	<6.0	9.6 J[A,B]	26[A,B]	<5.5	<6.0	1,600	430
Benzo(b)fluoranthene (HPAH)	16[A,B]	<9.9	11 J[A,B]	39[A,B]	<9.0	<9.8	-	-
Benzo(e)pyrene (HPAH)	15[A,B]	<8.1	10 J[A,B]	34[A,B]	<7.4	<8.1	-	-
Benzo(g,h,i)perylene (HPAH)	15[A,B]	<6.5	13[A,B]	27[A,B]	<6.0	<6.5	670	-
Benzo(k)fluoranthene (HPAH)	6.8 J[A,B]	<3.5	6.0 J[A,B]	17[A,B]	<3.2	<3.5	3,200	-
Biphenyl (LPAH)	18[A,B]	<1.7	8.3 J[A,B]	28[A,B]	2.9 J	3.3 J	-	-
Chrysene (HPAH)	20[A,B]	4.0 J[A,B]	14[A,B]	48[A,B]	3.2 J	<3.3	1,400	384
Dibenzo(a,h)anthracene (HPAH)	<12	<10	<10	<13	<9.1	<9.9	230	63.4
Dibenzothiophene (LPAH)	5.1 J[A,B]	<1.6	3.0 J[A,B]	13 J[A,B]	<1.4	<1.5	-	-
Fluoranthene (HPAH)	33[A,B]	<3.3	38[A,B]	110[A,B]	<3.0	<3.2	1,700	600
Fluorene (LPAH)	19[A,B]	<4.7	13[A,B]	40[A,B,C]	<4.3	<4.7	540	19
Indeno(1,2,3-cd)pyrene (HPAH)	12 J[A,B]	<8.0	11 J[A,B]	21[A,B]	<7.3	<7.9	600	-
Naphthalene (LPAH)	27[A,B]	<5.6	21[A,B]	53[A,B]	<5.1	<5.5	2,100	160
Perylene (HPAH)	100[A,B]	<1.7	85[A,B]	490[A,B]	3.3 J	<1.7	-	-
Phenanthrene (LPAH)	65[A,B]	5.4 J	42[A,B]	130[A,B]	8.5 J	9.7 J	1,500	240
Pyrene (HPAH)	30[A,B]	4.4 J[A,B]	38[A,B]	97[A,B]	2.5 J	3.1 J	2,600	665
∑ LPAHs	**320[A,B]**	**8.9 J**	**177[A,B]**	**579[A,B,C]**	**32.6 J**	**37.5 J**	**5,200**	**552**
∑ HPAHs	**269[A,B]**	**8.4 J[A]**	**244[A,B]**	**934[A,B]**	**9.0 J**	**3.1 J**	**12,000**	**1700**
∑ detected PAHs	**589[A,B]**	**17.3 J**	**421[A,B]**	**1513[A,B]**	**41.6 J**	**40.6 J**	**-**	**4022**

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site
C- Value exceeds ER-L

Table 4-1 (*continued*). Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	HUM-PROP-2025	HUM-HOODS-2025	SEF[1]	ER-L[2]
Chlorinated Hydrocarbons (µg/kg, dry wt)								
1,2,4-Trichlorobenzene	3.4 J[A,B]	<2.6	<2.6	4.6 J[A,B]	2.8 J	2.7 J	31	-
1,2-Dichlorobenzene	<2.9	<2.5	<2.6	<3.2	<2.3	<2.5	35	-
1,4-Dichlorobenzene	<6.3	<5.4	<5.5	<6.8	<4.9	<5.3	110	-
Hexachlorobenzene	<7.7	<6.5	<6.8	<8.3	<6.0	<6.5	22	-
Phthalate Esters (µg/kg, dry wt)								
Bis 2-ethylhexyl phthalate	59 J[A,B]	<42	58 J[A,B]	85[A,B]	<38	<42	1,300	-
Butyl benzyl phthalate	<32	<28	<29	<35	<25	<28	63	-
Diethyl phthalate	7.8 J[A,B]	<6.2	<6.5	<7.9	<5.7	<6.2	200	-
Dimethyl phthalate	<4.4	<3.8	<3.9	<4.8	<3.5	<3.8	71	-
Di-n-butyl phthalate	<71	65[A,B]	100[A,B]	<77	<55	<60	1,400	-
Di-n-octyl phthalate	<20	<17	<17	<21	<15	<17	6,200	-
Phenols (µg/kg, dry wt)								
2,4-Dimethylphenol	<6.5	<5.6	<5.8	<7.1	<5.1	<5.5	29	-
2-Methylphenol	<3.7	<3.2	<3.3	<4.1	<2.9	<3.2	63	-
3/4-Methylphenol	94[A,B]	<5.4	17 J[A,B]	180[A,B]	16 J	<5.4	670	-
Pentachlorophenol	<160	<130	<140	<170	<120	<130	400	-
Phenol	<13	<11	<11	<14	<10	<11	420	-
Total Phenols	94[A,B]	0	17 J[A,B]	180[A,B]	16 J	0	-	-
Miscellaneous Extractables (µg/kg, dry wt)								
Benzoic acid	<330	<290	<300	<360	<260	<280	650	-
Benzyl alcohol	<210	<180	<190	<230	<160	<180	57	-
Dibenzofuran	10 J[A,B]	<4.3	7.1 J[A,B]	22[A,B]	<3.9	<4.3	540	-
Hexachloro-1,3-butadiene	<5.9	<5.0	<5.2	<6.4	<4.6	<5.0	11	-
Hexachloroethane	<3.6	<3.1	<3.2	<3.9	<2.8	<3.1	-	-

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site.

Table 4-1 (*continued*). Results of Chemical Analyses of Humboldt Harbor and Bay Sediments.

Analyte	TEF	HUM-FL-2025		HUM-NB-2025		HUM-EK1-2025		HUM-EK2-2025		HUM-PROP-2025		HUM-HOODS-2025		SEF[1]	ER-L[2]
Dioxins and Furans (ng/kg, dry wt)		**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**		
1,2,3,4,6,7,8-HpCDD	0.05	5.6 J	0.28	0.93 J	0.0465	7.7	0.385	44	2.2	0.69 J	0.0345	1.1 J	0.055	-	-
1,2,3,4,6,7,8-HpCDF	0.02	0.88 J	0.0176	0.18 J	0.0036	1.6 J	0.032	11	0.22	0.20 J	0.004	0.15 J	0.003	-	-
1,2,3,4,7,8,9-HpCDF	0.1	<0.13	0	<0.095	0	0.20 J	0.02	1.4 J	0.14	<0.086	0	0.23 J	0.023	-	-
1,2,3,4,7,8-HxCDD	0.09	0.46 J	0.0414	0.22 J	0.0198	0.38 J	0.0342	1.4 J	0.126	<0.055	0	0.18 J	0.0162	-	-
1,2,3,6,7,8-HxCDD	0.07	0.75 J	0.0525	<0.041	0	0.55 J	0.0385	3.8 J	0.266	<0.052	0	0.20 J	0.014	-	-
1,2,3,7,8,9-HxCDD	0.05	0.51 J	0.0255	<0.037	0	0.48 J	0.024	2.5 J	0.125	0.11 J	0.0055	<0.058	0	-	-
1,2,3,4,7,8-HxCDF	0.3	0.19 J	0.057	<0.022	0	0.43 J	0.129	2.7 J	0.81	<0.031	0	<0.039	0	-	-
1,2,3,6,7,8-HxCDF	0.09	0.096 J	0.0086	<0.016	0	0.14 J	0.0126	1.0 J	0.09	<0.023	0	<0.031	0	-	-
1,2,3,7,8,9-HxCDF	0.2	0.26 J	0.052	0.24 J	0.048	0.27 J	0.054	0.45 J	0.09	0.23 J	0.046	0.26 J	0.052	-	-
2,3,4,6,7,8-HxCDF	0.1	<0.050	0	<0.015	0	0.11 J	0.011	0.65 J	0.065	<0.022	0	<0.028	0	-	-
OCDD	0.001	35	0.035	8.1 J	0.0081	49	0.049	270	0.27	4.3 J	0.0043	6.9 J	0.0069	-	-
OCDF	0.002	2.5 J	0.005	0.57 J	0.00114	4.1 J	0.0082	27	0.054	0.44 J	0.00088	0.29 J	0.00058	-	-
1,2,3,7,8-PeCDD	0.4	<0.099	0	<0.061	0	<0.095	0	0.82 J	0.328	<0.073	0	<0.082	0	-	-
1,2,3,7,8-PeCDF	0.1	<0.042	0	<0.023	0	0.11 J	0.011	0.58 J	0.058	<0.024	0	<0.028	0	-	-
2,3,4,7,8-PeCDF	0.1	<0.053	0	<0.028	0	0.16 J	0.016	0.93 J	0.093	<0.030	0	<0.035	0	-	-
2,3,7,8-TCDD	1	<0.10	0	<0.058	0	<0.052	0	0.41 J	0.41	<0.065	0	<0.081	0	-	-
2,3,7,8-TCDF	0.07	0.99 J	0.0693	<0.021	0	0.45 J	0.0315	1.1 J	0.077	0.22 J	0.0154	<0.028	0	-	-
∑ Dioxin/Furan (ng TEQ/kg, dry wt)	**NA**	**NA**	**0.644[A,B]**	**NA**	**0.127[B]**	**NA**	**0.856[A,B]**	**NA**	**5.422[A,B]**	**NA**	**0.111**	**NA**	**0.171**	**-**	**-**

Notes:
1 - Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE, 2018).
2- Effects Range Low (ER-L); NOAA Sediment Quality Guidelines (Long, et. al, 1995).
J - Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds HOODS reference site.
B - Value exceeds PROP reference site.

Table 4-2. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Composite Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
TOC (mg/L)	8.12	0.664	5.13	16.7	-	-
Total Sulfides (mg/L)	<0.0166	<0.0166	<0.0166	<0.0166	-	-
Ammonia (mg/L)	4.53	0.171	1.31	4.72	-	-
Metals (µg/L)						
Antimony	3.73	0.416	2.38	4.15	-	-
Arsenic	17.5	5.69	9.41	35.3	36[1]	69[1]
Barium	34.9	2.84	18.9	70.0	-	-
Beryllium	<0.290	<0.290	<0.290	<0.290	-	-
Cadmium	0.0384	<0.0130	0.0218	0.0526	9.3[1]	42[5]
Chromium	7.24	0.487 J	4.80	25.4	50[1,5]	1100[1,5]
Cobalt	0.762	0.123	0.607	1.68	-	-
Copper	5.17[A,B]	5.38[A,B]	4.10[A]	15.9[A,B]	3.1[1]	4.8[1]
Lead	1.21	0.0611	1.10	3.11	8.1[1]	210[1]
Mercury	0.00566	0.00295	0.0105	0.0238	0.025[1]	2.1[1]
Molybdenum	17.1	3.13	9.31	17.0	-	-
Nickel	4.63	0.414 J	3.55	10.6[A,B]	8.2[1]	7.4[1]
Selenium	<0.300	<0.300	<0.300	<0.300	5.0[6]	20[6]
Silver	<0.0780	0.112 J	<0.0780	0.104 J	-	-
Thallium	0.0207 J	<0.0150	<0.0150	0.0574	-	-
Vanadium	6.72	12.5	10.0	12.2	-	-
Zinc	3.61	1.37	3.42	11.4	-	-
Butyltins (µg/L)						
Tetrabutyltin	<1.4	<20	<1.5	<1.4	-	-
Tributyltin	<1.1	<15	<1.2	<1.1	-	-
Dibutyltin	4.6	<25	9.4	8.8	-	-
Monobutyltin	1800	670	2400	650	-	-
∑ detected Butylins	**1805**	**670**	**2409**	**659**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
5 -Water quality objectives is for chromium VI; however, it may be met as total chromium.
6 - National Toxics Rule.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds MWQO for Toxic Pollutants for Surface Waters Continuous Concentration Criterion.
B - Value exceeds MWQO for Toxic Pollutants for Surface Waters Maximum Concentration Criterion.

Table 4-2 *(continued)*. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
PCBs (µg/L, dry wt)						
PCB 005/008	<0.0013	<0.0013	<0.0013	<0.0013	-	0.03[1]
PCB 018	<0.0010	<0.0010	<0.0011	<0.0011	-	0.03[1]
PCB 028	<0.0010	<0.0010	<0.0010	<0.0011	-	0.03[1]
PCB 031	<0.00042	<0.00042	<0.00043	<0.00044	-	0.03[1]
PCB 033	<0.00044	<0.00044	<0.00045	<0.00046	-	0.03[1]
PCB 044	<0.0015	<0.0015	<0.0015	<0.0015	-	0.03[1]
PCB 049	<0.00099	<0.00098	<0.0010	<0.0010	-	0.03[1]
PCB 052	<0.0011	<0.0011	<0.0011	<0.0011	-	0.03[1]
PCB 056	<0.0017	<0.0017	<0.0018	<0.0018	-	0.03[1]
PCB 060	<0.00056	<0.00056	<0.00057	<0.00058	-	0.03[1]
PCB 066	<0.0019	<0.0019	<0.0020	<0.0020	-	0.03[1]
PCB 070	<0.00095	<0.00094	<0.00097	<0.00098	-	0.03[1]
PCB 074	<0.0013	<0.0013	<0.0013	<0.0013	-	0.03[1]
PCB 087	<0.00096	<0.00095	<0.00098	<0.00099	-	0.03[1]
PCB 095	<0.00072	<0.00072	<0.00074	<0.00074	-	0.03[1]
PCB 097	<0.00071	<0.00071	<0.00073	<0.00073	-	0.03[1]
PCB 099	<0.00069	<0.00069	<0.00071	<0.00071	-	0.03[1]
PCB 101	<0.0015	<0.0015	<0.0015	<0.0015	-	0.03[1]
PCB 105	<0.00097	<0.00096	<0.00099	<0.00099	-	0.03[1]
PCB 110	<0.0013	<0.0013	<0.0013	<0.0014	-	0.03[1]
PCB 118	<0.0014	<0.0014	<0.0015	<0.0015	-	0.03[1]
PCB 128	<0.0028	<0.0028	<0.0028	<0.0029	-	0.03[1]
PCB 132/153	<0.0021	<0.0021	<0.0022	<0.0022	-	0.03[1]
PCB 138/158	<0.0027	<0.0027	<0.0028	<0.0028	-	0.03[1]
PCB 141	<0.0011	<0.0011	<0.0012	<0.0012	-	0.03[1]
PCB 149	<0.00072	<0.00072	<0.00074	<0.00074	-	0.03[1]
PCB 151	<0.0011	<0.0011	<0.0011	<0.0011	-	0.03[1]
PCB 156	<0.0011	<0.0011	<0.0012	<0.0012	-	0.03[1]
PCB 170	<0.00072	<0.00072	<0.00074	<0.00075	-	0.03[1]
∑ detected PCBs	**0**	**0**	**0**	**0**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-2 *(continued)*. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Organochlorine Pesticides (µg/L)						
Aldrin	<0.018	<0.018	<0.018	<0.018	-	1.3[1]
alpha-BHC	<0.0072	<0.0072	<0.0072	<0.0072	-	-
beta-BHC	<0.024	<0.024	<0.024	<0.024	-	-
delta-BHC	<0.012	<0.012	<0.012	<0.012	-	-
gamma-BHC (lindane)	<0.0039	<0.0039	<0.0039	<0.0039	-	0.16[1]
∑ BHCs	**0**	**0**	**0**	**0**	**-**	**-**
Chlordane (technical)	<0.15	<0.15	<0.15	<0.15	-	-
Cis-nonachlor	<0.0068	<0.0068	<0.0068	<0.0068	-	-
alpha-Chlordane	<0.0050	<0.0050	<0.0050	<0.0050	-	-
gamma-Chlordane	<0.052	<0.052	<0.052	<0.052	-	-
Trans-nonachlor	<0.0043	<0.0043	0.0071 J	<0.0043	-	-
Heptachlor	<0.0071	<0.0071	<0.0071	<0.0071	0.0036[1]	0.053[1]
Heptachlor epoxide	<0.024	<0.024	<0.024	<0.024	0.0036[1]	0.053[1]
Methoxylchlor	<0.022	<0.022	<0.022	<0.022	-	-
∑ Chlordane[5]	**0**	**0**	**0.0071 J[A]**	**0**	**0.004[1]**	**0.09[1]**
Dieldrin	<0.0079	<0.0079	<0.0079	<0.0079	0.0019[1]	0.71[1]
Endosulfan I	<0.0077	<0.0077	<0.0077	<0.0077	-	-
Endosulfan II	<0.025	<0.025	<0.025	<0.025	-	-
Endosulfan sulfate	<0.0082	<0.0082	<0.0082	<0.0082	-	-
Endrin	<0.014	<0.014	<0.014	<0.014	0.0023[1]	0.037[1]
Endrin aldehyde	<0.15	<0.15	<0.15	<0.15	-	-
Endrin ketone	<0.013	<0.013	<0.013	<0.013	-	-
Toxaphene	<0.32	<0.32	<0.32	<0.32	0.0002[1]	0.2[1]
2,4'-DDD	<0.0051	<0.0051	<0.0051	<0.0051	-	-
2,4'-DDE	<0.13	<0.13	<0.13	<0.13	-	-
2,4'-DDT	<0.0081	<0.0081	<0.0081	<0.0081	-	-
4,4'-DDD	<0.026	<0.026	<0.026	<0.026	-	-
4,4'-DDE	<0.011	<0.011	<0.011	<0.011	-	-
4,4'-DDT	<0.0096	<0.0096	<0.0096	<0.0096	0.001[1]	0.13[1]
∑ detected DDTs	**0**	**0**	**0**	**0**	-	-

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
5 - Total Chlordane is the sum of: alpha Chlordane, gamma Chlordane, Cis-nonachlor, Trans-nonachlor, Methoxylchlor, Heptachlor, and Heptachlor epoxide.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Value exceeds MWQO for Toxic Pollutants for Surface Waters Continuous Concentration Criterion.

Table 4-2 *(continued)*. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
PAHs (µg/L)						
1-Methylnaphthalene (LPAH)	<0.063	<0.060	<0.061	<0.061	-	-
1-Methylphenanthrene (LPAH)	<0.053	<0.051	<0.052	<0.052	-	-
1,6,7-Trimethylnaphthalene (LPAH)	<0.047	<0.045	<0.046	<0.046	-	-
2,6-Dimethylnaphthalene (LPAH)	<0.073	<0.070	<0.072	<0.071	-	-
2-Methylnaphthalene (LPAH)	<0.051	<0.049	<0.050	<0.050	-	-
Acenaphthene (LPAH)	<0.066	<0.064	<0.065	<0.065	-	-
Acenaphthylene (LPAH)	<0.066	<0.063	<0.065	<0.064	-	-
Anthracene (LPAH)	<0.026	<0.025	<0.026	<0.026	-	-
Benzo(a)anthracene (HPAH)	<0.061	<0.058	<0.059	<0.059	-	-
Benzo(a)pyrene (HPAH)	<0.029	<0.028	<0.029	<0.029	-	-
Benzo(b)fluoranthene (HPAH)	<0.070	<0.067	<0.069	<0.068	-	-
Benzo(e)pyrene (HPAH)	<0.045	<0.043	<0.044	<0.044	-	-
Benzo(g,h,i)perylene (HPAH)	<0.061	<0.059	<0.060	<0.059	-	-
Benzo(k)fluoranthene (HPAH)	<0.070	<0.068	<0.069	<0.069	-	-
Biphenyl (LPAH)	<0.065	<0.063	<0.064	<0.064	-	-
Chrysene (HPAH)	<0.057	<0.055	<0.056	<0.056	-	-
Dibenzo(a,h)anthracene (HPAH)	<0.15	<0.14	<0.14	<0.14	-	-
Dibenzothiophene (LPAH)	<0.042	<0.040	<0.041	<0.041	-	-
Fluoranthene (HPAH)	<0.057	<0.055	<0.056	<0.055	-	-
Fluorene (LPAH)	<0.061	<0.059	<0.060	<0.060	-	-
Indeno(1,2,3-cd)pyrene (HPAH)	<0.14	<0.13	<0.13	<0.13	-	-
Naphthalene (LPAH)	<0.057	<0.055	<0.056	<0.056	-	-
Perylene (HPAH)	<0.042	<0.040	<0.041	0.050 J	-	-
Phenanthrene (LPAH)	<0.070	<0.067	<0.068	<0.068	-	-
Pyrene (HPAH)	<0.068	<0.066	<0.067	<0.067	-	-
∑ LPAHs	**0**	**0**	**0**	**0**	**-**	**-**
∑ HPAHs	**0**	**0**	**0**	**0.050 J**	**-**	**-**
∑ detected PAHs	**0**	**0**	**0**	**0.050 J**	**-**	**15[5]**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
5 - 24-hour average objective for total PAHs from the 1995 Basin Plan.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-2 *(continued)*. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Chlorinated Hydrocarbons (µg/L)						
1,2,4-Trichlorobenzene	<0.085	<0.081	<0.083	<0.083	-	-
1,2-Dichlorobenzene	<0.079	<0.076	<0.077	<0.077	-	-
1,4-Dichlorobenzene	<0.078	<0.075	<0.076	<0.076	-	-
Hexachlorobenzene	<0.071	<0.068	<0.070	<0.069	-	-
Phthalate Esters (µg/L)						
Bis 2-ethylhexyl phthalate	<1.1	<1.1	<1.1	<1.1	-	-
Butyl benzyl phthalate	<0.35	<0.34	<0.35	<0.35	-	-
Diethyl phthalate	<0.21	<0.20	<0.20	<0.20	-	-
Dimethyl phthalate	<1.7	<1.6	<1.6	<1.6	-	-
Di-n-butyl phthalate,	<0.73	<0.70	<0.71	<0.71	-	-
Di-n-octyl phthalate	<0.077	0.13 J	<0.075	<0.075	-	-
Phenols (µg/L)						
2,4-Dimethylphenol	<0.066	<0.063	<0.064	<0.064	-	-
3/4-Methylphenol	<0.029	<0.028	<0.028	<0.028	-	-
Pentachlorophenol	<0.099	<0.095	<0.097	<0.096	7.9[1]	13[1]
Phenol	<0.034	<0.033	<0.033	<0.033	-	-
Total Phenols	0	0	0	0	-	-
Miscellaneous Extractables (µg/L)						
Benzoic acid	<4.0	<3.8	<3.9	<3.9	-	-
Benzyl alcohol	<0.67	<0.64	<0.65	<0.65	-	-
Dibenzofuran	<0.056	<0.053	<0.054	<0.054	-	-
Hexachloro-1,3-butadiene	<0.11	<0.11	<0.11	<0.11	-	-
Hexachloroethane	<0.099	<0.095	<0.097	<0.097	-	-

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-2 *(continued)*. Results of mWET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	TEF	HUM-FL-2025		HUM-NB-2025		HUM-EK1-2025		HUM-EK2-2025		Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
										Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Dioxins and Furans (pg/L)		**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**		
2,3,7,8-TCDD	1	<0.31	0	<0.14	0	<0.29	0	<0.39	0	-	-
2,3,7,8-TCDF	0.07	0.53 J	0.037	<0.024	0	<0.23	0	<0.29	0	-	-
1,2,3,7,8-PeCDD	0.4	<0.45	0	<0.46	0	<1.0	0	<0.52	0	-	-
1,2,3,7,8-PeCDF	0.1	<0.30	0	<0.29	0	<0.71	0	<0.39	0	-	-
2,3,4,7,8-PeCDF	0.1	<0.33	0	<0.34	0	<0.74	0	<0.44	0	-	-
1,2,3,4,7,8-HxCDD	0.09	<1.5	0	<0.43	0	<0.64	0	1.7 J	0.153	-	-
1,2,3,6,7,8-HxCDD	0.07	<1.3	0	<0.37	0	<0.53	0	<1.1	0	-	-
1,2,3,7,8,9-HxCDD	0.05	<1.3	0	<0.34	0	<0.54	0	<1.1	0	-	-
1,2,3,4,7,8-HxCDF	0.3	<0.73	0	<0.11	0	<0.33	0	<0.47	0	-	-
1,2,3,6,7,8-HxCDF	0.09	<0.63	0	<0.094	0	<0.30	0	<0.41	0	-	-
2,3,4,6,7,8-HxCDF	0.1	<0.66	0	<0.089	0	<0.28	0	<0.41	0	-	-
1,2,3,7,8,9-HxCDF	0.2	<0.64	0	<0.093	0	<0.30	0	0.93 J	0.186	-	-
1,2,3,4,6,7,8-HpCDD	0.05	6.8 J	0.34	<0.0081	0	4.2 J	0.21	13 J	0.65	-	-
1,2,3,4,6,7,8-HpCDF	0.02	<1.4	0	<0.64	0	<0.22	0	3.1 J	0.062	-	-
1,2,3,4,7,8,9-HpCDF	0.1	<1.8	0	<0.75	0	<0.30	0	<0.72	0	-	-
OCDD	0.001	63 J	0.063	6.3 J	0.006	39 J	0.039	120	0.12	-	-
OCDF	0.002	5.6 J	0.011	<0.26	0	3.6 J	0.007	11 J	0.022	-	-
∑ Dioxin/Furan TEQ (pg TEQ/L)	**NA**	**NA**	**0.414**	**NA**	**0.006**	**NA**	**0.256**	**NA**	**0.854**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-3. Results of Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Total Suspended Solids (mg/L)	3.20	2.40	2.10	<0.800	-	-
DOC (mg/L)	1.93	0.607	0.269 J	6.01	-	-
Dissolved Sulfides (mg/L)	<0.0166	<0.0166	<0.0166	<0.0166	-	-
Ammonia (mg/L)	8.97	<0.105	3.36	17.4	-	-
Metals (µg/L)						
Antimony	4.96	0.628	2.97	7.89	-	-
Arsenic	2.90	2.35	1.75	8.79	36[1]	69[1]
Barium	135	22.5	129	394	-	-
Beryllium	<0.290	<0.290	<0.290	<0.290	-	-
Cadmium	<0.0130	0.0800	<0.0130	<0.0130	9.3[1]	42[5]
Chromium	1.55	1.64	1.50	1.87	50[1,5]	1100[1,5]
Cobalt	0.698	0.823	1.31	1.76	-	-
Copper	<0.430	1.16	<0.430	<0.430	3.1[1]	4.8[1]
Lead	<0.0230	<0.0230	<0.0230	<0.0230	8.1[1]	210[1]
Mercury, Total	0.00112	0.00119	0.000933	0.000995	0.025[1]	2.1[1]
Mercury, Dissolved	0.000340 J	0.00118	0.000260 J	0.000265 J	-	-
Molybdenum	37.7	19.8	26.4	40.3	-	-
Nickel	2.58	3.54	4.07	4.23	8.2[1]	7.4[1]
Selenium	<0.300	<0.300	<0.300	<0.300	5.0[6]	20[6]
Silver	<0.0780	<0.0780	<0.0780	0.408 J	-	-
Thallium	<0.0150	<0.0150	<0.0150	<0.0150	-	-
Vanadium	0.895 J	2.86	0.872 J	0.769 J	-	-
Zinc	0.580 J	1.94	0.633 J	0.601 J	-	-
Butyltins (ng/L)						
Tetrabutyltin	<2.7	<1.8	<1.8	<1.4	-	-
Tributyltin	<2.1	<1.4	<1.4	<1.1	-	-
Dibutyltin	<3.4	<2.2	<2.3	<1.7	-	-
Monobutyltin	7300	390	150	<4.5	-	-
∑ detected Butylins	**7300**	**390**	**150**	**0**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
5 -Water quality objectives is for chromium VI; however, it may be met as total chromium.
6 - National Toxics Rule.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-3 *(continued)*. Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
PCBs (µg/L, dry wt)						
PCB 005/008	<0.013	<0.012	<0.013	<0.013	-	0.03[1]
PCB 018	<0.0010	<0.00099	<0.00099	<0.0010	-	0.03[1]
PCB 028	<0.00099	<0.00098	<0.00098	<0.00099	-	0.03[1]
PCB 031	<0.00041	<0.00040	<0.00041	<0.00041	-	0.03[1]
PCB 033	<0.00043	<0.00042	<0.00043	<0.00043	-	0.03[1]
PCB 044	<0.0014	<0.0014	<0.0014	<0.0014	-	0.03[1]
PCB 049	<0.00096	<0.00094	<0.00095	<0.00096	-	0.03[1]
PCB 052	<0.0010	<0.0010	<0.0010	<0.0010	-	0.03[1]
PCB 056	<0.0017	<0.0017	<0.0017	<0.0017	-	0.03[1]
PCB 060	<0.00054	<0.00053	<0.00054	<0.00054	-	0.03[1]
PCB 066	<0.0018	<0.0018	<0.0018	<0.0018	-	0.03[1]
PCB 070	<0.00092	<0.00090	<0.00091	<0.00092	-	0.03[1]
PCB 074	<0.0012	<0.0012	<0.0012	<0.0012	-	0.03[1]
PCB 087	<0.00093	<0.00091	<0.00092	<0.00093	-	0.03[1]
PCB 095	<0.00070	<0.00069	<0.00069	<0.00070	-	0.03[1]
PCB 097	<0.00069	<0.00068	<0.00069	<0.00069	-	0.03[1]
PCB 099	<0.00067	<0.00066	<0.00067	<0.00067	-	0.03[1]
PCB 101	<0.0014	<0.0014	<0.0014	<0.0014	-	0.03[1]
PCB 105	<0.00094	<0.00092	<0.00093	<0.00093	-	0.03[1]
PCB 110	<0.0013	<0.0013	<0.0013	<0.0013	-	0.03[1]
PCB 118	<0.0014	<0.0014	<0.0014	<0.0014	-	0.03[1]
PCB 128	<0.0027	<0.0027	<0.0027	<0.0027	-	0.03[1]
PCB 132/153	<0.0021	<0.0021	<0.0021	<0.0021	-	0.03[1]
PCB 138/158	<0.0026	<0.0026	<0.0026	<0.0026	-	0.03[1]
PCB 141	<0.0011	<0.0011	<0.0011	<0.0011	-	0.03[1]
PCB 149	<0.00070	<0.00069	<0.00069	<0.00070	-	0.03[1]
PCB 151	<0.0011	<0.0010	<0.0010	<0.0011	-	0.03[1]
PCB 156	<0.0011	<0.0011	<0.0011	<0.0011	-	0.03[1]
PCB 170	<0.00070	<0.00069	<0.00070	<0.00070	-	0.03[1]
∑ detected PCBs	**0**	**0**	**0**	**0**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
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3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-3 *(continued)*. Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Organochlorine Pesticides (µg/L)						
Aldrin	<0.018	<0.018	<0.018	<0.018	-	1.3[1]
alpha-BHC	<0.0072	<0.0072	<0.0072	<0.0072	-	-
beta-BHC	<0.024	<0.024	<0.024	<0.024	-	-
delta-BHC	<0.012	<0.012	<0.012	<0.012	-	-
gamma-BHC (lindane)	<0.0039	<0.0039	<0.0039	<0.0039	-	0.16[1]
Total BHCs	0	0	0	0	-	-
Cis-nonachlor	<0.0068	<0.0068	<0.0068	<0.0068	-	-
alpha-Chlordane	<0.0050	<0.0050	<0.0050	<0.0050	-	-
gamma-Chlordane	<0.052	<0.052	<0.052	<0.052	-	-
Chlordane	<0.15	<0.15	<0.15	<0.15	0.004[1]	0.09[1]
Dieldrin	<0.0079	<0.0079	<0.0079	<0.0079	0.0019[1]	0.71[1]
Endosulfan I	<0.0077	<0.0077	<0.0077	<0.0077	-	-
Endosulfan II	<0.025	<0.025	<0.025	<0.025	-	-
Endosulfan sulfate	<0.0082	<0.0082	<0.0082	<0.0082	-	-
Endrin	<0.014	<0.014	<0.014	<0.014	0.0023[1]	0.037[1]
Endrin aldehyde	<0.15	<0.15	<0.15	<0.15	-	-
Endrin ketone	<0.013	<0.013	<0.013	<0.013	-	-
Heptachlor	<0.0071	<0.0071	<0.0071	<0.0071	0.0036[1]	0.053[1]
Heptachlor epoxide	<0.024	<0.024	<0.024	<0.024	0.0036[1]	0.053[1]
Methoxylchlor	<0.022	<0.022	<0.022	<0.022	-	-
Toxaphene	<0.32	<0.32	<0.32	<0.32	0.0002[1]	0.2[1]
Trans-nonachlor	<0.0043	<0.0043	<0.0043	<0.0043	-	-
2,4'-DDD	<0.0051	<0.0051	<0.0051	<0.0051	-	-
2,4'-DDE	<0.13	<0.13	<0.13	<0.13	-	-
2,4'-DDT	<0.0081	<0.0081	<0.0081	<0.0081	-	-
4,4'-DDD	<0.026	<0.026	<0.026	<0.026	-	-
4,4'-DDE	<0.011	<0.011	<0.011	<0.011	-	-
4,4'-DDT	<0.0096	<0.0096	<0.0096	<0.0096	0.001[1]	0.13[1]
∑ detected DDTs	**0**	**0**	**0**	**0**	-	-

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
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3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL

Table 4-3 *(continued)*. Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025 [A]	HUM-NB-2025 [A]	HUM-EK1-2025 [A]	HUM-EK2-2025 [A]	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
PAHs (µg/L)						
1-Methylnaphthalene (LPAH)	<0.057	<0.058	<0.058	<0.057	-	-
1-Methylphenanthrene (LPAH)	<0.049	<0.049	<0.049	<0.048	-	-
1,6,7-Trimethylnaphthalene (LPAH)	<0.043	<0.043	<0.043	<0.043	-	-
2,6-Dimethylnaphthalene (LPAH)	<0.067	<0.067	<0.067	<0.067	-	-
2-Methylnaphthalene (LPAH)	<0.047	<0.047	<0.047	<0.047	-	-
Acenaphthene (LPAH)	<0.061	<0.061	<0.061	<0.061	-	-
Acenaphthylene (LPAH)	<0.061	<0.061	<0.061	<0.060	-	-
Anthracene (LPAH)	<0.024	<0.024	<0.024	<0.024	-	-
Benzo(a)anthracene (HPAH)	<0.056	<0.056	<0.056	<0.055	-	-
Benzo(a)pyrene (HPAH)	<0.027	<0.027	<0.027	<0.027	-	-
Benzo(b)fluoranthene (HPAH)	<0.064	<0.064	<0.064	<0.064	-	-
Benzo(e)pyrene (HPAH)	<0.041	<0.041	<0.041	<0.041	-	-
Benzo(g,h,i)perylene (HPAH)	<0.056	<0.056	<0.056	<0.056	-	-
Benzo(k)fluoranthene (HPAH)	<0.065	<0.065	<0.065	<0.064	-	-
Biphenyl (LPAH)	<0.060	<0.060	<0.060	<0.060	-	-
Chrysene (HPAH)	<0.053	<0.053	<0.053	<0.052	-	-
Dibenzo(a,h)anthracene (HPAH)	<0.13	<0.13	<0.13	<0.13	-	-
Dibenzothiophene (LPAH)	<0.038	<0.038	<0.038	<0.038	-	-
Fluoranthene (HPAH)	<0.052	<0.052	<0.052	<0.052	-	-
Fluorene (LPAH)	<0.056	<0.056	<0.056	<0.056	-	-
Indeno(1,2,3-cd)pyrene (HPAH)	<0.13	<0.13	<0.13	<0.13	-	-
Naphthalene (LPAH)	<0.053	<0.053	<0.053	<0.052	-	-
Perylene (HPAH)	<0.039	<0.039	<0.039	<0.038	-	-
Phenanthrene (LPAH)	<0.064	<0.064	<0.064	<0.064	-	-
Pyrene (HPAH)	<0.063	<0.063	<0.0.63	<0.062	-	-
∑ LPAHs	**0**	**0**	**0**	**0**	**-**	**-**
∑ HPAHs	**0**	**0**	**0**	**0**	**-**	**-**
∑ detected PAHs	**0**	**0**	**0**	**0**	**-**	**15[5]**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
5 - 24-hour average objective for total PAHs from the 1995 Basin Plan.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.
A - Initial analysis performed <8 weeks from sample collection; however, the analytical lab performed the incorrect analysis. Re-analysis performed >8 weeks from sample collection.

Table 4-3 *(continued)*. Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	HUM-FL-2025	HUM-NB-2025	HUM-EK1-2025	HUM-EK2-2025	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]	
					Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Chlorinated Hydrocarbons (µg/L)						
1,2,4-Trichlorobenzene	<0.73	<0.98	<0.73	<0.73	-	-
1,2-Dichlorobenzene	<0.57	<0.76	<0.57	<0.57	-	-
1,4-Dichlorobenzene	<0.67	<0.90	<0.67	<0.67	-	-
Hexachlorobenzene	<0.85	<1.1	<0.85	<0.85	-	-
Phthalate Esters (µg/L)						
Bis 2-ethylhexyl phthalate	<4.7	<6.3	<4.7	<4.7	-	-
Butyl benzyl phthalate	<4.0	<5.3	<4.0	<4.0	-	-
Diethyl phthalate	<1.1	<1.5	<1.1	<1.1	-	-
Dimethyl phthalate	<0.89	<1.2	<0.89	<0.89	-	-
Di-n-butyl phthalate,	<1.3	<1.8	<1.3	<1.3	-	-
Di-n-octyl phthalate	<4.4	<5.9	<4.4	<4.4	-	-
Phenols (µg/L)						
2,4-Dimethylphenol	<1.1	<1.5	<1.1	<1.1	-	-
3/4-Methylphenol	<0.73	<0.97	<0.73	<0.73	-	-
Pentachlorophenol	<4.6	<6.2	<4.6	<4.6	7.9[1]	13[1]
Phenol	<0.40	<0.54	<0.40	<0.40	-	-
Total Phenols	0	0	0	0	-	-
Miscellaneous Extractables (µg/L)						
Benzoic acid	<14	<19	<14	<14	-	-
Benzyl alcohol	<2.4	<3.2	<2.4	<2.4	-	-
Dibenzofuran	<0.98	<1.3	<0.98	<0.98	-	-
Hexachloro-1,3-butadiene	<1.1	<1.4	<1.1	<1.1	-	-
Hexachloroethane	<0.84	<1.1	<0.84	<0.84	-	-

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 4-3 *(continued)*. Results of MET Elutriate Analyses of Humboldt Harbor and Bay Sediments.

Analyte	TEF	HUM-FL-2025		HUM-NB-2025		HUM-EK1-2025		HUM-EK2-2025		Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (ng/L)[1,2]	
										Criterion Continuous Concentration[3]	Criterion Maximum Concentration[4]
Dioxins and Furans (pg/L)		**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**	**Conc.**	**TEQ**		
2,3,7,8-TCDD	1	<0.19	0	<0.23	0	<0.11	0	0.14 J	0	-	-
2,3,7,8-TCDF	0.07	<0.27	0	<0.026	0	<0.015	0	<0.018	0	-	-
1,2,3,7,8-PeCDD	0.4	<0.97	0	<0.95	0	<0.70	0	<0.85	0	-	-
1,2,3,7,8-PeCDF	0.1	<0.56	0	<0.69	0	<0.47	0	<0.67	0	-	-
2,3,4,7,8-PeCDF	0.1	<0.72	0	<0.90	0	<0.61	0	<0.90	0	-	-
1,2,3,4,7,8-HxCDD	0.09	2.5 J	0.225	<0.71	0	<0.48	0	1.0 J	0.225	-	-
1,2,3,6,7,8-HxCDD	0.07	1.0 J	0	<0.69	0	<0.45	0	<0.75	0	-	-
1,2,3,7,8,9-HxCDD	0.05	<0.63	0	<0.61	0	<0.40	0	<0.68	0	-	-
1,2,3,4,7,8-HxCDF	0.3	<0.72	0	<0.49	0	<0.38	0	<0.43	0	-	-
1,2,3,6,7,8-HxCDF	0.09	<0.52	0	<0.39	0	<0.27	0	<0.33	0	-	-
1,2,3,7,8,9-HxCDF	0.1	3.2 J	0	2.0 J	0.4	2.4 J	0.48	2.5 J	0	-	-
2,3,4,6,7,8-HxCDF	0.2	<0.53	0	0.84 J	0.084	<0.26	0	<0.32	0	-	-
1,2,3,4,6,7,8-HpCDD	0.05	1.5 J	0	1.9 J	0.095	1.4 J	0.07	0.65 J	0	-	-
1,2,3,4,6,7,8-HpCDF	0.02	<0.82	0	<0.70	0	<0.64	0	<0.85	0	-	-
1,2,3,4,7,8,9-HpCDF	0.1	1.9 J	0	<0.84	0	<0.71	0	<1.1	0	-	-
OCDD	0.001	7.9 J	0.008	12 J	0.012	9.7 J	0.010	7.3 J	0.058	-	-
OCDF	0.002	5.2 J	0.010	3.9 J	0.008	2.2 J	0.004	0.93 J	0.010	-	-
∑ Dioxin/Furan TEQ (pg TEQ/L)	**NA**	**NA**	**0.243**	**NA**	**0.599**	**NA**	**0.564**	**NA**	**0.293**	**-**	**-**

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

The results of the physical and chemical analysis of the sediments were compared to:

- HOODS and PROP results;
- Marine sediment toxicity screening levels for chemicals of concern, Sediment Evaluation Framework for the Pacific Northwest (USACE 2018);
- Effects Range Low (ER-L) sediment quality objectives from Long et al. (1995); and
- Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (USEPA, 2000).

Analytes whose reported concentrations exceeded these screening levels are presented in Table 4-4.

Table 4-4. Sediment Analytes Measured Above Benchmark Data and Ecological Screening Levels.

Sample Area	Analytes Exceeding HOODS and/or PROP Concentrations	Analytes Exceeding SEF Sediment Toxicity Trigger	Analytes Exceeding ER-L	Marine Water Quality Objectives for Toxic Pollutants for Surface Waters (µg/L)[1,2]			
				Criterion Continuous Concentration[3]		Criterion Maximum Concentration[4]	
				mWet	MET	mWet	MET
HUM-FL-2025	Sulfides, ammonia, antimony, arsenic, barium[A], beryllium, cadmium, chromium[A], cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium[A], zinc, organotins[A], total LPAHs, total HPAHs, total PAHs, 1,2,4-Trichlorobenzene, bis 2-ethylhexyl phthalate, diethyl phthalate, 3/4-methylphenol, total phenols, dibenzofuran, & total dioxins/furans	None	Chromium & nickel	Copper	None	Copper	None
HUM-NB-2025	Sulfides, antimony, cadmium[A], molybdenum[B], thallium, organotins[A], total HPAHs[A], di-n-butyl phthalate, & total dioxins/furans[B]	None	Nickel	Copper	None	Copper	None
HUM-EK1-2025	Sulfides, ammonia, arsenic, barium[A], beryllium[A], cadmium, chromium[A], cobalt[A], copper, lead, mercury, molybdenum, nickel[A], selenium, silver, thallium, vanadium[A], zinc, organotins[A], total PCBs, 4,4'-DDE, total DDTs, total LPAHs, total HPAHs, total PAHs, bis 2-ethylhexyl phthalate, di-n-butyl phthalate, 3/4-methylphenol, , total phenols, dibenzofuran, & total dioxins/furans	None	Nickel	Copper & total chlordane	None	None	None
HUM-EK2-2025	Sulfides, ammonia, antimony, arsenic, barium[A], beryllium, cadmium, chromium, cobalt[A], copper, lead, mercury, molybdenum, nickel[A], selenium, silver, thallium, vanadium, zinc, organotins, total PCBs, total LPAHs, total HPAHs, total PAHs, 1,2,4-Trichlorobenzene, bis 2-ethylhexyl phthalate, 3/4-methylphenol, total phenols, dibenzofuran, & total dioxins/furans	None	Arsenic, chromium, copper, mercury, nickel, total LPAHs	Copper & nickel	None	Copper & nickel	None

Notes:
1 - California Toxics Rule Criteria, 40 CFR Part 131.38 (USEPA, 2000).
2 - Water quality objectives for metals criteria are expressed in terms of the dissolved fraction of the metal in the water column, unless otherwise noted.
3 - Criterion Continuous Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for an extended period (4-day average) without deleterious effects.
4 - Criterion Maximum Concentration = the greatest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.
A - Value exceeds HOODS reference site but not PROP reference site.
B - Value exceeds PROP reference site but not HOODS reference site.
C - mWET value only. MET value was below MWQO criterion continuous and maximum concentrations.

5. RESULTS OF BIOLOGICAL TESTING

Up to eight different biological tests were performed for the HUM-FL-2025, HUM-NB-2025, HUM-EK1-2025, and HUM-EK2-2025 Humboldt Harbor and Bay composite samples:

1. A 10-day amphipod survival test with the amphipod *Leptocheirus plumulosus*,
2. A 10-day juvenile polychaete survival test with the polychaete *Neanthes arenaceodentata*,
3. A 48-hr bivalve embryo survival and development test with the mussel *Mytilus galloprovincialis*,
4. A 96-hr mysid survival standard elutriate test with the mysid shrimp *Americamysis bahia*,
5. A 96-hr larval fish survival standard elutriate test with the estuarine fish *Menidia beryllina*,
6. A 96-hr modified (MET) elutriate mysid survival test with *Americamysis bahia,*
7. A 28-day bioaccumulation test with the clam *Macoma nasuta*, and
8. A 28-day bioaccumulation test with the polychaete *Nereis virens.*

The HUM-B&E-2025 and HUM-SAM-2025 samples were only tested with the 96-hr modified (MET) elutriate mysid survival test with *Americamysis bahia*.

All tests were performed following appropriate protocols as outlined in the SAP (USACE 2024). Test data and summaries of the statistical analyses for the bioassay results are provided in Appendices E-W. Summaries of test conditions and test acceptability criteria are provided in Appendix X.

5.1 Benthic (Solid-Phase Sediment) Toxicity Testing

Solid-phase bioassays were conducted with the amphipod *L. plumulosus, Eohaustorius estuaries,* and the polychaete *N. arenaceodentata*. Positive and negative Control treatments were tested concurrently with the bioassays. The positive Control for both species consisted of a 96-hr waterborne reference toxicant test; the results of these tests were compared to PER's in-house reference toxicant test response databases to determine whether these test organisms were responding to toxic stress in a typical fashion. The negative Control (termed "Lab Control") for the *L. plumulosu, E. estuaries,* and *N. arenaceodentata* tests consisted of sediment collected from Paradise Cove located in Central San Francisco Bay. Toxicity testing with ammonia was also performed.

ITM/OTM guidance requires that site sediment results be compared with disposal site and/or reference site sediment results or a reference site database (if available) to determine the potential impact of whole sediment on benthic organisms at and beyond the boundaries of the disposal site (USEPA/USACE 1991 and 1998). As detailed in the ITM/OTM, comparative guidelines for acceptance were followed as listed below:

1. If survival is greater in the proposed dredged sediments than in reference site sediment(s) or the reference site sediment database, the proposed dredged sediments are ***not*** acutely toxic to benthic organisms.

2. If a reduction in the survival response between the site sediment and in the reference sediment (or the 'reference site database survival') is ≤20% for amphipods or ≤10% for polychaetes, the test sediments are ***not*** acutely toxic to benthic organisms.
3. If a reduction in the survival response between the site sediment and in the reference sediment (or the 'reference site database survival') is >20% for amphipods or >10% for polychaetes, then the respective survival responses must be statistically compared. If a statistically significant reduction in survival is observed for the site sediment, then the site sediment is considered to be acutely toxic to benthic organisms. Statistical analyses are not performed when reference site database values are used.

5.1.1 Sediment Porewater Characterization

Prior to the initiation of the sediment testing, the composited sediment samples were removed from refrigerated storage, and each was re-homogenized in large stainless-steel bowls. An aliquot of each re-homogenized composite sediment was then centrifuged at 2,500 g for 15 minutes; the resulting supernatant porewater was carefully collected and analyzed for ammonia and total sulfides (Table 5-1). A summary of the measured concentrations of total ammonia and total sulfides in the sediment porewaters, and summary tables of the total ammonia concentrations measured in the test overlying waters are presented in Appendix E.

Table 5-1. Sediment Porewater Initial Water Ammonia Levels.

Sample ID	pH	Total Ammonia (mg/L N)	Total Sulfide (mg/L)
HUM-HOODS-2025	7.69	1.57	0.698
HUM-PROP-2025	7.90	25.6	0.663
HUM-B&E-2025	7.81	<1.00	0.237
HUM-SAM-2025	7.91	3.91	0.387
HUM-FL-2025	7.50	174.8	0.048
HUM-NB-2025	7.83	4.78	0.000
HUM-EK1-2025	7.77	28.7	0.108
HUM-EK2-2025	7.82	76.0	0.004

5.1.2 Purging of Sediment Porewater Ammonia for the Amphipod and Polychaete Tests

The initial sediment porewater ammonia concentrations for HUM-PROP-2025, HUM-FL-2025, HUM-EK1-2025, and HUM-EK2-2025 (Table 5-1 above) exceeded the USACE guidelines-recommended threshold of 15 mg/L for the sediment sample; accordingly, these sediments were purged of ammonia prior to test initiation by daily replacement of the overlying water with fresh diluted seawater coupled with aeration until the porewater total ammonia concentrations were below 15 mg/L, after which testing was initiated.

5.1.3 Effects of the Humboldt Harbor and Bay Sediments on Amphipods

The results of these tests are summarized in Tables 5-2a – 5-2c. There was 92% survival in the Lab Control treatment in the initial test with the amphipod *Leptocheirus plumulosus*. There was ≥67% survival in each of the Humboldt Harbor and Bay sediment samples. The differences in survival in the site sediments relative to the HUM-HOODS-2025 survival response were <20%. The differences in survival in the site sediments relative to the HUM-PROP-2025 survival response were <20% for all sites except HUM-NB-2025, which had a >20% response. The differences in survival in the site sediments relative to the control treatment were <20% except HUM-NB-2025, which had a >20% response.

Follow-up testing was performed on the HUM-NB-2025 sediment due to the nature of the sample matrix (100% gravel and sand). Follow-up testing consisted of re-testing with the amphipod *Leptocheirus plumulosus* and testing with the amphipod *Eohaustorius estuarius* **(**which is a species with a greater tolerance to sand).

- There was 98% survival in the Lab Control treatment re-test with *Leptocheirus plumulosus*. There was 95% survival in the HUM-NB-2025 sediment. The differences in survival in the HUM-NB-2025 sediment relative to the HUM-HOODS-2025 and HUM-PROP-2025 survival responses were <20%. The differences in survival in the HUM-NB-2025 sediment relative to the control treatment was <20%.
- There was 99% survival in the Lab Control treatment test with *Eohaustorius estuarius*. There was 95% survival in the HUM-NB-2025 sediment. The differences in survival in the HUM-NB-2025 sediment relative to the HUM-HOODS-2025 and HUM-PROP-2025 survival responses were <20%. The differences in survival in the HUM-NB-2025 sediment relative to the control treatment was <20%.

The totality of these test results indicate that the Humboldt Harbor and Bay sediments were ***not*** toxic to amphipods.

The test data and summary of statistical analyses for this testing are presented in Appendix F.

Table 5-2a. *Leptocheirus plumulosus* survival in the Humboldt Harbor and Bay sediments – Initial Tests.

Test Treatment	% Survival in Test Replicates					Mean % Survival	Percent Gravel + Sand	Percent fines (Silt+Clay)
	Rep A	Rep B	Rep C	Rep D	Rep E			
Lab Control	90	95	95	90	90	92		
HUM-HOODS-2025	85	80	95	80	75	83	100	0
HUM-PROP-2025	85	85	90	90	95	89	97.4	2.64
HUM-FL-2025	95	80	70	100	95	88	0.23	99.8
HUM-NB-2025	55	75	70	55	80	**67***	100	0
HUM-EK1-2025	90	80	85	85	95	87	93.53	6.47
HUM-EK2-2025	80	85	85	80	80	**82***	0.20	99.8

* The survival response at this treatment was significantly less than the Lab Control response at $p < 0.05$.

Table 5-2b. *Leptocheirus plumulosus* survival in the Humboldt Harbor and Bay sediments – Re-tests.

Test Treatment	% Survival in Test Replicates					Mean % Survival
	Rep A	Rep B	Rep C	Rep D	Rep E	
Lab Control	100	100	95	95	100	98
HUM-HOODS-2025	90	90	90	95	100	93
HUM-PROP-2025	100	90	90	90	50[A]	84
HUM-NB-2025	100	90	100	90	100	96

A – Surviving organisms were small and pale. The organisms recovered in the remaining replicates were typical.

Table 5-2c. *Eohaustorius estuarius* survival in the Humboldt Harbor and Bay sediments.

Test Treatment	% Survival in Test Replicates					Mean % Survival
	Rep A	Rep B	Rep C	Rep D	Rep E	
Lab Control	100	100	100	95	100	99
HUM-HOODS-2025	100	100	95	95	95	97
HUM-PROP-2025	95	100	100	100	95	98
HUM-NB-2025	90	100	100	100	95	97

5.1.3.1 Reference Toxicant Toxicity to Amphipods - The results of these test are summarized in Tables 5-3a and 5-3b. The LC_{50} for the *Leptocheirus plumulosus* tests were consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The LC_{50} for the *Eohaustorius estuarius* test was slightly above PER's reference toxicant test database for this species, indicating that these test organisms may have been slightly less sensitive to toxic stress than typical. The test data and summary of statistical analyses for these tests are presented in Appendix G.

Table 5-3a. Reference Toxicant Testing: Effects of KCl on *Leptocheirus plumulosus.*

KCl Treatment (g/L)	Mean % Survival	
	Test Initiated 10/29/24	Test Initiated 11/22/24
Lab Control	100	100
0.25	95	100
0.5	95	100
1	85	95.0
2	**0***	**0***
4	**0***	**0***
LC_{50} =	1.29 g/L KCl	1.37 g/L KCl
Typical Response Range (mean ± 2	0.882 – 1.57 g/L KCl	0.883 – 1.57 g/L KCl

* The survival response at this treatment was significantly less than the Lab Control response at $p < 0.05$.

Table 5-3b. Reference Toxicant Testing: Effects of KCl on *Eohaustorius estuarius.*

KCl Treatment (g/L)	Mean % Survival
Lab Control	100
0.25	100
0.5	100
1	100
2	90
4	**0***
LC_{50} =	2.64 g/L KCl
Typical Response Range (mean ± 2 SD) =	0.775 – 2.52 g/L KCl

* The survival response at this treatment was significantly less than the Lab Control response at $p < 0.05$.

5.1.3.2 Ammonia Toxicity to Amphipods - The results of these tests are summarized in Tables 5-4a and 5-4b. There was ≥95% survival in the Lab Control treatments. The LC_{50} was >120 mg/L NH_3 for the *Leptocheirus plumulosus*. The LC_{50} was >120 mg/L NH_3 for the *Eohaustorius estuaries.* The test data and summary of statistical analyses for this test are presented in Appendix H.

Table 5-4a. Effects of Ammonia on *Leptocheirus plumulosus.*

NH_3-N Treatment (mg/L)	Mean % Survival	
	Test Initiated 10/29/24	Test Initiated 11/22/24
Lab Control	95	100
7.5	100	100
15	85	100
30	95	100
60	100	100
120	85	100
LC_{50} =	>120 mg/L NH_3-N	>120 mg/L NH_3-N

Table 5-4b. Effects of Ammonia on *Eohaustorius estuarius.*

NH_3-N Treatment (mg/L)	Mean % Survival
Lab Control	100
15.6	100
31.2	100
62.5	100
125	100
250	100
LC_{50} =	>250 mg/L NH_3-N

5.1.4 Effects of the Humboldt Harbor and Bay Sediments on *Neanthes arenaceodentata*

The results of these tests are summarized in Table 5-5. There was 100% survival in the Lab Control treatment, indicating an acceptable survival response by the test organisms. There was ≥94% survival in each of the Humboldt Harbor and Bay sediment samples. The differences in survival in the site sediments relative to the HUM-HOODS-2025 and HUM-PROP-2025 survival responses were <10%. The differences in survival in the site sediments relative to the control treatment were <10%. These test results indicate that the Humboldt Harbor and Bay sediments are ***not*** toxic to polychaetes.

The test data and summary of statistical analyses for these tests are presented in Appendix I.

Table 5-5. *Neanthes arenaceodentata* survival in the Humboldt Harbor and Bay sediments.

Test Treatment	% Survival in Test Replicates					Mean % Survival
	Rep A	Rep B	Rep C	Rep D	Rep E	
Lab Control	100	100	100	100	100	100
HUM-HOODS-2025	100	100	90	90	100	96
HUM-PROP-2025	100	100	100	100	100	100
HUM-FL-2025	100	100	100	100	100	100
HUM-NB-2025	100	100	100	100	100	100
HUM-EK1-2025	90	100	90	90	100	**94***
HUM-EK2-2025	100	100	90	100	100	98

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.1.4.1 Reference Toxicant Toxicity to *Neanthes arenaceodentata* - The results of this test are summarized in Table 5-6. The LC_{50} for this test was consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix J.

Table 5-6. Reference Toxicant Testing: Effects of KCl on *Neanthes arenaceodentata.*

KCl Treatment (g/L)	Mean % Survival
Lab Control	100
0.5	100
1	100
2	**40***
3	**0***
4	**0***
LC_{50} =	1.76 g/L KCl
Typical Response Range (mean ± 2 SD) =	1.04 – 1.99 g/L KCl

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.1.4.2 Ammonia Toxicity to *Neanthes arenaceodentata* - The results of this test are summarized in Table 5-7. There was 100% survival in the Lab Control treatment. The LC_{50} was >240 mg/L NH_3. The test data and summary of statistical analyses for this test are presented in Appendix K.

Table 5-7. Effects of Ammonia on *Neanthes arenaceodentata.*

NH_3-N Treatment (mg/L)	Mean % Survival
Lab Control	90
15	100
30	100
60	100
120	100
240	100
LC_{50} =	>240 mg/L NH_3-N

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2 Water Column (Standard Sediment Elutriate) Toxicity Testing

The 48-hr bivalve embryo survival and development toxicity test with *M. galloprovincialis* and 96-hr survival tests with *A. bahia* and *M. beryllina* were performed on standard sediment elutriates to assess the water column effects of dredged material disposal. A summary of these test results is presented in Table 5-8; detailed toxicity test results are presented in Sections 5.2.1-5.2.4. The test data and summary of statistical analyses for these tests are presented in Appendices L-Q. Elutriate mixing model calculations are presented in Appendix R.

Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriates. The positive Lab Controls consisted of 'waterborne' reference toxicant tests; the

results of these tests were compared to PER's reference toxicant test response databases to determine whether the test organisms were responding to toxic stress in a typical fashion. The negative Lab Control treatments (and dilution medium) consisted of 0.45 µm-filtered natural seawater (obtained from the UC Davis Granite Canyon Marine Laboratory, Carmel, CA), diluted to the test salinity of 30 ppt via addition of Type 1 lab water (reverse-osmosis de-ionized water). As an additional QA measure, the site water that was used to prepare the 100% elutriates was also tested.

The test results for the sediment composite elutriates were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of the proposed dredged materials on pelagic organisms at and beyond the boundaries of the disposal site (USEPA/USACE 1991 and 1998). The following criteria were used for suitability determinations:

1. If the survival response and/or normal embryo development response in the 100% sediment elutriate treatment is ≥ the Control (clean seawater) treatment response(s), the dredged material is ***not*** predicted to be acutely toxic to water column organisms.
2. If the reduction in survival response and/or normal embryo development response in the 100% sediment elutriate treatment relative to the Control treatment is ≤10%, there is no need for statistical analyses and no indication of water column toxicity attributable to the test sediments.
3. If the reduction in survival response and/or normal embryo development response in the 100% sediment elutriate treatment relative to the Control treatment is >10%, then the data must be evaluated statistically to determine the magnitude of toxicity. If there is >50% survival or normal embryo development in the 100% elutriate treatment, the LC_{50}/EC_{50} is assumed to be ≥100%. If there is <50% survival or normal embryo development in at least one of the elutriate treatments, then an LC_{50}/EC_{50} should be calculated and compared with existing acceptability standards.

In order for the dredged material to be determined suitable for disposal at HOODS, compliance with the narrative water quality standard must be met. Compliance with the narrative water quality standard is determined by evaluating whether the dredge material concentration (suspended particulate phase [SPP]), after mixing, would exceed 1% of the LC_{50} or EC_{50} value calculated from the sediment elutriate test (whichever is most conservative), outside of the mixing zone. Disposal site dilution models for the HOODS disposal was used to simulate the initial mixing concentration of the suspended particulate phase (SPP) during disposal. Mixing model results are presented in Table 5-8; mixing model calculations are presented in Appendix R.

Table 5-8. Results of the Humboldt Harbor and Bay Sediment Elutriate Toxicity Tests and Dilution Model Calculations.

Sampling Area	Test Species	Survival LC50	Development EC50	Lowest LC50 or EC50 x 0.01[A]	Predicted Suspended Particulate Phase	Pass?[B]
					HOODS	
HUM-FL-2025	*M. galloprovincialis*	74.5% elutriate	72.3% elutriate	0.723	0.003	**YES**
	A. bahia	>100% elutriate		-	-	
	M. beryllina	>100% elutriate		-	-	
HUM-NB-2025	*M. galloprovincialis*	>100% elutriate	>100% elutriate	-	-	**YES**
	A. bahia	>100% elutriate		-	-	
	M. beryllina	>100% elutriate		-	-	
HUM-EK1-2025	*M. galloprovincialis*	>100% elutriate	>100% elutriate	-	-	**YES**
	A. bahia	>100% elutriate		-	-	
	M. beryllina	>100% elutriate		-	-	
HUM-EK2-2025	*M. galloprovincialis*	27.9% elutriate	30% elutriate	0.279	0.003	**YES**
	A. bahia	>100% elutriate		-	-	
	M. beryllina	>100% elutriate		-	-	

A – Considered the Limiting Permissible Concentration (LPC) for placement at HOODS.
B – If the suspended solid concentration is less than 1% of the lowest LC50 or EC50 value calculated from the sediment elutriate test, or if the lowest reported test LC50/EC50 is >100% elutriate, the sediment passes, and the narrative water quality standard is met.

5.2.1 Toxicity of the Humboldt Harbor and Bay Sediment Elutriates to *Mytilus galloprovincialis*

The results of this testing are summarized below in Tables 5-9 through 5-12. There was ≥90.7% survival and ≥97.1% normal development in the Lab Control treatments, indicating acceptable responses by the test organisms.

- The survival LC_{50} value for the HUM-FL-2025 elutriate was 74.5%. The normal development EC_{50} value for the HUM-FL-2025 elutriate was 72.3% elutriate.
- The survival LC_{50} value for the HUM-EK2-2025 elutriate was 27.9%. The normal development EC_{50} value for the HUM-EK2-2025 elutriate was 30%.
- The survival LC_{50} and development EC_{50} values for the remaining Humboldt Harbor Bay sediments were >100%.

The test data and summaries of statistical analyses for these tests are presented in Appendix L.

Table 5-9. Effects of HUM-FL-2025 Sediment Elutriate on *Mytilus galloprovincialis.*

Elutriate Treatment	Mean % Survival	Mean % Normal Development
Lab Control	99.2	97.1
1%	94.3	97.2
10%	98.5	96.6
50%	98.6	**87.7***
100%	**0.0***	**0.0***
Site Water	80.9	95.3
Salinity Control	96.3	97.9
Survival LC_{50} or Development EC_{50} =	74.5% elutriate	72.3% elutriate

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

Table 5-10. Effects of HUM-NB-2025 Sediment Elutriate on *Mytilus galloprovincialis.*

Elutriate Treatment	Mean % Survival	Mean % Normal Development
Lab Control	94.6	97.5
1%	89.1	**94.0***
10%	89.0	**93.2***
50%	90.6	**86.9***
100%	95.1	**78.4***
Site Water	80.9	95.3
Salinity Control	96.3	97.9
Survival LC_{50} or Development EC_{50} =	>100% elutriate	>100% elutriate

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

Table 5-11. Effects of HUM-EK1-2025 Sediment Elutriate on *Mytilus galloprovincialis.*

Elutriate Treatment	Mean % Survival	Mean % Normal Development
Lab Control	90.7	97.4
1%	88.3	95.9
10%	91.7	96.9
50%	95.0	96.9
100%	92.0	**95.1***
Site Water	80.9	95.3
Salinity Control	96.3	97.9
Survival LC_{50} or Development EC_{50} =	>100% elutriate	>100% elutriate

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

Table 5-12. Effects of HUM-EK2-2025 Sediment Elutriate on *Mytilus galloprovincialis.*

Elutriate Treatment	Mean % Survival	Mean % Normal Development
Lab Control	94.5	98.5
1%	89.0	99.3
10%	85.7	99.7
50%	**0.0***	**0.0***
100%	**0.0***	**0.0***
Site Water	80.9	95.3
Salinity Control	96.3	97.9
Survival LC_{50} or Development EC_{50} =	27.9% elutriate	30% elutriate

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2.1.1 Reference Toxicant Toxicity to *Mytilus galloprovincialis* Embryos - The results of this test are summarized in Table 5-13. The EC_{50} for this test were consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix M.

Table 5-13. Reference Toxicant Testing: Effects of KCl on *Mytilus galloprovincialis.*

KCl Treatment (g/L)	Mean % Normal Embryo Development
Lab Control	97.6
0.5	97.1
1	98.3
2	**56.2***
3	**0.0***
4	**0.0***
EC_{50} =	2.13 g/L KCl
Typical Response Range (mean ± 2 SD)	1.8 – 2.76 g/L KCl

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2.2 Toxicity of the Humboldt Harbor and Bay Sediment Elutriates to *Americamysis bahia*

The results of these tests are summarized below in Tables 5-14 through 5-17. There was ≥96% survival in the Lab Control treatments, indicating acceptable survival responses by the test organisms. The survival LC_{50} values for the Humboldt Harbor and Bay sediments were all >100% elutriate. The test data and summary of statistical analyses for these tests are presented in Appendix N.

Table 5-14. Effects of HUM-FL-2025 Sediment Elutriate on *Americamysis bahia.*

Elutriate Treatment	Mean % Survival
Lab Control	96
1%	96
10%	98
50%	98
100%	96
Site Water	100
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-15. Effects of HUM-NB-2025 Sediment Elutriate on *Americamysis bahia.*

Elutriate Treatment	Mean % Survival
Lab Control	98
1%	98
10%	98
50%	100
100%	100
Site Water	100
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-16. Effects of HUM-EK1-2025 Sediment Elutriate on *Americamysis bahia.*

Elutriate Treatment	Mean % Survival
Lab Control	100
1%	100
10%	98
50%	98
100%	96
Site Water	100
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-17. Effects of HUM-EK2-2025 Sediment Elutriate on *Americamysis bahia.*

Elutriate Treatment	Mean % Survival
Lab Control	98
1%	98
10%	98
50%	96
100%	98
Site Water	100
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

5.2.2.1 Reference Toxicant Toxicity to *Americamysis bahia* - The results of this test are summarized in Table 5-18. The LC_{50} for this test are consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix O.

Table 5-18. Reference Toxicant Testing: Effects of KCl on *Americamysis bahia*.

KCl Treatment (g/L)	Mean % Survival
Lab Control	97.5
0.125	97.5
0.25	95.0
0.5	90.0
1	**0.0***
2	**0.0***
LC_{50} =	0.659 g/L KCl
Typical Response Range (mean ± 2 SD) =	0.608 – 0.728 g/L KCl

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2.3 Toxicity of the Humboldt Harbor and Bay Sediment Elutriates to *Menidia beryllina*
The results of these tests are summarized in Tables 5-19 through 5-22. There was ≥94% survival in the Lab Control treatments, indicating acceptable survival responses by the test organisms. The survival LC_{50} values for the Humboldt Harbor and Bay sediments were all >100% elutriate. The test data and summary of statistical analyses for these tests are presented in Appendix P.

Table 5-19. Effects of HUM-FL-2025 Sediment Elutriate on *Menidia beryllina.*

Elutriate Treatment	Mean % Survival
Lab Control	100
1%	92
10%	94
50%	98
100%	94
Site Water	96
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-20. Effects of HUM-NB-2025 Sediment Elutriate on *Menidia beryllina.*

Elutriate Treatment	Mean % Survival
Lab Control	100
1%	100
10%	100
50%	96
100%	98
Site Water	96
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-21. Effects of HUM-EK1-2025 Sediment Elutriate on *Menidia beryllina.*

Elutriate Treatment	Mean % Survival
Lab Control	100
1%	100
10%	96
50%	96
100%	100
Site Water	96
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Table 5-22. Effects of HUM-EK2-2025 Sediment Elutriate on *Menidia beryllina.*

Elutriate Treatment	Mean % Survival
Lab Control	94
1%	98
10%	94
50%	100
100%	98
Site Water	96
Survival LC_{50} =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

5.2.3.1 Reference Toxicant Toxicity to *Menidia beryllina* - The results of this test are presented in Table 5-23. The LC_{50} for this test was consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix Q.

Table 5-23. Reference Toxicant Testing: Effects of KCl on *Menidia beryllina.*

KCl Treatment (g/L)	Mean % Survival
Lab Control	100
0.125	100
0.25	100
0.5	95.0
1	95.0
2	**0.0***
LC_{50} =	1.32 g/L KCl
Typical Response Range (mean ± 2 SD) =	0.882 – 1.63 g/L KCl

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2.4 Toxicity Testing of Humboldt Harbor and Bay Modified Elutriates (MET) using *Americamysis bahia*

The results of the MET tests are summarized in Table 5-24. There was 100% survival at the Lab Control treatment, indicating acceptable survival responses by the test organisms. There was ≥86% survival in the Humboldt Harbor and Bay MET samples. The test data and summary of statistical analyses for this testing are presented in Appendix S.

Table 5-24. Effects of Humboldt Harbor and Bay MET Elutriates on *Americamysis bahia.*

Test Treatments	Mean % Survival
Lab Control	100
HUM-B&E-2025	100
HUM-SAM-2025	100
HUM-EK1-2025	86
HUM-EK2-2025	**94***
HUM-FL-2025	98
HUM-NB-2025	98
Site Water	100

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.2.4.1 Reference Toxicant Toxicity to *Americamysis bahia* - The results of this test are presented in Table 5-25. The LC_{50} for this test was consistent with PER's reference toxicant test database for this species, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix T.

Table 5-25. Reference Toxicant Testing: Effects of KCl on *Americamysis bahia*.

KCl Treatment (g/L)	Mean % Survival
Lab Control	97.5
0.125	97.5
0.25	95.0
0.5	90.0
1	**0.0***
2	**0.0***
LC_{50} =	0.659 g/L KCl
Typical Response Range (mean ± 2 SD) =	0.608 – 0.728 g/L KCl

* The response at this test treatment was significantly less than the Control treatment response at $p < 0.05$.

5.3 Bioaccumulation Testing of the Humboldt Harbor and Bay Sediments

Sediment bioaccumulation testing was performed using the bivalve *M. nasuta* and the polychaete *N. virens*. Negative Lab Control treatments consisted of "clean" sediment collected from Paradise Cove in San Francisco Bay. The survival results for the bioaccumulation tests with *M. nasuta* and *N. virens* are presented in Tables 5-26 and 5-27, respectively.

5.3.1 Sediment Bioaccumulation Test Data for *Macoma nasuta*

The percentage of bivalves that survived in each of the test replicates is summarized in Table 5-26. The test data for this testing are presented in Appendix U.

Table 5-26. Humboldt Harbor and Bay Sediment Bioaccumulation Testing with *Macoma nasuta.*

Test Treatment	Percent of Bivalves that Survived					Mean % Survival
	Rep A	Rep B	Rep C	Rep D	Rep E	
Lab Control	95	95	95	90	100	95
HUM-HOODS-2025	90	95	95	90	95	93
HUM-PROP-2025	95	90	100	95	100	96
HUM-FL-2025	100	100	100	95	95	98
HUM-NB-2025	100	95	100	100	95	98
HUM-EK1-2025	100	95	100	100	95	98
HUM-EK2-2025	85	90	100	95	95	93

5.3.2 Sediment Bioaccumulation Test Data for *Nereis virens*

The percentage of polychaetes that survived in each of the test replicates is summarized in Table 5-27. The test data for this testing are presented in Appendix V.

Table 5-27. Humboldt Harbor and Bay Sediment Bioaccumulation Testing with *Nereis virens*.

Test Treatment	Percent of Polychaetes that Survived					Mean % Survival
	Rep A	Rep B	Rep C	Rep D	Rep E	
Lab Control	90	100	80	90	80	88
HUM-HOODS-2025	100	90	80	90	90	90
HUM-PROP-2025	100	100	100	100	100	100
HUM-FL-2025	100	90	90	100	100	96
HUM-NB-2025	80	100	100	90	100	94
HUM-EK1-2025	90	100	100	100	90	96
HUM-EK2-2025	100	90	90	100	80	92

6. CHEMICAL ANALYSES OF BIVALVE AND POLYCHAETE TISSUES

Per USEPA and USACE coordination, the tissue samples from each of the Humboldt Harbor and Bay sediment bioaccumulation tests were analyzed for PAHs or dioxins/furans to support disposal at HOODS and/or PROP (Table 6-1).

Table 6-1. Tissue Analysis Performed to Support Disposal at HOODS and PROP.

Area	Area Sample ID	Tissue Analysis to Support Disposal at HOODS
Field's Landing Channel & Turning Basin	HUM-FL-2025	PAHs
North Bay Channel	HUM-NB-2025	PAHs
Outer Eureka Channel	HUM-EK1-2025	PAHs
Inner Eureka Channel	HUM-EK2-2025	Dioxins/Furans

Evaluation of bioaccumulation test data was consistent with ITM/OTM guidelines and DMMO guidance. To support disposal at HOODS and PROP, organism tissue contaminant concentrations were compared to the HOODS and PROP tissues.

6.1 Bioaccumulation Test Tissue Analytical Chemistry Results

The results of these analyses (performed by Eurofins) are summarized in Tables 6-2 and 6-3.

Macoma nasuta

The test initiation (T0) mean total PAHs tissue concentration was <MDL. The Control mean tissue total PAHs concentration was 9.7 µg/kg. HOODS mean tissue total PAHs concentration was 2.5 µg/kg. PROP mean total PAHs tissue concentration was <MDL.

The test initiation (T0) mean tissue total dioxins and furans concentration was 0.067 ng TEQ/kg. The test Control mean tissue total dioxins and furans concentration was 0.116 ng TEQ/kg. HOODS mean tissue total dioxins and furans concentration was 0.069 ng TEQ/kg. PROP mean tissue total dioxins and furans concentration was 0.088 ng TEQ/kg.

The following total PAHs or total dioxins and furans tissue concentrations were measured in *Macoma nasuta* exposed to site sediments:

- The mean total PAHs concentration for the HUM-FL-2025 *Macoma nasuta* was <MDL.
- The mean total PAHs concentration for the HUM-NB-2025 *Macoma nasuta* was <MDL.
- The mean total PAHs concentration for the HUM-EK1-2025 *Macoma nasuta* was 12.2 µg/kg which is greater than the HOODS (2.5 µg/kg) and PROP (<MDL) mean tissue total PAHs concentrations.

- The mean total dioxins and furans concentration for the HUM-EK2-2025 *Macoma nasuta* was 0.166 ng TEQ/kg which is greater than the HOODS (0.069 µg/kg) and PROP (0.088 µg/kg).

Nereis virens

The test initiation (T0), Control, HOODS, and PROP mean total PAHs tissue concentrations were <MDL.

The test initiation (T0) mean tissue total dioxins and furans concentration was 0.241 ng TEQ/kg. The test Control mean tissue total dioxins and furans concentration was 0.285 ng TEQ/kg. HOODS mean tissue total dioxins and furans concentration was 0.387 ng TEQ/kg. PROP mean tissue total dioxins and furans concentration was 0.490 ng TEQ/kg.

- The mean total PAHs concentration for the HUM-FL-2025 *Nereis virens* was <MDL.
- The mean total PAHs concentration for HUM-NB-2025 *Nereis virens* was 12.2 µg/kg which is greater that then the HOODS and PROP mean tissue total PAHs concentrations (<MDL).
- The mean total PAHs concentration for the HUM-EK1-2025 *Nereis virens* was <MDL.
- The mean total dioxins and furans concentration for the HUM-EK2-2025 *Nereis virens* was 0.228 ng TEQ/kg which is less that then the HOODS and PROP mean tissue total dioxins and furans concentrations.

The full Data Report for the *M. nasuta* and *N. virens* tissue analyses is presented in Appendix W.

Table 6-2. Results of the Chemical Analysis of *Macoma nasuta* Tissues for Humboldt Harbor and Bay Samples.

Analyte	HOODS						PROP						T0 (Sample collected at time of test initiation)					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
Total lipids %													-	-	-	-	-	**0.617**
PAHs (µg/kg, wet wt)																		
∑ LPAHs	0	5.7 J	0	0	0	**1.1 J**	0	0	0	0	0	0	0	0	0	0	0	**0**
∑ HPAHs	0	7.0 J	0	0	0	**1.4 J**	0	0	0	0	0	0	0	0	0	0	0	**0**
∑ detected PAHs	**0**	**12.7 J**	**0**	**0**	**0**	**2.5 J**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dioxins and Furans (ng TEQ/kg, wet wt)																		
∑ Dioxin/Furan	**0.0178 J**	**0.043 J**	**0.100 J**	**0.066 J**	**0.118 J**	**0.069 J**	**0.026 J**	**0.207 J**	**0.010 J**	**0.017 J**	**0.180 J**	**0.088 J**	**0.109 J**	**0.049 J**	**0.049 J**	**0.083 J**	**0.044 J**	**0.067 J**

Notes:
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 6-2 *(continued).* Results of the Chemical Analysis of *Macoma nasuta* Tissues for Humboldt Harbor and Bay Samples.

Analyte	Lab Control						HUM-FL-2025						HUM-NB-2025					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
PAHs (µg/kg, wet wt)																		
∑ LPAHs	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0
∑ HPAHs	0	0	12.6 J	35.9	0	**9.7**	0	0	0	0	0	0	0	0	0	0	0	0
∑ detected PAHs	**0**	**0**	**12.6 J**	**35.9**	**0**	**9.7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dioxins and Furans (ng TEQ/kg, wet wt)																		
∑ Dioxin/Furan	**0.055 J**	**0.062 J**	**0.159 J**	**0.151 J**	**0.152 J**	**0.116 J**												

Notes:
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 6-2 *(continued).* Results of the Chemical Analysis of *Macoma nasuta* Tissues for Humboldt Harbor and Bay Samples.

Analyte	HUM-EK1-2025						HUM-EK2-2025					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
PAHs (µg/kg, wet wt)												
∑ LPAHs	0	0	0	0	0	**0**						
∑ HPAHs	13	12	12	14	10	**12.2**						
∑ detected PAHs	**13**	**12**	**12**	**14**	**10**	**12.2**						
Dioxins and Furans (ng TEQ/kg, wet wt)												
∑ Dioxin/Furan							**0.274**	**0.136 J**	**0.130 J**	**0.121 J**	**0.170 J**	**0.166**

Notes:
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 6-3. Results of the Chemical Analysis of *Nereis virens* Tissues for Humboldt Harbor and Bay Samples.

Analyte	HOODS						PROP						T0 (Sample collected at time of test initiation)					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
Total lipids %													-	-	-	-	-	**1.66**
PAHs (µg/kg, wet wt)																		
∑ LPAHs	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
∑ HPAHs	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
∑ detected PAHs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dioxins and Furans (ng TEQ/kg, wet wt)																		
∑ Dioxin/Furan	**0.301 J**	**0.413 J**	**0.333 J**	**0.348 J**	**0.504 J**	**0.387 J**	**0.365 J**	**0.350 J**	**0.893 J**	**0.674 J**	**0.169 J**	**0.490 J**	**-[A]**	**0.423 J**	**0.135 J**	**0.258 J**	**0.388 J**	**0.241 J**

Notes:
A – Analytical laboratory indicated that there was insufficient tissue mass for T0 Replicate A to perform dioxins/furans analysis.
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 6-3 *(continued)*. Results of the Chemical Analysis of *Nereis virens* Tissues for Humboldt Harbor and Bay Samples.

Analyte	Lab Control						HUM-FL-2025						HUM-NB-2025					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
PAHs (µg/kg, wet wt)																		
∑ LPAHs	0	0	0	0	0	**0**	0	0	0	0	0	**0**	6.5 J	0	0	0	0	**1.3 J**
∑ HPAHs	0	0	0	0	0	**0**	0	0	0	0	0	**0**	7.5 J	0	0	0	0	**1.5 J**
∑ detected PAHs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14 J**	0	0	0	0	**2.8 J**
Dioxins and Furans (ng TEQ/kg, wet wt)																		
∑ Dioxin/Furan	**0.429 J**	**0.253 J**	**0.116 J**	**0.433 J**	**0.196 J**	**0.285 J**												

Notes:
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

Table 6-3 *(continued)*. Results of the Chemical Analysis of *Nereis virens* Tissues for Humboldt Harbor and Bay Samples.

Analyte	HUM-EK1-2025						HUM-EK2-2025					
	Rep A	Rep B	Rep C	Rep D	Rep E	Mean	Rep A	Rep B	Rep C	Rep D	Rep E	Mean
PAHs (µg/kg, wet wt)												
∑ LPAHs	0	0	0	0	0	**0**						
∑ HPAHs	0	0	0	0	0	**0**						
∑ detected PAHs	**0**	**0**	**0**	**0**	**0**	**0**						
Dioxins and Furans (ng TEQ/kg, wet wt)												
∑ Dioxin/Furan							**0.457**	**0.166 J**	**0.156 J**	**0.189 J**	**0.172 J**	**0.228**

Notes:
J – Analyte detected below the method reporting limit (MRL) and the reported value is therefore an estimate.
All concentrations reported as being below the laboratory MDL are reported above as < the MDL.

6.2 Comparison of Tissue Concentrations to HOODS and PROP Reference Sites

The *M. nasuta* and *N. virens* tissue total PAHs and total dioxins and furans concentrations were compared to the HOODS and PROP reference site values. Exceedances (i.e., tissue concentrations that exceeded the HOODS and PROP reference site values) for the Humboldt Harbor and Bay samples are listed in Table 6-4.

The HUM-EK1-2025 *Macoma nasuta* mean total PAHs and total dioxins/furans TEQs concentrations were greater than the HOODS and PROP reference site values, however total dioxins/furans TEQs results were not statistically significantly greater than the PROP reference site value. Further evaluations of total PAHs were performed on the HOODS and PROP reference site concentrations, and further evaluation of dioxins and furans was performed based on the HOODS comparison.

The HUM-NB-2025 *Nereis virens* mean total PAHs tissue concentration was greater than the HOODS and PROP reference site values, however it was not statistically significantly greater than the HOODS or PROP reference site values. Based on the overall results, no further evaluation was performed on HUM-NB-2025.

Table 6-4. Tissue Analytes whose Concentrations Exceeded HOODS and PROP Reference Database Values.

Management Unit	*Macoma nasuta* Tissues	*Nereis virens* Tissues
HUM-FL-2025	none	none
HUM-NB-2025	none	Total PAHs
HUM-EK1-2025	Total PAHs	none
HUM-EK2-2025	Total (TEQ) dioxins/furans	none

6.3 Comparison of Tissue Concentrations to Tissue Residue Effects Data for Invertebrates

The *M. nasuta* tissue total PAH and/or total dioxins/furans TEQs concentrations that exceeded the HOODS and/or PROP reference sites values were compared to USACE ERED effects data to determine the potential for impacts to benthic invertebrates after placement at HOODS or PROP. The results of this assessment are presented in Sections 6.3.1 and 6.3.2.

6.3.1 Development of Toxicity Reference Values (TRV) Using the USACE ERED

As there are currently no promulgated screening criteria for determination of ecological effects at HOODS or PROP; accordingly, and consistent with ITM/OTM and USACE ERED guidance, toxicity reference values (TRVs) were developed using “effects” data from the USACE ERED database.

Consistent with ITM/OTM and USACE ERED guidance, data used in developing TRVs for use in dredged material disposal assessments were limited to effects data reported in the

USACE ERED database that identify measurable biological effects (e.g., reduced survival, growth, or reproduction) for species that were most relevant to *M. nasuta*.

Available relevant data for each of the compounds identified in organism tissues as exceeding the HOODS and/or PROP reference sites values are presented in Table 6-5. The TRV was established as equivalent to the lesser of the reported lowest observed-effect concentration (LOEC) or lowest observed-effect dose (LOED) to ensure that a conservative screening was applied. In the absence of a relevant LOEC or LOED value, an estimated LOEC-LOED TRV was calculated by applying any appropriate uncertainty factor (i.e., uncertainty factor of 20 is applied to the reported LD_{50}/ED_{50} values [USACHPPM 2000]). The total PAHs and total dioxins/furans TEQs TRVs used followed the above guidance and were developed by the San Francisco Estuary Institute (SFEI 2018) or developed in the absence of a SFEI TRV.

Table 6-5 Summary of ERED Tissue 'Effect' Concentrations Used to Determine Potential Benthic Impacts.

Compound	Species	Units	Reported "Effects" Concentration	TRV	Type of Effect	Toxicity Endpoint	Lifestage	Reference from ERED Database
Benzo(a)pyrene	*Psettichthys melanostictus*	µg/kg ww	2,100	2,100	Embryo development	LOEC	egg	Hose et al. 1982
Dioxins/Furans (2,3,7,8-TCDD)	*Pacifastacus leniusculus* (Crayfish)	ng/kg ww	3,000	300[A]	Delayed mortality	Estimated LOEC	adult	Ashley et al. 1996

Notes:
LOEC - Lowest Observed Effect Concentration.
ww – wet weight.
A - Uncertainty factor of 10 applied to reported LC25 value to obtain an estimated LOEC-based TRV value (USACHPPM, 2000).

6.3.2 Comparison of Tissue Analyte Concentrations to Toxicity Reference Values

As the bioaccumulation tests were 28-days in duration and may not represent "steady-state" conditions, an estimation of steady-state for each compound was performed, where necessary, using available information (USACE 2010, ASTM 2016, USACE/USEPA 1998) prior to comparison to TRV values. The steady-state corrected PAHs and dioxins/furans TEQs tissue concentrations were summed prior to comparison to the most relevant TRV.

The *M. nasuta* tissue PAHs and dioxins/furans concentrations were compared to the selected TRVs; none of the tissue concentrations for these compounds exceeded TRV values. The results of these comparisons are summarized in Table 6-6.

Table 6-6. Comparison of *Macoma nasuta* 28-day Tissue Concentrations Exceeding the HOODS and/or PROP Reference Site Values Total PAHs and Total Dioxins/Furans TEQs to USACE ERED Database.

Sampling Area	Chemical	Units	Mean 28-day Tissue Concentration	Steady State Correction Factor	Estimated Steady State Corrected Mean Tissue Concentration	TRV	Exceedance of TRV?
HUM-EK1-2025	Benzo(a)pyrene	µg/kg ww	12.2	1.02[A]	12.4	2,100	no
HUM-EK2-2025	Total dioxins/furans TEQs	ng/kg ww	0.166	-[B]	0.483	300	no

Notes:
TRV = Toxicity Reference Value.
TEQ = Toxicity Equivalent Quotient
A - Average for *Macoma nasuta* as reported in USACE 2010.
B - Each 28-day dioxin and furan congener tissue concentration was steady-state corrected after which the TEF (WHO 2005) for each congener was applied and the resulting TEQs summed to achieve a total TEQ. The specific data used for this calculation are presented in Appendix Y.

6.4 Comparison of Tissue Analyte Concentrations to USFDA Action Levels

Tissue concentrations were compared to available USFDA action levels. Steady-state corrected total PAHs concentration was compared to available USFDA action levels (Table 6-8). The predicted *M. nasuta* range of tissue total PAHs concentration was well below USFDA action levels. The USFDA does not identify any action levels for dioxin/furan compounds that can be used as a basis for comparison of measured concentrations in invertebrate (i.e., *M. nasuta*) tissues.

Table 6-7. Comparison of Tissue Burden Levels to USFDA Action Levels.

Compound	Steady-state Corrected Tissue Concentration Range (µg/kg)	USFDA Action Level (µg/kg ww)
Total PAHs	12.2	6,000

7. QUALITY CONTROL REVIEW

7.1 Conventional and Chemical Analytical Quality Control Summary

The QA/QC review entailed reviewing the contract lab Data Reports for sample integrity, correct methodology, and compliance with all appropriate quality Lab Control requirements. The overall data quality assessment found that all data were usable. Appendix B contains the sediment conventional and chemical analysis reports. Appendix C contains the Modified Waste Extraction Test (mWET) chemical analysis reports. Appendix D contains the Modified Elutriate Test chemical analysis reports. Appendix W contains the conventional and chemical analysis reports for the tissue samples. Each of these reports includes the contract laboratory QA/QC narrative.

A review summary of the analytical methods, the targeted reporting limits, and the achieved method reporting and detection limits are presented in Table 7-1.

7.1.1 Sediment Conventional and Chemical Analytical QA/QC Summary

Eurofins Calscience Report 570-203622-1
Grain size – The sample duplicate precision for analytical batch 570-495204 was outside control limits. Sample matrix interference and/or non-homogeneity was suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits.

Eurofins Calscience Report 570-203622-2
Metals – The method blank for preparation batch 570-494538 and analytical batch 570-494821 contained copper above the method detection limit (MDL). This target analyte concentration was less than the reporting limit (RL) in the method blank; therefore, re-extraction and/or re-analysis of samples was not performed.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 570-494538 and analytical batch 570-494821 were outside control limits for one or more analytes. Sample matrix interference and/or non-homogeneity was suspected because the associated LCS recovery was within acceptance limits.

Eurofins Calscience Report 570-203622-3
No analytical or quality issues were noted.

Eurofins Calscience Report 570-204149-1
Grain size – The sample duplicate) precision for analytical batch 570-496569 was outside control limits. Sample matrix interference and/or non-homogeneity was suspected because the associated LCS/LCSD precision was within acceptance limits.

Eurofins Calscience Report 570-204149-2

Butyltins – The LCS/LCSD for preparation batch 570-496125 and analytical batch 570-499195 and the MS/MSD for preparation batch 570-496125 and analytical batch 570-499195 were recovered outside control limits for monobutyltin. Eurofins Calscience has identified monobutyltin as a poor performing analyte when analyzed using this method; therefore, re-extraction/reanalysis was not performed. Batch precision also exceeded control limits for monobutyltin. These results were reported and qualified.

Semivolatile Organic Compounds – The MS/MSD precision for preparation batch 570-497120 and analytical batch 570-501448 was outside control limits. Sample matrix interference and/or non-homogeneity were suspected because the associated sample LCS/LCSD precision was within acceptance limits.

OCl pesticides – The RPD of the LCS/LCSD for preparation batch 570-497115 and analytical batch 570-500681 were recovered outside control limits for aldrin.

Metals – The MS/MSD recoveries for preparation batch 570-496761 and analytical batch 570-497177 were outside control limits for one or more analytes. Sample matrix interference and/or non-homogeneity were suspected because the associated LCS recovery was within acceptance limits.

The method blank for preparation batch 570-496761 and analytical batch 570-497177 contained nickel above the MDL. This target analyte concentration was less than the RL in the method blank; therefore, re-extraction and/or re-analysis of samples was not performed.

Sulfide – Eurofins Calscience indicated that the samples were received outside of holding time for sulfide analyses.

The MS/MSD recoveries for the HUM-NB-2025 (570-204149-10), HUM-NB-2025 (570-204149-10[MS]) and HUM-NB-2025 (570-204149-10[MSD]) samples associated with preparation batch 570-499593 and analytical batch 570-499789 were outside control limits: The associated LCS recovery met acceptance criteria.

Eurofins Calscience Report 570-204149-3

No analytical or quality issues were noted.

Eurofins Calscience Report 570-204149-8

Butyltins – The MS/MSD recoveries for preparation batch 570-507903 and analytical batch 570-509164 were outside control limits. Sample matrix interference was suspected because the associated LCS recovery was within acceptance limits.

PCBs – Eurofins Calscience indicated that insufficient sample volume was available to perform a MS/MSD associated with preparation batch 570-506178.The LCS was performed in duplicate (LCSD) to provide precision data for this batch.

OCl pesticides – The LCS was performed in duplicate (LCSD) to provide precision data for the batch. Eurofins Calscience indicated that insufficient sample volume was available to perform a MS/MSD associated with preparation batch 570-506179.

Eurofins Calscience Report 570-204149-8
No analytical or quality issues were noted.

7.1.2 Modified Waste Extraction Test (mWET) Chemical Analytical QA/QC Summary

Eurofins Calscience Report 570-204149-4
Butyltins – The samples were prepared outside of preparation holding time.

The (MS/MSD) recoveries for preparation batch 570-500544 and analytical batch 570-501637 were outside control limits. Sample matrix interference was suspected because the associated LCS recovery was within acceptance limits.

Eurofins Calscience indicated that insufficient sample volume was available to perform a MS/MSD associated with preparation batch 570-500423.The LCS was performed in duplicate LCSD to provide precision data for this batch.

The LCS/LCSD for preparation batch 570-500423 and analytical batch 570-501448 were recovered outside control limits for benzoic acid. Eurofins Calscience stated that benzoic acid has been identified as a poor performing analyte when analyzed using this method; therefore, re-extraction/reanalysis was not performed.

PCBs – Eurofins Calscience indicated that insufficient sample volume was available to perform a matrix MS/MSD associated with preparation batch 570-500535. The LCS was performed in duplicate (LCSD) to provide precision data for this batch.

OCl pesticides – The MS/MSD precision for preparation batch 570-500824 and analytical batch 570-501721 was outside control limits. Sample matrix interference was suspected.

Sulfide – The continuing calibration blank (CCB) for analytical batch 570-501129 contained sulfide above the MDL. All reported samples associated with this CCB were either non-detect (ND) for this analyte or contained this analyte at a concentration greater than 10 times the value found in the CCB; therefore, re-analysis of samples was not performed. Eurofins Calscience indicated that the samples were received outside of holding time for sulfide analyses.

Eurofins Calscience Report 570-204149-5
No analytical or quality issues were noted.

Eurofins Calscience Report 570-204149-6

Semivolatile Organic Compounds – Elevated reporting limits were provided for the HUM-NB-2025 (570-204149-17[MSD]) sample due to insufficient sample provided for 8270C preparation/analysis.

The MS/MSD recoveries for preparation batch 570-500751 and analytical batch 570-501454 were outside control limits. Sample matrix interference was suspected because the associated LCS recovery was within acceptance limits.

The MS/MSD precision for preparation batch 570-500751 and analytical batch 570-501454 was outside control limits. Sample matrix interference and/or non-homogeneity were suspected because the LCS/LCSD precision was within acceptance limits.

The LCS/LCSD for preparation batch 570-500751 and analytical batches 570-501454 and 570-501626 were recovered outside control limits for 3,3'-dichlorobenzidin and benzidine. Eurofins Calscience stated that 3,3'-dichlorobenzidine and benzidine were identified as poor performing analytes when analyzed using this method; therefore, re-extraction/re-analysis was not performed.

The RPD of the LCS and LCSD for preparation batch 570-500751 and analytical batch 570-501626 were recovered outside control limits for benzoic acid, n-nitrosodiphenylamine (as diphenylamine), 3,3'-dichlorobenzidine, 4-chloroaniline, 4-nitroaniline, 4-nitrophenol, aniline, bis (2-chloroisopropyl) ether, and pyridine.

OCl pesticides – The MS/MSD/sample duplicate) precision for preparation batch 570-500824 and analytical batch 570-501138 were outside control limits. Sample matrix interference and/or non-homogeneity were suspected because the associated LCS/LCSD precision was within acceptance limits.

Eurofins Calscience Report 570-204149-7

Dioxins/Furans – The MS recoveries for preparation batch 320-815471 and analytical batch 320-818537 were outside control limits for one or more analytes. Sample matrix interference and/or non-homogeneity were suspected because the associated LCS recovery was within acceptance limits.

The ion abundance ratio was outside criteria for the Internal Standard 13C-1,2,3,4-TCDD associated with the HUM-NB-2025 (570-204149-17[MSD]) sample. The theoretical area for the Internal Standard was used to quantitate the related IDA recoveries.

7.1.3 Modified Elutriate Test (MET) Chemical Analytical QA/QC Summary

Eurofins Calscience Report 570-204397-1

Metals – The CCB for analytical batch 350-3264 contained selenium above the RL. All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than ten times the value found in the CCB; therefore, re-analysis of samples was not performed.

Eurofins Calscience Report 570-204683-1

Butyltins – Eurofins Calscience indicated that insufficient sample volume was available to perform analysis on the HUM-FL-2025 (570-204683-1), HUM-NB-2025 (570-204683-2) and HUM-EK1-2025 (570-204683-3) samples.

PCBs – The MS/MSD recoveries and precision for analytical batch 570-497563 were outside control limits. Sample matrix interference and/or non-homogeneity were suspected because the associated LCS/LCSD precision was within acceptance limits. Eurofins Calscience indicated that the samples were analyzed outside of analytical holding time due to a sample scheduling error.

Eurofins Calscience Report 570-204683-2

No analytical or quality issues were noted.

Eurofins Calscience Report 570-204683-3

Semivolatile Organic Compounds – The LCS/LCSD for preparation batch 570-496933 and analytical batch 570-498945 were recovered outside control limits for benzidine. Eurofins Calscience stated that benzidine has
been identified as a poor performing analyte when analyzed using this method; therefore, re-extraction/re-analysis was not performed.

Eurofins Calscience Report 570-205967-1

Butyltins – The MS/MSD recoveries for preparation batch 570-500544 and analytical batch 570-501637 were outside control limits. Sample matrix interference was suspected because the associated LCS recovery was within acceptance limits.

Eurofins Calscience Report 570-213339-1

Semivolatile Organic Compounds – The LCS/LCSD and MS/MSD for preparation batch 570-521825 and analytical batch 570-523394 were recovered outside control limits for benzidine. Eurofins Calscience stated that benzidine has been identified as a poor performing analyte when analyzed using this method; therefore, re-extraction/re-analysis was not performed.

The RPD of the LCS and LCSD for preparation batch 570-521825 and analytical batch 570-523394 were recovered outside control limits for multiple compounds.

The MS/MSD precision for preparation batch 570-521825 and analytical batch 570-523394 was outside control limits. Sample matrix interference and/or non-homogeneity were suspected because the associated LCS/LCSD precision was within acceptance limits.

Total Suspended Solids – The sample duplicate precision for analytical batch 570-521948 was outside control limits. Sample matrix interference and/or non-homogeneity was suspected because the associated LCS/LCSD precision was within acceptance limits.

7.1.4 Tissue Sample Analytical QA/QC Summary

Eurofins Calscience Report 570-212864-1

PAHs – The RPD of the LCS and LCSD for preparation batch 570-521987 and analytical batch 570-526284 was recovered outside control limits for pyrene.

Eurofins Calscience Report 570-212864-2

Dioxins/Furans - The IDA recovery associated was below the method recommended limit, however signal-to-noise ratios are within method recommended limits. The LCS and / or LCSD for preparation batch 410-607454 and analytical batch 410-607663 were recovered outside control limits for 1,2,3,4,6,7,8-HpCDD and OCDD. These analytes were biased high in the LCS.

Table 7-1. Achieved Detection and Reporting Limits for Sediments.

Analyte	Units	Method Used	Targeted MRL	Achieved MDL	Achieved MRL
Metals					
Arsenic	mg/kg	EPA 6020	1	0.11 – 0.15	0.602 – 0.82
Cadmium	mg/kg	EPA 6020	0.5	0.019 – 0.021	0.043 – 0.048
Chromium	mg/kg	EPA 6020	2	0.125 – 0.17	1.2 – 1.64
Copper	mg/kg	EPA 6020	3	0.136 – 0.186	1.2 – 1.64
Lead	mg/kg	EPA 6020	3	0.0787 – 0.107	0.602 – 0.82
Mercury	mg/kg	EPA 7471B	0.05	0.0256 – 0.0356	0.0927 – 0.129
Nickel	mg/kg	EPA 6020	5	0.114 – 0.156	1.2 – 1.64
Selenium	mg/kg	EPA 7742	0.1	0.09 – 0.101	0.18 – 0.202
Silver	mg/kg	EPA 6020	0.5	0.024 – 0.027	0.047 – 0.053
Zinc	mg/kg	EPA 6020	3	0.667 – 0.909	12 – 16.4
Pesticides					
Aldrin	µg/kg	EPA 8081A	2	0.018 – 0.6	0.02 – 26
a-*BHC*	µg/kg	EPA 8081A	2	0.0072 – 0.13	0.008 – 1.6
b-BHC	µg/kg	EPA 8081A	2	0.024 – 0.31	0.03 – 1.6
d-BHC	µg/kg	EPA 8081A	2	0.012 – 0.25	0.02 – 1.6
g-BHC (Lindane)	µg/kg	EPA 8081A	2	0.0039 – 0.17	0.008 – 1.6
Chlordane	µg/kg	EPA 8081A	20	0.15 – 1.2	0.2 – 8.2
2,4'-DDD	µg/kg	EPA 8081A	2	0.0051 – 0.1	0.008 – 1.6
2,4'-DDE	µg/kg	EPA 8081A	2	0.13 – 1.7	0.2 – 3.3
2,4'-DDT	µg/kg	EPA 8081A	2	0.0081 – 0.15	0.012 – 1.6
4,4'-DDD	µg/kg	EPA 8081A	2	0.026 – 0.82	0.04 – 1.6
4,4'-DDE	µg/kg	EPA 8081A	2	0.011 – 0.44	0.02 – 1.6
4,4'-DDT	µg/kg	EPA 8081A	2	0.0096 – 0.5	0.02 – 1.6
Total DDT	µg/kg	EPA 8081A	2	0.0051 – 1.7	0.008 – 3.3
Dieldrin	µg/kg	EPA 8081A	2	0.0079 – 0.11	0.02 – 0.33
Endosulfan I	µg/kg	EPA 8081A	2	0.0077 – 0.19	0.008 – 1.6
Endosulfan II	µg/kg	EPA 8081A	2	0.025 – 0.37	0.04 – 1.6
Endosulfan sulfate	µg/kg	EPA 8081A	2	0.0082 – 0.18	0.02 – 1.6
Endrin	µg/kg	EPA 8081A	2	0.014 – 0.31	0.02 – 1.6
Endrin aldehyde	µg/kg	EPA 8081A	2	0.15 – 1.6	0.2 – 1.6
Heptachlor	µg/kg	EPA 8081A	2	0.0071 – 0.097	0.008 – 1.6
Heptachlor epoxide	µg/kg	EPA 8081A	2	0.024 – 0.14	0.04 – 1.6
Toxaphene	µg/kg	EPA 8081A	20	0.32 – 1.6	0.4 – 8.2
Total Organotins	µg/kg	Krone 1989	10	0.63 – 65	3 – 130
Total PAHs	µg/kg	EPA 8270C	20	0.025 – 13	0.2 – 16
Total PCBs	µg/kg	EPA 8270C	0.5	0.00042 – 0.4	0.002 – 0.65
Dioxins/Furans	ng/kg	EPA 8290	2.0	0.015 – 0.75	1.2 – 49
Grain Size	%	ASTM D4464 (M)	0.1	0.01	0.01
Total Solids	%	SM 2540B	0.1	0.1	0.1
Total Organic Carbon	%	EPA 9060A	0.1	0.0367	0.0644
Tissue Lipids (wet weight)	%	NOAA 1993	0.01	0.099 – 0.0995	0.099 – 0.0995

Table 7-2. Achieved Detection and Reporting Limits for Modified Elutriate and Modified Waste Extraction Test Analytes.

Analyte	Units	Method Used	Targeted MRL	Achieved MDL	Achieved MRL
Metals					
Arsenic	µg/L	EPA 1640	1	0.63	0.7
Cadmium	µg/L	EPA 1640	0.25	0.013	0.02
Chromium	µg/L	EPA 1640	1	0.11	1
Copper	µg/L	EPA 1640	1	0.43	0.5
Lead	µg/L	EPA 1640	0.25	0.0230	0.05
Mercury	µg/L	EPA 1631E	0.005	0.0002	0.0005
Nickel	µg/L	EPA 1640	5	0.15	0.5
Selenium	µg/L	EPA 1640	0.5	0.3	0.7
Zinc	µg/L	EPA 1640	10	0.31	1
Pesticides					
Aldrin	µg/L	EPA 8081B	0.01	0.018	0.020
a-*BHC*	µg/L	EPA 8081B	0.01	0.0072	0.0080
b-BHC	µg/L	EPA 8081B	0.01	0.024	0.030
d-BHC	µg/L	EPA 8081B	0.01	0.012	0.020
g-BHC (Lindane)	µg/L	EPA 8081B	0.01	0.0039	0.0080
Chlordane	µg/L	EPA 8081B	0.2	0.15	0.20
2,4'-DDD	µg/L	EPA 8081B	0.01	0.0051	0.0080
2,4'-DDE	µg/L	EPA 8081B	0.01	0.13	0.20
2,4'-DDT	µg/L	EPA 8081B	0.01	0.0081	0.012
4,4'-DDD	µg/L	EPA 8081B	0.01	0.026	0.040
4,4'-DDE	µg/L	EPA 8081B	0.01	0.011	0.020
4,4'-DDT	µg/L	EPA 8081B	0.01	0.0096	0.020
Total DDT	µg/L	EPA 8081B	0.01	0.0051 – 0.13	0.0080 – 0.20
Dieldrin	µg/L	EPA 8081B	0.01	0.0079	0.020
Endosulfan I	µg/L	EPA 8081B	0.01	0.077	0.0080
Endosulfan II	µg/L	EPA 8081B	0.01	0.025	0.040
Endosulfan sulfate	µg/L	EPA 8081B	0.01	0.0082	0.020
Endrin	µg/L	EPA 8081B	0.01	0.014	0.020
Endrin aldehyde	µg/L	EPA 8081B	0.01	0.15	0.20
Heptachlor	µg/L	EPA 8081B	0.01	0.0071	0.0080
Heptachlor epoxide	µg/L	EPA 8081B	0.01	0.024	0.040
Toxaphene	µg/L	EPA 8081B	0.5	0.32	0.40
Total Organotins	µg/L	Krone 1989	0.05	1.1 - 180	2.8 - 370
Total PAHs	µg/L	EPA 8270C	0.19	0.024 – 0.13	0.19
Total PCBs	µg/L	EPA 8270C	10	0.0004 – 0.0027	0.0019 - 0.0038
Dioxins/Furans	pg/L	EPA 8290	-	0.015 – 1.1	9.5 - 96

8. SUMMARY

The Humboldt Harbor and Bay Channel sediments were analyzed to evaluate suitability of the material to be dredged for placement at the Humboldt Open Ocean Disposal Site (HOODS) or Proposed Nearshore Disposal Site (PROP).

8.1 Unconfined Aquatic Disposal at HOODS

Tier I confirmatory grain size analysis indicated that sediments from the Bar and Entrance Channel (HUM-B&E-2025), the North Bay Channel (HUM-NB-2025), and the Samoa Channel and Turning Basin (HUM-SAM-2025) were >80% sand.

For the Field's Landing Channel & Turning Basin (HUM-FL-2025), North Bay Channel (HUM-NB-2025), Outer Eureka Channel (HUM-EK1-2025), and Inner Eureka Channel (HUM-EK2-2025) sediments, one or more analyte concentrations were above HOODS reference sediment concentrations. Benthic toxicity testing performed on these sediments indicated that none of the measured compounds in these sediments were biologically available to cause toxicity in the 10-day sediment tests. In addition, the narrative WQO was met for the sediment elutriate tests performed.

Evaluation of site bioaccumulation test tissues total PAH concentrations and or total dioxins/furans indicated that some site tissue concentrations for these compounds were above the HOODS reference site tissue screening value; however, they were below invertebrate "effects" concentrations obtained from the USACE ERED database; the results of these analyses also indicated that the measured tissue concentrations were below USFDA action levels for food consumption.

Based on these results, the HUM-B&E-2025, HUM-SAM-2025, HUM-NB-2025, HUM-FL-2025, HUM-EK1-2025, and HUM-EK2-2025 sediments should be considered suitable for unconfined aquatic disposal (SUAD) at HOODS.

8.2 Proposed Nearshore Disposal Site

Tier I confirmatory grain size analysis indicated that sediments from the HUM-B&E-2025, HUM-NB-2025, and HUM-SAM-2025 were >80% sand.

For HUM-FL-2025, HUM-NB-2025, HUM-EK1-2025, and HUM-EK2-2025 sediments, one or more analyte concentrations were above PROP reference sediment concentrations. Benthic toxicity testing performed on these sediments indicated that none of the measured compounds in these sediments were biologically available to cause toxicity in the 10-day sediment tests. In addition, the narrative WQO was met for the sediment elutriate tests performed.

Evaluation of site bioaccumulation test tissues total PAH concentrations and or total dioxins/furans indicated that some site tissue concentrations for these compounds were above the PROP reference site tissue screening value; however, they were below invertebrate "effects" concentrations obtained from the USACE ERED database; the results of these analyses also indicated that the measured tissue concentrations were below USFDA action levels for food consumption.

Based on these results, the HUM-B&E-2025, HUM-SAM-2025, HUM-NB-2025, HUM-FL-2025, HUM-EK1-2025, and HUM-EK2-2025 sediments should be considered suitable for unconfined aquatic disposal (SUAD) at the PROP.

8.3 Potential Beach Placement Site

Although beach placement will not occur in 2025, USACE testing was performed in a manner to supported future beach placement.

Tier I confirmatory grain size analysis indicated that sediments from the HUM-B&E-2025, HUM-NB-2025, and HUM-SAM-2025 were >80% sand.

For HUM-FL-2025, HUM-NB-2025, HUM-EK1-2025, and HUM-EK2-2025 sediments Modified Waste Extraction Tests (mWET), one or more analyte concentrations were measured above the Marine Water Quality Objectives (MWQO) for Toxic Pollutants for Surface Waters surface water discharge screening criteria. However, none of the analyte concentrations were measured above the MWQOs in the Modified Elutriate Tests (MET), no toxicity was observed in the MET surface water test, benthic toxicity tests indicated that none of the measured compounds were biologically available to cause toxicity in 10-day sediment test, and the narrative WQO was met for the sediment elutriate tests.

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Appendix A

Sediment Core Collection Forms

Appendix B

Eurofins Data Reports of the Sediment Analyses

Appendix C

Eurofins Data Report for the mWET Analyses

Appendix D

Eurofins Data Report for the Sediment MET Elutriate Analyses

Appendix E

Sediment Porewater Water Quality Analyses and Overlying Water Ammonia Analyses Performed in Support of Bioassay Testing

Table E-1. Sediment porewater initial water quality characteristics for *Leptocheirus plumulosus* toxicity tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control (initial test)	7.27	20.3	0.290	<1.00
HUM-HOODS-2025	NM	NM	NM	2.50
HUM-PROP-2025	NM	NM	NM	9.10
HUM-FL-2025	7.49	21.5	0.120	7.94
HUM-NB-2025	NM	NM	NM	4.58
HUM-EK1-2025	7.63	22.3	0.160	5.65
HUM-EK2-2025	7.61	21.7	0.210	18.6
Lab Control (re-test)	7.07	23.1	0.034	<1.00
HUM-HOODS-2025	7.54	20.7	0.054	<1.00
HUM-PROP-2025	7.61	21.9	0.048	5.81
HUM-NB-2025	7.58	21.5	0.040	1.17

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-2. Sediment porewater final water quality characteristics for *Leptocheirus plumulosus* toxicity tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control (initial test)	7.30	25.8	0.080	<2.00
HUM-HOODS-2025	NM	NM	NM	NM
HUM-PROP-2025	NM	NM	NM	4.41
HUM-FL-2025	7.42	17.5	0.110	3.35
HUM-NB-2025	NM	NM	NM	3.94
HUM-EK1-2025	7.67	23.4	0.082	2.08
HUM-EK2-2025	7.69	20.6	0.146	8.71
Lab Control (re-test)	7.29	18.6	0.199	<1.00
HUM-HOODS-2025	7.72	NM	NM	<1.00
HUM-PROP-2025	7.69	17.7	NM	4.01
HUM-NB-2025	NM	NM	NM	<1.00

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-3. Sediment overlying water total ammonia levels for *Leptocheirus plumulosus* tests.

Sample ID	Total Ammonia (mg/L N)	
	Test Initiation	Test Termination
Lab Control (initial test)	<1.00	<2.00
HUM-HOODS-2025	<1.00	<2.00
HUM-PROP-2025	<1.00	<2.00
HUM-FL-2025	1.01	<2.00
HUM-NB-2025	<1.00	<2.00
HUM-EK1-2025	<1.00	<2.00
HUM-EK2-2025	1.16	<2.00
Lab Control (re-test)	<1.00	<1.00
HUM-HOODS-2025	<1.00	<1.00
HUM-PROP-2025	<1.00	<1.00
HUM-NB-2025	<1.00	<1.00

Table E-4. Sediment porewater initial water quality characteristics for *Eohaustorius estuaries* toxicity tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control	7.33	23.9	0.081	<1.00
HUM-HOODS-2025	7.60	22.7	0.284	<1.00
HUM-PROP-2025	7.65	22.0	0.117	4.25
HUM-NB-2025	7.74	24.9	0.024	<1.00

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-5. Sediment porewater final water quality characteristics for *Eohaustorius estuaries* toxicity tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control	7.26	19.6	0.097	<1.00
HUM-HOODS-2025	7.69	23.2	0.321	1.20
HUM-PROP-2025	7.73	19.0	0.453	2.29
HUM-NB-2025	7.73	19.0	0.136	<1.00

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-6. Sediment overlying water total ammonia levels for *Eohaustorius estuaries* tests.

Sample ID	Total Ammonia (mg/L N)	
	Test Initiation	Test Termination
Lab Control	<1.00	<1.00
HUM-HOODS-2025	<1.00	<1.00
HUM-PROP-2025	<1.00	<1.00
HUM-NB-2025	<1.00	<1.00

Table E-7. Sediment porewater initial water quality characteristics for *Neanthes arenaceodentata* tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control	7.33	30.7	0.080	1.77
HUM-HOODS-2025	7.67	32.1	0.174	<1.00
HUM-PROP-2025	7.77	29.4	11.1	NM
HUM-FL-2025	7.57	28.7	0.101	13.5
HUM-NB-2025	7.62	32.9	0.230	3.14
HUM-EK1-2025	7.62	30.6	0.086	5.43
HUM-EK2-2025	7.68	28.4	0.110	22.0

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-8. Sediment porewater final water quality characteristics for *Neanthes arenaceodentata* tests.

Sample ID	pH	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L N)
Lab Control	7.33	30.7	0.067	<2.00
HUM-HOODS-2025	NM	NM	NM	NM
HUM-PROP-2025	NM	NM	NM	NM
HUM-FL-2025	7.07	36.2	0.069	<2.00
HUM-NB-2025	NM	NM	NM	NM
HUM-EK1-2025	7.50	38.3	0.112	2.62
HUM-EK2-2025	7.46	33.8	0.065	2.64

NM– not measured due to insufficient volume due to nature of the sample matrix.

Table E-9. Sediment overlying water total ammonia levels for *Neanthes arenaceodentata* tests.

Sample ID	Total Ammonia (mg/L N)	
	Test Initiation	Test Termination
Lab Control	<1.00	<2.00
HUM-HOODS-2025	<1.00	<2.00
HUM-PROP-2025	<1.00	<2.00
HUM-FL-2025	<1.00	<2.00
HUM-NB-2025	<1.00	<2.00
HUM-EK1-2025	<1.00	<2.00
HUM-EK2-2025	1.63	<2.00

Table E-10. Total Ammonia Levels for Standard Elutriate Test (SET) and Modified Elutriate Test (MET) Samples.

Sample ID	Total Ammonia (mg/L N)	Total Ammonia (mg/L N)
	SET	MET
HUM-B&E-2025		<1.00
HUM-SAM-2025		<1.00
HUM-FL-2025	17.0	9.23
HUM-NB-2025	<1.00	<.00
HUM-EK1-2025	8.03	3.58
HUM-EK2-2025	35.6	15.1

Table E-11. Sediment overlying water total ammonia levels for *Macoma nasuta* bioaccumulation tests.

Sample ID	Total Ammonia (mg/L N)				
	Day 0	Day 7	Day 14	Day 21	Day 28
Lab Control	<1.00	1.25	<1.00	<2.00	<1.00
HUM-HOODS-2025	<1.00	1.72	1.21	<2.00	<1.00
HUM-PROP-2025	<1.00	3.15	1.84	<2.00	<1.00
HUM-FL-2025	2.48	5.09	2.79	<2.00	<1.00
HUM-NB-2025	<1.00	2.78	1.76	<2.00	<1.00
HUM-EK1-2025	2.18	3.68	2.04	<2.00	<1.00
HUM-EK2-2025	1.31	6.60	3.79	<2.00	<1.00

Table E-12. Sediment overlying water total ammonia levels for *Nereis virens* bioaccumulation tests.

Sample ID	Total Ammonia (mg/L N)				
	Day 0	Day 7	Day 14	Day 21	Day 28
Lab Control	<1.00	2.15	<2.00	<1.00	<1.00
HUM-HOODS-2025	<1.00	3.78	5.69	1.73	<1.00
HUM-PROP-2025	1.02	4.18	<2.00	<1.00	<1.00
HUM-FL-2025	1.67	6.93	3.39	<1.00	<1.00
HUM-NB-2025	<1.00	1.73	<2.00	<1.00	<1.00
HUM-EK1-2025	2.10	3.74	4.06	<1.00	<1.00
HUM-EK2-2025	1.28	10.7	4.93	<1.00	<1.00

Appendix F

Test Data and Summary of Statistics for the Evaluation of the Toxicity of the Humboldt Harbor and Bay Sediments to the Amphipods

Appendix G

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Amphipods

Appendix H

Test Data and Summary of Statistics for the Ammonia Toxicity Evaluation of the Amphipods

Appendix I

Test Data and Summary of Statistics for the Evaluation of the Toxicity of the Humboldt Harbor and Bay Sediments to the Polychaete, *Neanthes arenaceodentata*

Appendix J

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Polychaete, *Neanthes arenaceodentata*

Appendix K

Test Data and Summary of Statistics for the Ammonia Toxicity Evaluation of the Polychaete, *Neanthes arenaceodentata*

Appendix L

Test Data and Summary of Statistics for the Evaluation of the Toxicity of the Humboldt Harbor and Bay Sediment Elutriates to Bivalve *(Mytilus galloprovincialis)* Embryos

Appendix M

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the *Mytilus galloprovincialis* Embryos

Appendix N

Test Data and Summary of Statistics for the Evaluation of the Toxicity of the Humboldt Harbor and Bay Sediment Elutriates to Mysids *(Americamysis bahia)*

Appendix O

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Mysid, *Americamysis bahia*

Appendix P

Test Data and Summary of Statistics for the Toxicity Evaluation of the Humboldt Harbor and Bay Sediment Elutriates with the Inland Silverside *(Menidia beryllina)*

Appendix Q

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Inland Silverside, *Menidia beryllina*

Appendix R

Disposal Site Mixing Model Calculations

Appendix S

Test Data and Summary of Statistics for the Toxicity Evaluation of the Humboldt Harbor and Bay Modified Elutriate Test Sediment Elutriates to *Americamysis bahia*

Appendix T

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Mysid, *Americamysis bahia*

Appendix U

Test Data for the Humboldt Harbor and Bay Sediment Bioaccumulation Tests with the Bivalve, *Macoma nasuta*

Appendix V

Test Data for the Humboldt Harbor and Bay Sediment Bioaccumulation Tests with the Polychaete, *Nereis virens*

Appendix W

Results of *Macoma nasuta* and *Nereis virens* Tissue Analyses: Laboratory Data Report Submitted by Eurofins

Appendix X

Bioassay Standard Test Conditions

Summary of Test Conditions and Acceptability Criteria for the Amphipod (*Leptocheirus plumulosus)* 10-Day Sediment Toxicity Test	
1. Test type	Static non-renewal
2. Test duration	10 d
3. Temperature	25 ± 1°C
4. Salinity	20 ± 2 ppt
5. Light quality	Ambient Laboratory
6. Light intensity	50 – 100 ft c.
7. Photoperiod	Continuous
8. Test chamber size	1 L
9. Seawater volume	800 mL
10. Sediment depth	25 mm (~200 mL)
11. Renewal of seawater	None
12. Age of test organisms	Cultured, immature juveniles
13. # of organisms per test chamber	20
14. # of replicate chambers/concentration	5
15. # of organisms per sediment type	100
16. Feeding regime	None
17. Test chamber cleaning	Lab washing prior to test
18. Test solution aeration	Low bubble (~100/minute)
19. Overlying water	1 µm-filtered seawater (at test salinity)
20. Test materials	Test sites, reference and control
21. Dilution series	None
22. Endpoint	% Survival
23. Sample holding requirements	< 8 weeks
24. Sample volume required	4 L
25. Test acceptability criteria	≥ 90% survival in the Control treatment
26. Reference toxicant results	Within 2 SD of laboratory mean

Summary of Test Conditions and Acceptability Criteria for the Marine Polychaete (*Neanthes arenaceodentata)* 10-Day Sediment Toxicity Test		
1.	Test type	Static-renewal
2.	Test duration	10 d
3.	Temperature	20 ± 1°C
4.	Salinity	20 – 35 ppt
5.	Light quality	Ambient Laboratory
6.	Light intensity	50 – 100 ft c.
7.	Photoperiod	12L/12D
8.	Test chamber size	1 L glass beakers
9.	Test solution volume	800 L
10.	Sediment depth	25 mm (~200 mL)
11.	Renewal of seawater	None, unless needed. If needed, renew 80% of overlying water at 48-hour intervals
12.	Age of test organisms	2-3 weeks
13.	# of organisms per test chamber	10
14.	# of replicate chambers/concentration	5
15.	# of organisms per sediment type	50
16.	Feeding regime	None
17.	Test chamber cleaning	Lab washing prior to test
18.	Test solution aeration	Low bubble (~100/minute)
19.	Overlying water	1 µm-filtered seawater, at test salinity
20.	Test concentrations	Test sites, reference and Control
21.	Dilution series	None
22.	Endpoint	Survival
23.	Sample holding requirements	< 8 weeks
24.	Sample volume required	4 L
25.	Test acceptability criteria	≥ 90% survival in the Control treatment
26.	Reference toxicant results	Within 2 SD of laboratory mean

Summary of Test Conditions and Acceptability Criteria for the Mussel (*Mytilus galloprovinciales*) Water Column Toxicity Test	
1. Test type	Static non-renewal
2. Test duration	48 hours
3. Salinity	30 ±1 ppt
4. Temperature	16 ± 1°C (mussels)
5. Light quality	Ambient Laboratory
6. Light intensity	50 –100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	20 mL vials
9. Test solution volume	10 mL
10. Renewal of seawater	None
11. Age of test organisms	Embryo ≤ 4h old
12. # of organisms per test chamber	150 – 300
13. # of replicate chambers/concentration	5
14. # of organisms per concentration	750 – 1,500
15. Feeding regime	None
16. Test chamber cleaning	Lab washing prior to test
17. Test chamber aeration	None
18. Elutriate preparation water	Site water
19. Test concentrations	Test sites, and Lab Control
20. Dilution series	Four concentrations (1, 10, 50, 100%) and a Lab Control.
21. Dilution water	1 µm-filtered seawater, at test salinity
22. Endpoints	% survival and % normal development
23. Sampling holding requirements	< 8 weeks
24. Sample volume required	2L
25. Test acceptability criteria	≥70% survival and normal development in the Lab Controls, <10% abnormal in Lab Control

Summary of Test Conditions and Acceptability Criteria for the Mysid (*Americamysis bahia*) Water Column Toxicity Test	
1. Test type	Static non-renewal
2. Test duration	96 hours
3. Salinity	25-30 ppt ± 10 ppt
4. Temperature	20 ± 1°C
5. Light quality	Ambient Laboratory
6. Light intensity	50 –100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	400 mL beaker
9. Test solution volume	200 mL
10. Renewal of seawater	None
11. Age of test organisms	1-5 days; 24-hour range in age
12. # of organisms per test chamber	10
13. # of replicate chambers per concentration	5
14. # of organisms per concentration	50
15. Feeding regime	Daily
16. Test chamber cleaning	Lab washing prior to test
17. Test chamber aeration	If needed to maintain >40% saturation
18. Elutriate preparation water	Site water or Clean sea water
19. Test concentrations	Test sites, and Lab Control
20. Dilution series	Four concentrations (1, 10, 50, 100%) and a Lab Control for SETs. 100% only for METs.
21. Dilution water	Natural seawater/artificial seawater
22. Endpoints	% Survival
23. Sampling holding requirements	< 8 weeks
24. Sample volume required	2L
25. Test acceptability criteria	≥90% survival in the Lab Controls

Summary of Test Conditions and Acceptability Criteria for the Inland Silverside (*Menidia beryllina*) Water Column Toxicity Test	
1. Test type	Static non-renewal
2. Test duration	96 hours
3. Salinity	5 – 32 ppt ± 10 ppt
4. Temperature	20 ± 1°C
5. Light quality	Ambient Laboratory
6. Light intensity	50 –100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	400 mL beaker
9. Test solution volume	200 mL
10. Renewal of seawater	None
11. Age of test organisms	9-14 days; 24-hour range in age
12. # of organisms per test chamber	10
13. # of replicate chambers per concentration	5
14. # of organisms per concentration	50
15. Feeding regime	At 48 hrs
16. Test chamber cleaning	Lab washing prior to test
17. Test chamber aeration	If needed to maintain >40% saturation
18. Elutriate preparation water	Site water or Clean sea water
19. Test concentrations	Test sites, and Lab Control
20. Dilution series	Four concentrations (1, 10, 50, 100%) and a Lab Control.
21. Dilution water	Natural seawater/artificial seawater
22. Endpoints	%Survival
23. Sampling holding requirements	< 8 weeks
24. Sample volume required	2L
25. Test acceptability criteria	≥90% survival in the Lab Controls

Summary of Test Conditions and Acceptability Criteria for the Bioaccumulation Testing Using *Macoma nasuta* and *Nereis virens*	
1. Test type	Static-renewal
2. Test duration	28-days
3. Salinity	>25 ppt
4. Temperature	12-16 ± 1°C
5. Light quality	Ambient Laboratory
6. Light intensity	50 –100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	19-L tank
9. Test sediment/test solution volume	2-L sediment/8-L water
10. Renewal of seawater	3x per week
11. Age of test organisms	*Macoma* 2-4 years, 28-45 mm shell length; *Nereis* large adults
12. # of organisms per test chamber	20 *Macoma*/10 *Nereis* (or as needed)
13. # of replicate chambers per concentration	5
14. # of organisms per concentration	100 *Macoma*/50 *Nereis* (or as needed)
15. Feeding regime	None
16. Test chamber cleaning	As needed
17. Test chamber aeration	Moderate as needed
18. Elutriate preparation water	Site water or Clean sea water
19. Test concentrations	Test sediment, reference sediment, and a Lab Control sediment
20. Dilution series	N/A
21. Dilution water	Natural seawater/artificial seawater
22. Endpoints	Bioaccumulation
23. Sampling holding requirements	< 8 weeks
24. Sample volume required	≥25-L
25. Test acceptability criteria	Adequate mass of organisms at test completion for detection of target analytes

Appendix Y

Macoma nasuta Steady State Corrected Dioxins/Furans Tissue Concentrations: Total TEQ

Table Y-1. Humboldt Harbor and Bay *Macoma nasuta* Steady-State Adjusted Tissue Total Dioxin/Furan Concentration.

Analyte	Sample ID				
	HUM-EK2-2025				
Dioxins and Furans	**28-day Tissue Concentration (µg/kg, wet wt)**	**Steady State Correction Factor**	**Estimated Steady State Corrected Tissue Concentration (µg/kg, wet wt)**	**TEF**	**TEQ**
1,2,3,4,6,7,8-HpCDD	3.40	1.8[A]	6.12	0.05	0.306
1,2,3,4,6,7,8-HpCDF	0.34	1.9[A]	0.646	0.02	0.013
1,2,3,4,7,8-HxCDD	0.11	1.4[B]	0.154	0.09	0.014
1,2,3,4,7,8-HxCDF	<MDL	1.2[A]	0	0.3	0
1,2,3,4,7,8,9-HpCDF	0.061	2.9[B]	0.177	0.1	0.018
1,2,3,6,7,8-HxCDD	0.51	1.5[A]	0.765	0.07	0.054
1,2,3,6,7,8-HxCDF	0.073	2.2[B]	0.161	0.09	0.014
1,2,3,7,8-PeCDD	<MDL	1.0[A]	0	0.4	0
1,2,3,7,8-PeCDF	<MDL	1.7[A]	0	0.1	0
1,2,3,7,8,9-HxCDD	0.18	1.0[A]	0.18	0.05	0.009
1,2,3,7,8,9-HxCDF	<MDL	2.2[B]	0	0.2	0
2,3,4,6,7,8-HxCDF	<MDL	1.2[A]	0	0.1	0
2,3,4,7,8-PeCDF	0.05	1.3[A]	0.065	0.1	0.006
2,3,7,8-TCDD	<MDL	2.3[A]	0	1	0
2,3,7,8-TCDF	0.07	1.9[A]	0.133	0.07	0.009
OCDD	18.0	2.0[A]	36.0	0.001	0.036
OCDF	0.90	2.4[A]	2.16	0.002	0.004
∑ Dioxins/Furans	**NA**	-	**-**	**NA**	**0.483**

Notes:
MDL = Method Detection Limit
TEF = Toxicity Equivalency Factor.
TEQ = Toxicity Equivalency Quotient.
A - USACE 2010.
B - USACE/EPA 1998.

Appendix D

Compiled Environmental Permits for the Humboldt Nearshore Placement Pilot Project, Year 1

March 2025

Appendix A. Clean Water Act, Section 401 Water Quality Certificate and Sediment Suitability Determination, North Coast Regional Water Quality Control Board

From: Teicher, Margarete@Waterboards
To: Fahning, Savannah R CIV USARMY CESPN (USA)
Cc: Covington, Ellie L CIV USARMY CESPN (USA); Carmody, Juliana C CIV (USA); Siu, Jennifer
Subject: [Non-DoD Source] RE: Humboldt Nearshore Placement Pilot Project 401 WQC Application
Date: Wednesday, February 12, 2025 11:46:51 AM

Hello Savannah,

Yes, based on the application materials including the analytical results of the B&E sediment, the dredge material from the B&E should not adversely impact water quality.

Thanks.

Margarete "Maggie" Teicher
North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403
Margarete.Teicher@waterboards.ca.gov
(707) 576-2501
Work Schedule 8:00-4:30

****Due to COVID restrictions, I am mostly working from home. The best way to contact me is via email.****

From: Fahning, Savannah R CIV USARMY CESPN (USA) <Savannah.R.Fahning@usace.army.mil>
Sent: Wednesday, February 12, 2025 11:07 AM
To: Teicher, Margarete@Waterboards <Margarete.Teicher@waterboards.ca.gov>
Cc: Covington, Ellie L CIV USARMY CESPN (USA) <Ellie.L.Covington@usace.army.mil>; Carmody, Juliana C CIV (USA) <Juliana.C.Carmody@usace.army.mil>; Siu, Jennifer <Siu.Jennifer@epa.gov>
Subject: RE: Humboldt Nearshore Placement Pilot Project 401 WQC Application

Hi Maggie,

Thank you for the 401 certification, a hard copy will not be necessary. May we assume that your statement in Section 7, Avoidance and Minimization Impacts "Sediment samples have been collected and tested for physical, chemical, and biological characteristics. This testing ensures that the sediment to be placed in the HNPSA is suitable for that environment" serve as sediment suitability concurrence? I am attaching the EPA's concurrence document for your convenience. Let me know, thank you.

Savannah Fahning
Environmental Manager
U.S. Army Corps of Engineers, San Francisco District
601 Startare Dr #100, Eureka, CA 95501

savannah.r.fahning@usace.army.mil

From: Teicher, Margarete@Waterboards <Margarete.Teicher@waterboards.ca.gov>
Sent: Thursday, February 6, 2025 11:11 AM
To: Carmody, Juliana C CIV (USA) <Juliana.C.Carmody@usace.army.mil>
Cc: Fahning, Savannah R CIV USARMY CESPN (USA) <Savannah.R.Fahning@usace.army.mil>; Covington, Ellie L CIV USARMY CESPN (USA) <Ellie.L.Covington@usace.army.mil>; Ishii, Jade K CIV USARMY CESPN (USA) <Jade.Ishii@usace.army.mil>; WB-DWQ-Stateboard401 <Stateboard401.Stateboard401@waterboards.ca.gov>; R9cwa401 <r9cwa401@epa.gov>; CESPN-RG-Info <CESPN-RG-Info@usace.army.mil>; Jen Siu <Siu.Jennifer@epa.gov>; Van Hattem, Michael@Wildlife <Michael.VanHattem@wildlife.ca.gov>; Kraemer, Melissa@Coastal <Melissa.Kraemer@coastal.ca.gov>; Matt Goldsworthy <matt.goldsworthy@noaa.gov>
Subject: [Non-DoD Source] RE: Humboldt Nearshore Placement Pilot Project 401 WQC Application

Hello,

Please find the attached 401 certification for the subject project.

A hardcopy is available upon request.

Thank you.

Margarete “Maggie” Teicher
North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403
Margarete.Teicher@waterboards.ca.gov
(707) 576-2501
Work Schedule 8:00-4:30

****Due to COVID restrictions, I am mostly working from home. The best way to contact me is via email.****

From: Carmody, Juliana C CIV (USA) <Juliana.C.Carmody@usace.army.mil>
Sent: Monday, December 16, 2024 6:02 PM
To: NorthCoast <NorthCoast@Waterboards.ca.gov>
Cc: Fahning, Savannah R CIV USARMY CESPK (USA) <Savannah.R.Fahning@usace.army.mil>; Covington, Ellie L CIV USARMY CESPN (USA) <Ellie.L.Covington@usace.army.mil>; Teicher, Margarete@Waterboards <Margarete.Teicher@waterboards.ca.gov>; Ishii, Jade K CIV USARMY CESPN (USA) <Jade.Ishii@usace.army.mil>
Subject: Humboldt Nearshore Placement Pilot Project 401 WQC Application

February 6, 2025

In the Matter of

Water Quality Certification

for the

Humboldt Nearshore Placement Pilot Project
WDID No. 1B24176WNHU

APPLICANT:	United State Army Corps of Engineers, Ms. Ellie Covington
RECEIVING WATER:	Pacific Ocean
HYDROLOGIC UNIT:	Eureka Plain Hydrologic Unit No.110.00
COUNTY:	Humboldt
Files:	Humboldt Nearshore Placement Pilot Project, ECM PIN No. CW-898607

FINDINGS BY THE EXECUTIVE OFFICER:

1. On December 16, 2024, Ms. Ellie Covington of the United States Army Corps of Engineers (USACE, Applicant) submitted a draft application and requested a pre-filing meeting (October, 17, 2024) for water quality certification (certification) under section 401 of the Clean Water Act (33 U.S.C. § 1341) with the California Regional Water Quality Control Board, North Coast Region (Regional Water Board) for activities associated with the beneficial reuse of dredged material from Eureka Bay at the Nearshore placement site in the Pacific Ocean (Project). On December 27, 2024, the draft application was deemed incomplete. Additional application information was submitted to Regional Water Board on December 18,

2024, and January 10, 2025. The application was deemed complete on February 5, 2025.

The pilot Project is located in the Pacific Ocean at a nearshore placement site, referred to as the Nearshore Placement Study Area (HNPSA), approximately 0.5 mile from the North Spit of Eureka Bay at the Humboldt, at latitude 40.81357°N, -124.20382°W.

2. **Public Notice:** The Regional Water Board provided 21-day public notice of the application pursuant to Title 23, California Code of Regulations, Section 3858 on January 16, 2025, and posted information describing the Project on the Regional Water Board's website. No comments were received.

3. **Receiving Waters:** The proposed Project have the potential to cause disturbances to the Pacific Ocean, Eureka Plain Hydrologic Unit No. 110.00.

4. **Project Purpose and Description:** The primary purpose of the pilot Project is an effort to beneficially reuse Humboldt Bay dredged material[1] to determine the feasibility of nearshore placement at the HNPSA to address shoreline retreat and to provide data for regulatory decisions for future beneficial reuse projects.

   The shoreline along the North Spit is experiencing retreat due to multiple factors including, but not limited to, variations in water level, wave action, wind action, climate change, sea level rise, and other atmospheric and oceanic conditions. It is anticipated that sediment placed at the HNPSA will be transported onshore by wave action and nourish the bar system in the nearshore area by the Humboldt North Jetty, which has the greatest rate of shoreline retreat along the North Spit. The HNPSA was selected based on extensive wave and sediment transport modeling focused on the potential benefits to natural sediment supply to the erosional area along the North Spit, while ensuring safe and efficient access for hopper dredges with water depths between 40 and 70 feet.

   The proposed pilot Project includes transporting and placing up to 300,000 cubic yards (cy) of dredged material from the Humboldt Bar & Entrance Channel by the USACE (via hopper dredge Essayons[2]) at the HNPSA. Placement of dredged material is planned between water depths of -45 feet to -65 feet MLLW (mean lower low water) to ensure adequate depth for safe vessel operation and will result in an approximate 1,700-foot long by 6,000-foot wide by 2-foot high (maximum) broad, low-relief berm and consisting of 20 cells. It is anticipated that it will take approximately 60 trips to place up to 300,000 CY, based on the median dredge volume per load (5,200 CY) for the Essayons. One pass over a cell will result in approximately 0.29 ft of mean mound height. Each cell will receive three passes. Total mound height will not exceed two feet.

[1] The Humboldt Harbor and Bay, located in Humboldt County, California, is comprised of five federally maintained channels: Bar and Entrance (B&E), North Bay, Samoa, Eureka, and Fields Landing. To maintain navigational access, the USACE dredges approximately one million cubic yards of shoaled material from the federal channels annually. Dredged material, which is usually at least 90% sand, has typically been disposed at the Humboldt Open Ocean Disposal Site (HOODS), located outside of the littoral cell three miles from the Harbor entrance.

[2] The Essayons is a large hopper dredge (350 ft L X 68 ft W) that hydraulically dredges the navigational channel and houses the dredged material contents in the hull for aquatic placement via bottom-dumping doors.

5. **Construction Timing:** The Project will be conducted in two phases: late May 2025 and early July 2025. Each phase will last 7-14 days.
6. **Project Impacts:** The Project will temporarily disturb approximately 234 acres of waters of the state (Pacific Ocean).
7. **Avoidance and Minimization of Impacts:** Placement of dredged material at the HNPSA will temporarily increase turbidity and is expected to return to ambient conditions shortly after placement of dredged material has been completed. Sediment samples have been collected and tested for physical, chemical, and biological characteristics. This testing ensures that the sediment to be placed in the HNPSA in suitable for that environment.
8. **Other Agency Actions:** The Applicant has initiated Section 7 consultation with the National Marine Fisheries Service (NMFS). On August 1, 2022, NMFS issued its Biological Opinion, which concludes that the proposed "…action is not likely to jeopardize the continued existence of SONCC coho salmon and CC Chinook salmon, nor is the project likely to destroy or adversely modify designated critical habitat for these species. NMFS expects the proposed action would result in incidental take of SONCC coho salmon and CC Chinook salmon. An incidental take statement with terms and conditions is included with the enclosed biological opinion. NMFS has also concurred with the United States Army Corps of Engineers (Corps) determinations that the Project is not likely to adversely affect Northern California (NC) steelhead and its designated critical habitat, or Southern Distinct Population Segment (SDPS) of North American green sturgeon or its designated critical habitat." NMFS also conclude that the Project would adversely affect EFH [essential fish habitat] of all three FMPs and has provided one EFH Conservation Recommendation." NMFS recommended that the "…Corps should offset the adverse effects caused by the significant removals of prey species entrained in the suction dredge by contributing towards the improvement of the productivity of the action area and surrounding environment in Humboldt Bay. Contributing to tidal restoration actions would ameliorate the losses of prey by providing additional habitat and tidal areas where prey resources can be produced to replace and compensate for impacts out of kind."

   On September 15, 2022, The USACE provide a response letter to NMFS indicating that they will work NMFS and partners in the vicinity of Humboldt Bay to fund tidal restoration actions that would offset the losses of prey resulting from project activities.
9. **CEQA Compliance:** The USACE prepared the *Environmental Assessment and FONSI (Finding of no significant impact), the Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2021-2025), Humboldt Bay, Humboldt County, California* (March 2021 (Amended January 2025). The Regional Water Board has considered the environmental document.
10. **Antidegradation Policy:** The federal antidegradation policy requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies

under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's *Water Quality Control Plan for the North Coast Region* (Basin Plan) implements, and incorporates by reference, both the state and federal antidegradation policies. This certification is consistent with applicable federal and state antidegradation policies, as it does not authorize the discharge of increased concentrations of pollutants or increased volumes of treated wastewater, and does not otherwise authorize degradation of the waters affected by this Project.

11. Notwithstanding any determinations by the U.S. Army Corps or other federal agency made pursuant to 40 C.F.R. section 121.9, dischargers must comply with the entirety of this certification because this discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification," which requires compliance with all conditions of this water quality certification. The Order may be accessed at this web address: (https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/generalorders/go_wdr401regulated_projects.pdf)

Receiving Water: Eureka Plain Hydrologic Unit No. 110.00

Permanent impacts to waters of the state: None

Temporary impacts to waters of the state: 234.0 acres

Latitude / Longitude: 40.81357°N / -124.20382°W

Certification Expiration: February 6, 2030

Accordingly, based on its independent review of the record, the Regional Water Board certifies that the Humboldt Nearshore Placement Pilot Project (WDID No. 1B24176WNHU) as described in the application will comply with sections 301, 302, 303, 306 and 307 of the Clean Water Act, and with applicable provisions of state law, provided that the Applicant complies with the following terms and conditions:

All conditions of this certification apply to the Applicant (and their employees) and all contractors (and their employees), sub-contractors (and their employees), and any other entity or agency that performs activities or work on the Project as related to this Water Quality Certification.

TERMS AND CONDITIONS:

Project-Specific Conditions

1. Monitoring and reporting shall be implemented in accordance with the *December 2024 USACE Pilot Placement and Monitoring Plan, Humboldt Nearshore*

Placement Study Area, North Spit, Humboldt, CA, and any subsequent revisions approved by the Executive Officer. (CCR Title 23 section 3013, section 3856, Dredge or Fill Procedures section IV. A & B)

2. **Project Tracking**: Within 30 days of issuance of this Order, the Applicant shall upload Project information to EcoAtlas using the "Project Tracker" form found at the following website: (Https://ptrack.ecoatlas.org). Required information includes a Project map that may either be uploaded to EcoAtlas or created within EcoAtlas by using the "draw polygon" tool. Required mitigation monitoring reports shall be uploaded to EcoAtlas by March 1 following the certification January 31 monitoring report due date. To upload monitoring reports into EcoAtlas, use the "Files and Links" tab found on your project's EcoAtlas page. (CA Water Code section 13267)

Standard Conditions

3. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Water Code section 13330 and title 23, California Code of Regulations, section 3867.
4. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to title 23, California Code of Regulations, section 3855, subdivision (b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.
5. The application fee for this project is waived since the Applicant is a federal agency and this federal Humboldt Nearshore Placement Pilot Project is exempt from state fees as set forth in the above case and 23 CCR section 3833 (C) (f).
6. The Regional Water Board shall be notified at least five working days (working days are Monday – Friday) prior to the commencement of construction. (CA Water Code section 13267)
7. Only wildlife-friendly, 100-percent biodegradable erosion and sediment control products that will not entrap or harm wildlife shall be used. Erosion and sediment control products shall not contain synthetic (e.g., plastic or nylon) netting. Photodegradable synthetic products are not considered biodegradable. The Applicant shall request approval from the Regional Water Board if an exception from this requirement is needed for a specific location. (Water Quality Control Plan for the North Coast Region, Section 4.2.1, State Board Resolution No. 68-16)
8. BMPs shall be implemented as proposed in the application materials. BMPs for erosion, sediment and turbidity control shall be implemented and in place at commencement of, during and after any ground clearing activities or any other Project activities that could result in erosion or sediment discharges to surface water. Severe and unseasonal rain events are becoming more frequent due to the effects of climate change. Therefore, BMPs shall be immediately available for deployment at all times to prevent discharges to waters of the state. (State Board

Resolution No. 68-16, 40 CFR Part 131.12 (a)(1), CA Water Code section 13369, CCR section 3861(d)(2))

9. The Applicant is prohibited from discharging waste to waters of the state, unless explicitly authorized by this certification. For example, no debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete washings, oil or petroleum products, or other organic or earthen material from any construction or associated activity of whatever nature, other than that authorized by this certification, shall be allowed to enter into or be placed where it may be washed by rainfall into waters of the state. When operations are completed, any excess material or debris shall be removed from the work area. (Water Quality Control Plan for the North Coast Region, section 4.2.1)
10. The Applicant shall provide Regional Water Board staff access to the Project site to document compliance with this certification. (CA Water Code section 13267(c))
11. If, at any time, an unauthorized discharge to surface water (including wetlands, lakes, rivers or streams) occurs, or any water quality problem arises, the associated Project activities shall cease immediately until adequate BMPs are implemented including stopping work. The Regional Water Board shall be notified promptly and in no case more than 24 hours after the unauthorized discharge or water quality problem arises. (CA Water Code sections 13170 or 13245 and 13271)
12. Prior to implementing any change to the Project that may be a material change as defined in California Water Code section 13260(c) as a proposed change in character, location, or volume of the discharge, the Applicant shall obtain prior written approval of the Regional Water Board Executive Officer. If the Regional Water Board is not notified of the material change to the discharge, it will be considered a violation of this certification, and the Applicant may be subject to Regional Water Board enforcement action(s). (CA Water Code section 13264)
13. All Project activities shall be implemented as described in the submitted certification application package and the findings and conditions of this certification. Subsequent Project changes that could significantly impact water quality shall first be submitted to Regional Water Board staff for prior review, consideration, and written concurrence. If the Regional Water Board is not notified of a significant alteration to the Project, it will be considered a violation of this certification, and the Applicant may be subject to Regional Water Board enforcement actions. (CA Water Code section 13264)
14. The Applicant shall provide a copy of this certification and State Water Resources Control Board (SWRCB) Order No. 2003-0017-DWQ to any contractor(s), subcontractor(s), and utility company(ies) conducting work on the Project, and shall require that copies remain in their possession at the work site. The Applicant shall be responsible for ensuring that all work conducted by its contractor(s), subcontractor(s), and utility companies is performed in accordance with the information provided by the Applicant to the Regional Water Board. (CA Water Code sections 13170 or 13245)
15. Fueling, lubrication, maintenance, storage, and staging of vehicles and equipment shall not result in a discharge or threatened discharge to any waters

of the state including dry portions of the shoreline. At no time shall the Applicant or its contractors allow use of any vehicle or equipment, which leaks any substance that may impact water quality. (State Board Resolution No. 68-16, 40 CFR Part 131.12 (a)(1), Water Code section 13369, Water Quality Control Plan for the North Coast Region, section 3.3.16)

16. The Applicant shall not use leaking vehicles or equipment within State waters or riparian areas. Vehicles and equipment used within State waters shall be checked for leaks at the beginning of each workday. (State Board Resolution No. 68-16, 40 CFR Part 131.12 (a)(1), CA Water Code section 13369, Water Quality Control Plan for the North Coast Region, section 3.3.16)

17. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable state or federal law. For the purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification. In response to a suspected violation of any condition of this certification, the State Water Board may require the holder of any federal permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the State Water Board deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In response to any violation of the conditions of this certification, the Regional Water Board may add to or modify the conditions of this certification as appropriate to ensure compliance. (CA Water Code sections 13385, 13267)

18. The Regional Water Board may add to or modify the conditions of this certification, as appropriate, to implement any new or revised water quality standards and implementation plans adopted or approved pursuant to the Porter-Cologne Water Quality Control Act or section 303 of the Clean Water Act. (CA Water Code section 13330, and CCR title 23 chapter 28, Article 6 commencing with section 3867)

19. Except as may be modified by any preceding conditions, all certification actions are contingent on:

    i) The discharge being limited to and all proposed mitigation being completed in strict compliance with the Applicant's Project description and environmental documentation, as approved herein (CA Water Code section 13264); and

    ii) Compliance with all applicable water quality requirements and water quality control plans including the requirements of the Water Quality Control Plan for the North Coast Region (Basin Plan), and amendments thereto. (Water Quality Control Plan for the North Coast Region)

20. The authorization of this certification for any dredge and fill activities expires on February 6, 2030. Conditions and monitoring requirements outlined in this certification are not subject to the expiration date outlined above, and remain in full effect and are enforceable to ensure compliance with water quality objectives adopted or approved under Sections 13170 or 13245 of the CA Water Code.

Conditions 1, 2, 6, 11, 12, 13, 14, and 17 have requirements for information and reports. Any requirement for a report made as a condition to this certification is a formal requirement pursuant to California Water Code section 13267, and failure or refusal to provide, or falsification of such required report is subject to civil liability as described in California Water Code, section 13268.

If you have any questions or comments, please contact Margarete "Maggie" Teicher at Margarete.Teicher@waterboards.ca.gov.

_____

Valerie Quinto
Executive Officer

250206_MT_HNPPP401

Original to: Ms. Ellie Covington, USACE, Ellie.L.Covington@usace.army.mil

cc: State Water Resources Control Board, Stateboard401@waterboards.ca.gov
EPA Region 9, R9cwa401@epa.gov
SF U.S. Army Corps of Engineers, cespn-rg-info@usace.army.mil
Ms. Jennifer Siu, USEPA, Jennifer.Siu@epa.gov
Mr. Michael Van Hattem, CDFW, Michael.VanHattem@wildlife.ca.gov
Ms. Melissa Kraemer, CCC, Melissa.Kraemer@coastal.ca.gov
Ms. Savannah Fahning, USACE, Savannah.R.Fahning@usace.army.mil
Mr. Matt Goldsworthy, NMFS, Matt.goldsworthy@noaa.gov

Appendix B. Marine Protection, Research, and Sanctuaries Act, Humboldt Open Ocean Disposal Concurrence and Sediment Suitability Determination, Environmental Protection Agency

REGION 9
SAN FRANCISCO, CA 94105

January 10, 2024

Sent by email only

LTC Timothy Shebesta
District Commander and Engineer
USACE, San Francisco District
450 Golden Gate Avenue
San Francisco, California 94102-3404

Re: USACE Humboldt Harbor and Bay 2025 Maintenance Dredging - Conditional Ocean Disposal Concurrence

Dear Lieutenant Colonel Shebesta:

The EPA received the November 2024 request for suitability and concurrence for ocean disposal at the Humboldt Open Ocean Disposal Site (HOODS) of up to 1.4-mcy of suitable material to be dredged from Humboldt Harbor Federal Channels. This request is for dredging the Bar and Entrance Channel (B&E) and the North Bay Channel in spring of 2025 to variable design depths ranging from -26ft to -48ft (plus a 2 ft over-depth allowance). This determination excludes the Samoa channel and turning basin (Stations 0+00-392+46), the Eureka outer and inner channels (Stations 0+00-89+70), and the Field's Landing channel and turning basin (Stations 8+00-124+35), pending results of testing that is currently underway. This email transmits the EPA's conditional concurrence for ocean disposal at HOODS of material to be dredged from the B&E and North Bay channels. Concurrence is provided pursuant to our authorities and responsibilities under the Marine Protection, Research, and Sanctuaries Act (MPRSA), and to the related Ocean Dumping regulations published at 40 CFR 220-227.

The sediment from the Humboldt Harbor Federal Channels was sampled and tested under Sampling and Analysis Plans (SAP) developed in accordance with the Ocean Testing Manual (OTM) and approved in advance by EPA. Channels with greater than 80% sand are tested every five years for physical confirmation, while those with less than 80% sand are tested every five years for physical and chemical testing with biological testing every ten years. All Humboldt federal channels were comprehensively tested in 2015. In 2020 and October 2024 the B&E and North Bay Channel were tested for physical parameters to confirm greater than 80% sand composition, while both physical and chemical testing is being conducted on the less sandy channels. Sampling and Analysis Results reports (SAR) were reviewed by EPA, the Regional Water Board, and the Coastal Commission. The testing indicated that all composites in the B&E and the North Bay Channel are suitable for unconfined aquatic disposal at the

HOODS ocean disposal site. The EPA provided our previous suitability determinations for ocean disposal on March 20, 2023, and April 10, 2024, for dredging the B&E and the North Bay Channel. The EPA has reviewed the Tier 1 exclusion from further testing for these channels, as described in *USACE Humboldt Harbor and Bay- 2024 Maintenance Dredging, Tier I Evaluation*, February 2024, as well as the October 2024 physical confirmation results (submitted via USACE email on November 20, 2024) for the B&E and the North Bay Channel. EPA confirms that the sediment is still suitable for ocean disposal as based on our review of recent and historical Tier I and III testing data and the lack of recent significant contaminant spills.

The USACE has also requested concurrence of suitability for the placement of up to 300,000 cy of the 1.4 mcy of material from the B&E and North Bay Channel to be placed at the Humboldt Nearshore Placement Study Area (HNPSA). The EPA and USACE have been collaborating on the NEPA process and evaluation of the HNPSA as a pilot CWA 404 demonstration site. Placement of sandy material (i.e., exclusionary material greater than 90% sand and free of contaminants) into the HNPSA would provide beneficial nourishment of sand into the nearshore littoral cell to the north of the Humboldt jetty. Beach erosion north of the jetty has occurred for decades. The EPA regulations require the least adverse environmental impact for ocean disposal and therefore mandate the denial of ocean disposal of suitable sand at HOODS if other alternatives are available (40 CFR § 227.16). Placement at HOODS would be solely a disposal action with no environmental or economic benefits. The HNPSA provides a viable and regionally preferred placement location for a portion of the sand dredged from the B&E and North Bay Channel as a beneficial reuse. EPA commends USACE for piloting the HNPSA in 2025 and looks forward to continued engagement on that project.

The EPA hereby concurs on ocean disposal at HOODS of up to 1.1 mcy of suitable material, and nearshore placement at the HNPSA of up to 300,000 cy of suitable material to be dredged from B&E and the North Bay Channel in spring 2025. Our concurrence is conditional on compliance with all aspects of the attached mandatory ocean disposal site use conditions, fully incorporated into the project's authorization and/or contracts. Please note that the tracking data for the project must be actively posted to the web, and that reporting, both monthly and upon project completion, must be sent to the EPA within the appropriate time periods, as indicated in the conditions.

If there are any questions about the EPA's concurrence or required ocean disposal site use conditions, please contact me at cohen.sahrye@epa.gov, 415-264-4675 or Jennifer Siu at siu.jennifer@epa.gov, 415-972-3983.

Sincerely,

Sahrye Cohen
Manager, Wetlands and Oceans Section

Enclosures

cc: Eli Covington, USACE
Chris Eng, USACE
Jessica Vargas, USACE
Brenda Goeden, BCDC
Jazzy Graham-Davis, San Francisco RWQCB

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

January 10, 2025

EPA Ocean Disposal Special Conditions for USACE Use of the Expanded Humboldt Open Ocean Disposal Site (HOODS)

The following mandatory conditions for disposal operations at the HOODS are provided pursuant to EPA's authority under sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), and the ocean dumping regulations at 40 CFR Parts 220-228. Please note that these conditions and reporting requirements apply both to USACE using its owned and operated dredging equipment (e.g., the hopper dredge *Essayons*) as well as to any company contracted by USACE to perform dredging and ocean disposal with non-USACE owned and operated equipment (e.g., under USACE's West Coast Hopper Contract). These conditions also apply to any and all dredging episodes by or for USACE throughout calendar year 2025.

Also note that these conditions differ somewhat from past years, because as of January 2021 EPA expanded the boundaries of HOODS. As part of that action, **no further disposal is allowed within the original HOODS site**. All disposal operations must now take place in specified cells within the expanded HOODS boundaries, as described below and shown on the attached figure.

Definitions:

1. ***"Permit"*** and ***"permittee"*** as used here mean USACE ocean dumping permits issued to others under Section 103 of the MPRSA, and to USACE itself and its contracts or other authorizations for USACE dredging projects (see MPRSA section 103(e) and 40 CFR Part 220.2).
2. ***"Towing vessel"*** is any self-propelled tug or other marine vessel used to transport (tow or push) the "disposal vessel" (see #3 following) for any portion of the transit to G-DODS.
3. ***"Disposal vessel"*** is any barge, scow, or self-propelled vessel (such as a hopper dredge) that carries dredged material during transit and from which the dredged material is discharged, typically by opening doors in the bottom of the hull or by splitting the hull.
4. ***"Transit"*** or ***"transport"*** to the disposal site begins as soon as dredged material loading into the disposal vessel is completed and a towing vessel begins moving the disposal vessel to the disposal site.
5. ***"Buffer cells"*** are the outermost cells of the overall disposal site, adjacent to the site boundaries. NO DISPOSAL is allowed in the buffer cells unless specified by EPA on a project-by-project basis.
6. ***"Closed cells"*** are specified (smaller) cells in the interior of the overall disposal site; disposal site that EPA has identified as having mounded to a degree that DISPOSAL IS NO LONGER ALLOWED.
7. ***"Allowable Disposal Cells"*** are specified (smaller) cells in the interior of the overall disposal site within which the disposal vessel must discharge all of the dredged material.

EPA Conditions for use of the Humboldt Open Ocean Disposal Site (HOODS) in 2021:

1. All disposal operations at the HOODS shall be conducted in accordance with the most recent update of the Site Management and Monitoring Plan (SMMP) (https://www.epa.gov/sites/production/files/2020-12/documents/epa-r09-ow-2020-0188-hoods_smmp_2021_final-2020-10-19.pdf), as well as these specific conditions. (In the event of any contradictions, these conditions prevail.)
2. Dredged material shall not be leaked or spilled from disposal vessels during transit to the HOODS. Transportation of dredged material to the HOODS shall only be allowed when weather and sea state conditions will not interfere with safe transportation and will not create risk of spillage, leak or other loss of dredged material in transit to the HOODS. No disposal vessel trips shall be initiated when the National Weather Service has issued a gale warning for local waters during the time period necessary to complete dumping operations, or when wave heights are 16 feet or greater.
3. No more than one disposal vessel may be present within the HOODS at any time.
4. **NO DISPOSAL in buffer cells or closed cells:** Disposal may only occur in certain interior cells of the expanded HOODS (refer to attached schematic of the expanded HOODS and Condition 5, below). **Specifically, no disposal** shall occur in buffer cells A1 through A12, L1 through L12, B1 through K1, or B12 through K12. Similarly, **no disposal** shall occur in the original HOODS which is now closed (Quadrant 1 on the attached schematic).
5. **Allowable disposal cells**: Disposal events for this project shall occur **only** over the northeast and northwest slopes of the existing mound where depths currently exceed 130 feet MLLW. Specifically, all disposal events must occur within the 11 cells labeled B6 through G6, and G7 through G11 as shown on the attached schematic. (Coordinates for the corners of these allowable disposal cells are also provided on the schematic.) Dredged material from sequential trips shall not be disposed in the same cell; rather, to the maximum extent practicable consistent with safe vessel operation, disposal events shall progress to all allowable disposal cells before returning to a previously used cell. (Note, this does not mean disposal must happen in order from one cell to the next. Nor does it mean that single disposal events cannot cross a cell's boundary and discharge material in multiple authorized cells.)
6. The disposal vessel must have a disposal tracking system, and the system must be operational before any individual disposal trip to HOODS is initiated. Throughout transit to the disposal site, during disposal, and for at least 10 minutes after disposal is complete, the disposal tracking system must automatically indicate and record the position, speed and draft of the disposal vessel, and the load level within the bin. These data must be generated at a maximum 1-minute interval while en route to the HOODS, and at a maximum 15-second interval while within 1/4 mile of and inside the HOODS boundary. The tracking system must also indicate and record the time and location of the beginning and end of each disposal event (e.g., opening and closing of scow hull or hopper doors).
7. "E-mail alerts" regarding any degree of apparent dumping outside the HOODS boundary, and regarding any apparent substantial leakage/spillage or other loss of material en route to the HOODS must be sent within 24 hours of USACE becoming aware of the apparent issue, to Jennifer Siu (siu.jennifer@epa.gov) at EPA Region IX, the San Francisco District USACE project manager, and Cassidy Teufel at the California Coastal Commission (Cassidy.Teufel@coastal.ca.gov). Substantial leakage/spillage or other loss shall be

defined as an apparent loss of draft of one foot or more between the time that the disposal vessel begins transport to the HOODS and the time of actual disposal.

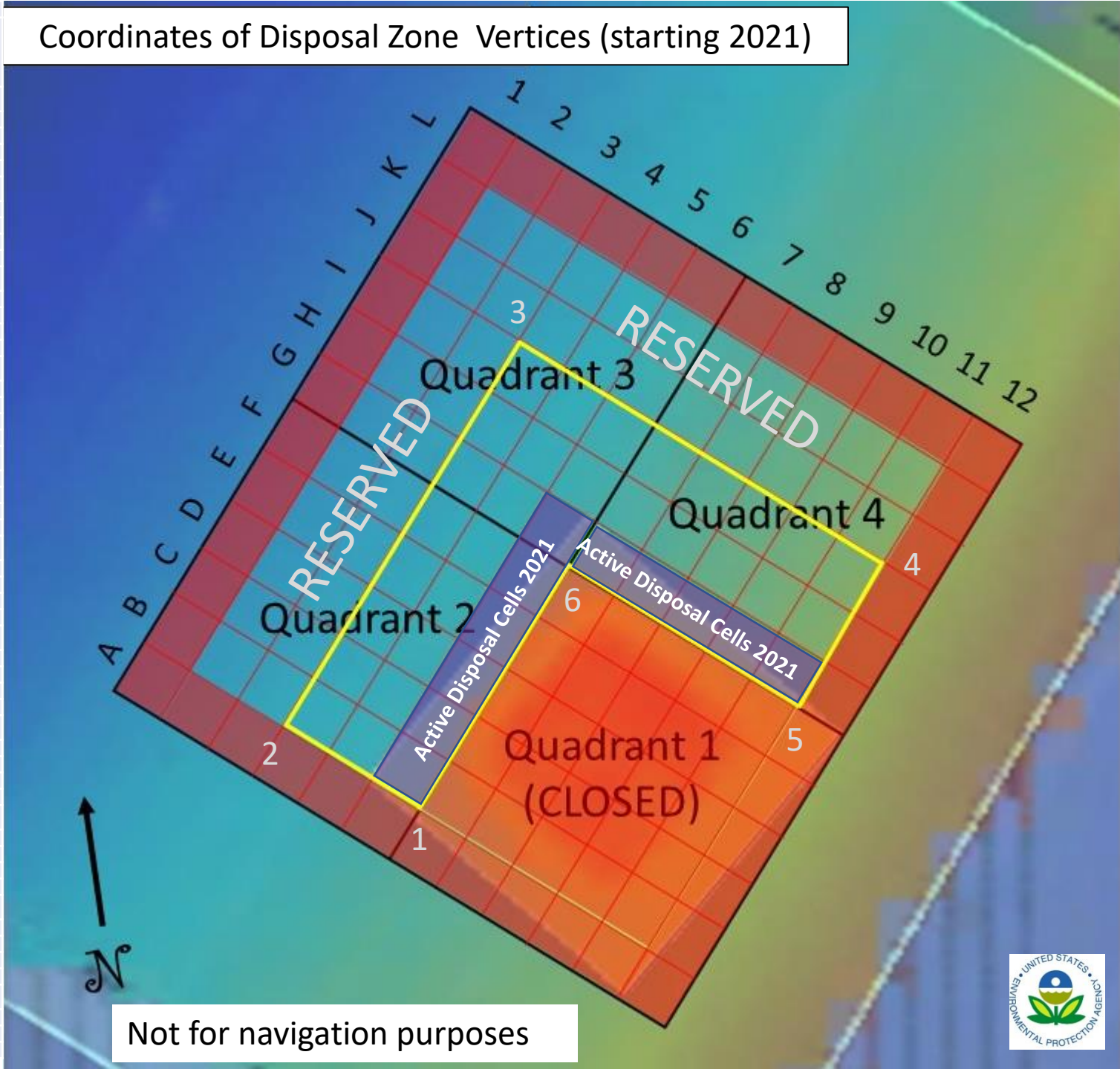
8. In addition to any alerts pursuant to Condition 7 above, data recorded from the disposal tracking system must be provided to EPA Region IX, the San Francisco District USACE, and the California Coastal Commission at a minimum on a weekly basis during disposal operations. For each disposal trip the records must include disposal trip number and date, estimated bin volume of material disposed, and a visual display of the beginning and ending locations of the disposal event relative to the expanded HOODS boundaries and its internal disposal cells. The reports shall include a cover letter describing any problems complying with these Ocean Disposal Special Conditions, the cause(s) of the problems, any steps taken to rectify the problems, and whether the problems occurred on subsequent disposal trips.
9. A post-disposal bathymetric survey of the expanded HOODS, extending at least 500 feet outside the site boundaries in all directions, shall be conducted within 60 days of completion of disposal operations, and provided to EPA Region IX within 30 days of completion.

ALSO SEE ATTACHED FIGURE AND COORDINATE TABLE SHOWING UPDATED ALLOWABLE CELLS POST 2021.

-end-

Coordinates of Disposal Zone Vertices (starting 2021)

2021 Active Disposal Cell	N Latitude	W Longitude
B6	40° 48' 19"	124° 18' 16"
	40° 48' 13"	124° 18' 05"
	40° 48' 27"	124° 18' 10"
	40° 48' 22"	124° 17' 59"
C6	40° 48' 27"	124° 18' 10"
	40° 48' 22"	124° 17' 59"
	40° 48' 36"	124° 18' 03"
	40° 48' 30"	124° 17' 52"
D6	40° 48' 36"	124° 18' 03"
	40° 48' 30"	124° 17' 52"
	40° 48' 44"	124° 17' 57"
	40° 48' 39"	124° 17' 45"
E6	40° 48' 44"	124° 17' 57"
	40° 48' 39"	124° 17' 45"
	40° 48' 53"	124° 17' 50"
	40° 48' 48"	124° 17' 39"
F6	40° 48' 53"	124° 17' 50"
	40° 48' 48"	124° 17' 39"
	40° 49' 02"	124° 17' 43"
	40° 48' 56"	124° 17' 32"
G6	40° 49' 02"	124° 17' 43"
	40° 48' 56"	124° 17' 32"
	40° 49' 10"	124° 17' 37"
	40° 49' 05"	124° 17' 25"
G7	40° 49' 05"	124° 17' 25"
	40° 48' 56"	124° 17' 32"
	40° 48' 59"	124° 17' 14"
	40° 48' 51"	124° 17' 21"
G8	40° 48' 59"	124° 17' 14"
	40° 48' 51"	124° 17' 21"
	40° 48' 55"	124° 17' 03"
	40° 48' 46"	124° 17' 10"
G9	40° 48' 55"	124° 17' 03"
	40° 48' 46"	124° 17' 10"
	40° 48' 50"	124° 16' 52"
	40° 48' 41"	124° 16' 59"
G10	40° 48' 50"	124° 16' 52"
	40° 48' 41"	124° 16' 59"
	40° 48' 44"	124° 16' 40"
	40° 48' 36"	124° 16' 47"
G11	40° 48' 44"	124° 16' 40"
	40° 48' 36"	124° 16' 47"
	40° 48' 39"	124° 16' 29"
	40° 48' 30"	124° 16' 36"



Appendix C. Coastal Zone Management Act, Negative Determination Concurrence, California Coastal Commission

CALIFORNIA COASTAL COMMISSION
ENERGY, OCEAN RESOURCES AND FEDERAL CONSISTENCY
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105
VOICE (415) 904-5260

February 3, 2025

Ellie Covington
Navigation and Operations Section Chief
San Francisco District,
U.S. Army Corps of Engineers
450 Golden Gate Avenue
San Francisco, CA 94102
Via e-mail to: Savannah.R.Fahning@usace.army.mil

Subject: Negative Determination **ND-0044-24** (2025 Maintenance Dredging of Federal Navigation Channels at Humboldt Bay, Humboldt County)

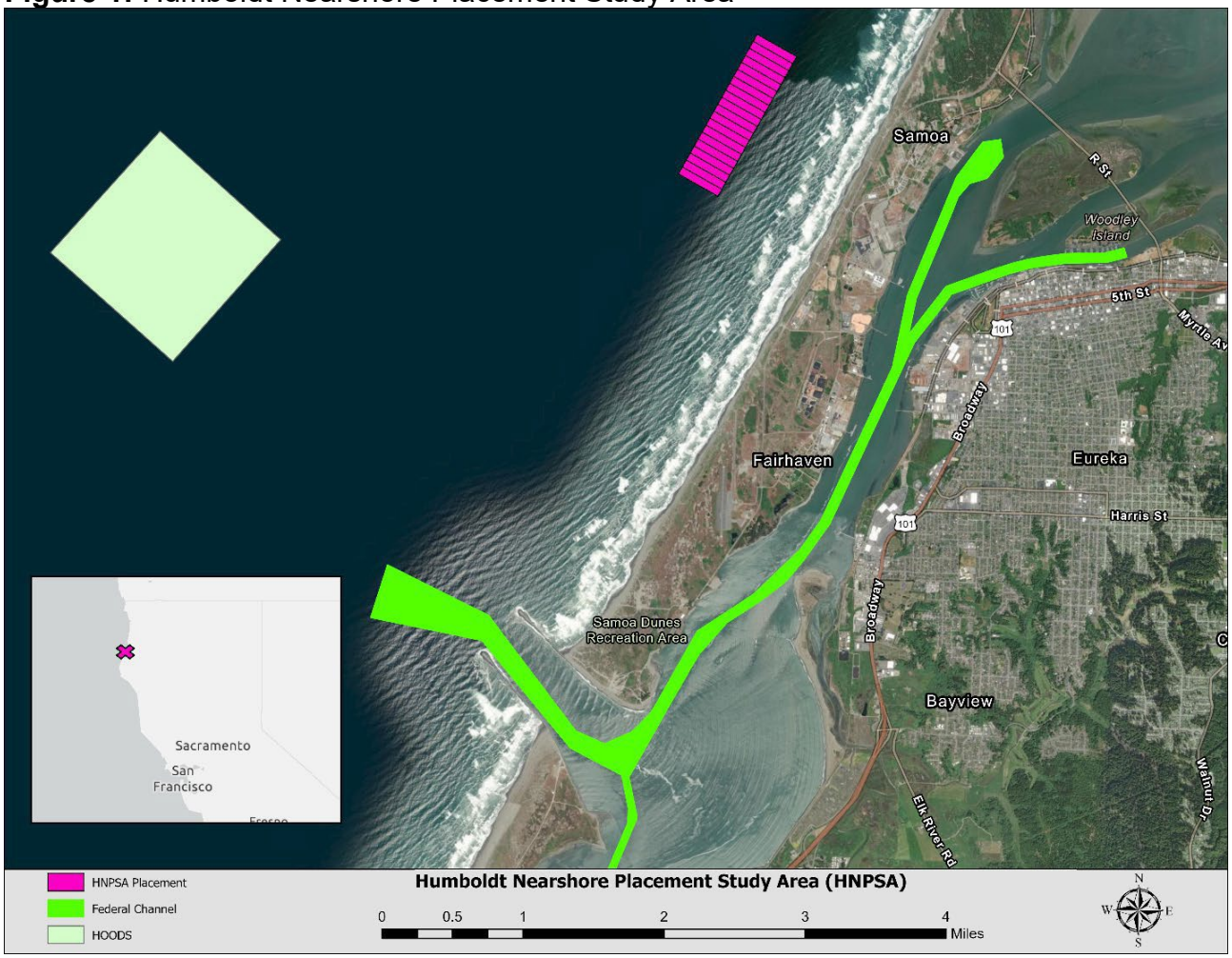
Dear Ellie Covington:

The Coastal Commission staff has reviewed the above-referenced negative determination for the 2025 cycle of maintenance dredging of the federal navigation channels in Humboldt Bay. Under current funding, the U.S. Army Corps of Engineers (USACE) proposes to dredge approximately 1.1 million cubic yards of sediment from the Bar and Entrance channel and up to approximately 300,000 cubic yards from the North Bay Channel (for a total of up to 1.4 million cubic yards), with disposal primarily at the Humboldt Open Ocean Disposal Site (HOODS). However, up to approximately 300,000 cubic yards of predominantly sandy sediment from the Bar and Entrance channel would be placed at the Humboldt Nearshore Placement Study Area (HNPSA) as part of the Humboldt Nearshore Placement Pilot Project (HNPPP), which is described in more detail below. The total volume of up to approximately 1.4million cubic yards is similar to previous dredging cycles. Dredging and disposal is proposed to begin in March 2025, however the HNPPP portion is not planned to begin until May 2025. Annual maintenance dredging is necessary to remove shoals that build up in the Bar and Entrance channels during the winter and spring, and to maintain authorized channel depths and navigational safety for commercial, recreational, and Coast Guard vessels entering and exiting Humboldt Bay. These 2025 dredging activities would use a hopper dredge.

As described above, the 2025 project will, for the first time, include the beneficial reuse of dredged material in the nearshore area off the North Spit through the HNPPP. The hopper dredge will place clean dredged material (primarily sand) to construct a broad, low- relief berm approximately 1,700-feet-long, 6,000-feet-wide, and 1-to-2-feet-thick, in the HNSPA, approximately 4,000-feet offshore of the North Spit (**Figure 1**). The sediment placement will occur in an area of sandy seafloor, avoiding sensitive hard substrate habitats, at depths between 45 feet to 62 feet below MLLW (within the annual depth of closure) to ensure adequate draft for safe vessel operation. The berm placement will occur in loads of approximately 5,200 cubic yards and each load would be deposited in a cell within the

HNSPA with 3 placement passes per cell (each cell is 1,700-feet-long in the cross-shore direction and 300-feet-wide in the along-shore direction). The initial round of placement is planned for late May 2025, with a second round of placement during early July 2025.

Figure 1: Humboldt Nearshore Placement Study Area



The USACE would conduct pre- and post-placement monitoring as described in the "USACE Pilot Placement and Monitoring Plan" for the project, dated December 2024, included in the ND. The monitoring activities that would be conduced in accordance with that plan include both shoreline monitoring and biological monitoring for crab and benthic species via benthic coring and visual surveys. The monitoring plan also outlines a schedule which includes: (1) baseline condition monitoring prior to the initial placement, including collecting bathymetric data of the HNPSA and surf zone (e.g. multi-beam hydrographic survey), topographic information (e.g. beach width and elevations via LiDAR), and aerial imagery of the North Spit, as well as biological monitoring surveys; (2) multi-beam bathymetric surveys immediately post-placement and every month afterwards for up to a year after the initial placement; (3) aerial imagery and LiDAR before and after the winter season; and (4) post-placement biological surveys in July 2025 (after the second round of placement), October 2025 and April 2026. Additionally, if funding allows, USACE would explore developing a coupled hydrodynamic and sediment transport model

to perform a hindcast and simulate post-placement conditions to compare observed data against the model. By the end of October 2025, USACE will prepare a preliminary update based on the monitoring data collected to date, including pre- and post-placement hydrographic surveys. Following the conclusion of monitoring activities in May 2026, USACE will prepare a full report sharing the biological and shoreline monitoring results and recommendations for future pilot sediment placements.

With the notable addition of the HNPPP, the proposed 2025 maintenance dredging and disposal project at Humboldt Bay is similar to annual projects previously concurred with by the Commission or authorized by the Executive Director dating back to 1985, most recently in negative determinations ND-0011-24, ND-0006-23, ND-0011-22, ND-0007-21 and ND-0032-19 for the 2024, 2023, 2022, 2021 and 2020 maintenance dredging projects, respectively. Prior to these negative determinations, the Commission concurred with consistency determination number CD-0005-18 for the 2019 maintenance dredging project. Under the federal consistency regulations [15 CFR Section 930.35(a)], a negative determination can be submitted for an activity "…which is the same or is similar to activities for which consistency determinations have been prepared in the past."

As noted in CD-0005-18, the current sediment testing schedule for Humboldt Bay calls for physical testing of sediments every five years for those channels that have historically contained sediments consisting predominately of sand. The most recent sediment testing was conducted on samples collected from the federal channels and reference sites, HOODS and HNPSA, in October 2024. USACE had prepared a Sediment Analysis Plan (SAP) for the pilot project in May 2024, which was submitted to the U.S. Environmental Protection Agency (EPA) and North Coast Regional Water Quality Control Board (NCRWQCB) for review. Sediment testing results confirmed that the sediments to be dredged in 2025 are physically and chemically suitable for offshore disposal at the HOODS and nearshore placement at the HNPSA. EPA has provided its concurrence with the suitability of these placement activities. Coordination with NCRWQCB is ongoing.

In response to concerns about shoreline erosion and the on-going loss of littoral sediment through disposal at HOODS, USACE, EPA, and the Humboldt Bay Harbor, Recreation, & Conservation District (HBHRCD) developed the pilot project, discussed above, to test the nearshore placement of sandy dredged material at a demonstration site along the North Spit. USACE hosted an interagency meeting in July 2023 to introduce the HNPPP, including representatives from the USACE, EPA, HBHRCD, National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and the Coastal Commission. In November 2023, the USACE hosted a public meeting, attended by local tribal organizations, recreational groups, university faculty, and interested citizens, to further introduce the project and collect feedback. Interagency coordination on the project has continued since then.

As it has for many years, Commission staff continues to encourage USACE to carry out the studies and take all other necessary steps to pursue beneficial reuse for suitable materials dredged from Humboldt Bay's Bar and Entrance Channel. We also note that these priorities are reflected in the Water Resources Development Act (WRDA) of 2020 which asserts that there is a critical need for USACE to "maximize the beneficial use, in an

environmentally acceptable manner, of suitable dredged material obtained from the construction or operation and maintenance of water resources development projects."

In this 2025 project, approximately 21 percent of the material dredged from the Bar and Entrance and North Bay Channels would be used for nearshore placement. The USACE's Supplemental Information Report (dated January 2025) to the Humboldt Harbor & Bay Environmental Assessment states: "Should the HNPPP be considered for routine use following the pilot episode such that ongoing effects from placement of material could be expected, a subsequent NEPA review will be performed to examine effects over a longer time period as part of the formal process to designate the HNPSA as a beneficial use site." The proposed HNPPP is a step in the right direction for exploring the long-term feasibility of beneficial reuse of these dredged materials, and the Commission staff continues to support and emphasize the importance of developing programs to maximize beneficial reuse of suitable material as part of the regular dredging of the federal channels at Humboldt Bay.

CD-0005-18 also included a commitment by USACE to provide an update to the Humboldt Shoreline Monitoring Program (HSMP). The update was to contain information on the significance of shoreline erosion on the North Spit of Humboldt Bay, which could potentially indicate the need for changes to dredged sediment disposal to reduce the removal of material from the Eureka littoral cell (including at HOODS). Results from the update were to include aerial flyover photography and subsequent analysis of shoreline changes. At that time, the last Humboldt Shoreline Monitoring Program update had analyzed shoreline changes using data from 2011 to 2015 and the survey results had shown no excessive shoreline retreat and determined that erosion of the North Spit was not significant, and no immediate corrective action was needed. However, up-to-date survey information is critical for determining what modifications to dredged material disposal operations are needed address shoreline retreat along the North Spit, particularly given more recent beach erosion in this area[1].

The USACE provided an update to the HSMP in December 2024 which extends the record of shoreline changes documented to 2024 and incorporated topographic data from a LiDAR survey conducted in 2019 and ground survey transects in 2024. The analysis in that update found excessive shoreline retreat along the North Spit while results suggest that the South Spit is actively accreting and that the upper beach reference line continues its long-term seaward movement. The update report also noted that, along the North Spit, "it is possible that the shoreline, while long-term net erosional, has reached a new equilibrium with local sediment supply and wave energy", but recommended implementation of measures to counteract erosion, including increasing sediment supply in the nearshore zone.

[1] Commission staff is aware of at least two instances of localized severe beach erosion along North Spit occurring during recent winter storms, resulting in damage to the Fairhaven "T" beach parking area and exposure of the Humboldt Bay Harbor, Recreation & Conservation District (HBHRCD) wastewater outfall line. In the latter case, the Commission issued an emergency coastal development permit (No. G-1-24-0035) to allow placement of rock stabilization to prevent damage to the outfall and potential wastewater spills.

In addition to addressing sediment testing and an update to the Humboldt Shoreline Monitoring Program, CD-0005-18 included a commitment by the USACE to develop and implement, in coordination with the NMFS, CDFW and Commission staff, a Fish Survey and Monitoring Plan (FSMP) to evaluate the potential impact of entrainment of fish species by USACE dredging operations in Humboldt Bay. This FSMP relied on benthic trawl surveys of the areas to be dredged to determine which marine fish and invertebrate species are present and potentially at risk of entrainment during dredging operations. Carried out from 2019 to 2021, the FSMP sampling documented the presence of common marine fish species within the dredge area such as anchovy, sand lance, surf perch and sole as well as two species listed as threatened under the federal Endangered Species Act (ESA) and California ESA, green sturgeon and longfin smelt.

To help ensure that potential entrainment risk to these listed species during dredge operations is minimized and offset, USACE will continue to implement all conservation measures and recommendations for listed species, their critical habitat, and essential fish habitat (EFH) identified by NMFS in its Biological Opinion and Essential Fish Habitat consultation. Further, USACE has committed to working with NMFS, the Wiyot Tribe, and coordinating agencies, (including the Commission) to identify and fund tidal restoration actions (up to $10,000) that would help mitigate for adverse impacts to fish species from maintenance dredging operations.

USACE met with NMFS and the Wiyot Tribe in February 2024 to further discuss tidal restoration and related projects. Priorities identified by the Tribe include (i) funding to acquire a water quality monitoring sonde, (ii) support for a new continuous monitoring site within the Bay, (iii) soil and water sampling of suspected contaminated sites vulnerable to sea level rise or sediment mobilization during the proposed heavy-life terminal development on Samoa peninsula. USACE will continue to work with the Tribe to realize its commitment to support tidal restoration actions.

With this commitment and implementation of the conservation measures and recommendations identified by NMFS in its Biological Opinion and Essential Fish Habitat consultation, which the USACE has incorporated into Negative Determination No. ND-0044-24, the Commission staff agrees that the proposed 2025 maintenance dredging project will not adversely affect coastal resources. Consultation with the US Fish and Wildlife Service (for the federally-threatened marbled murrelet)[2] and with the NCRWQCB on the HNPPP portion of the project, are on-going, and USACE will notify Commission staff of any significant project changes that arise out of this process.

However, as noted in the Commission and Executive Director's previous concurrences with USACE's consistency and negative determinations (including CD-0005-18, CD-0001-20, ND-0032-19, ND-0007-21, ND-0011-22, ND-0006-23, and ND-0011-24) concurrence with this negative determination is not in any way meant to convey the message that the Commission's concerns have diminished regarding excessive erosion at the North Spit and the need for viable long-term beneficial reuse alternatives following the proposed pilot

[2] USACE has a programmatic informal consultation with the US Fish and Wildlife Service (USFWS) that covers the maintenance dredging and placement at HOODS, but USACE has reinitiated consultation with USFWS for the HNPPP portion of the project, which is ongoing.

project. Commission staff appreciates USACE's on-going work to implement the Humboldt Nearshore Placement Pilot Project, as part of the 2025 maintenance dredging. We look forward to USACE staff providing preliminary results of the proposed physical and biological monitoring and an update to the status of development of sediment transport modeling to support future nearshore placement plans, as well as updates to the Humboldt Shoreline Monitoring Program, in the next negative determination request submitted by the USACE for Humboldt Bay dredging. Commission staff also looks forward to working with USACE staff to begin making progress on developing and implementing tidal restoration projects prior to the next negative determination request.

With that understanding, we **concur** with your negative determination made pursuant to 15 CFR Section 930.35 of the NOAA implementing regulations. Please contact Walt Deppe at Walt.Deppe@coastal.ca.gov should you have any questions regarding this matter.

Sincerely,

(for)
KATE HUCKELBRIDGE
Executive Director

cc: CCC – North Coast District

Appendix D. Endangered Species Act, Informal Consultation, U.S. Fish and Wildlife Service

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California 95521
Phone: 707-822-7201 Fax: 707-822-8411

In Reply Refer to:
AFWO-2025-0040675

Sent electronically

Ellie Covington
Chief of Environmental Navigation and Operations
U.S. Army Corps of Engineers
San Francisco District
Ellie.L.Covington@usace.army.mil

Dear Ellie Covington:

Thank you for your Biological Assessment (Assessment) and letter dated January 13, 2025. In your letter, you requested informal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Humboldt Harbor and Bay Maintenance Dredging Project and Nearshore Placement Pilot Project (proposed project) in Humboldt County, California. At issue are the proposed project's effects on the federally threatened marbled murrelet (*Brachyramphus marmoratus*). This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

The federal action on which we are consulting is the maintenance dredging of the Humboldt Harbor and Bay federal navigation channels and transport of dredged material via dredge boat to Humboldt Open Ocean Disposal Site (HOODS) and the Humboldt Nearshore Placement Study Area (HNPSA). Placement of material at HOODS has been on-going for decades, and placement of material at HNPSA (located 0.75 miles offshore from the North Spit of Humboldt Bay) is part of a new pilot project proposed to increase the beneficial use of dredged material and alleviate pressure on HOODS. The purpose of the proposed action is to continue to maintain the Congressionally-authorized depths of the Federal navigation channels within Humboldt Harbor and Bay through annual maintenance dredging. Dredging will provide safe navigation for ocean-going vessels, including providing a harbor of refuge for the U.S. Coast Guard. The pilot project will allow dredging materials placed at HNPSA to potentially replenish the bar system in the nearshore area by the Humboldt North Jetty, which has the greatest rate of shoreline retreat along the spit. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is not likely to adversely affect the marbled murrelet.

We concur with your determination on the marbled murrelet based on the rationale and conservation measures provided in your Assessment and supporting materials that will be implemented to avoid and minimize potential adverse effects. Those rationales and conservation measures are summarized below:

1) Because the project area is confined primarily to the Humboldt Bay Harbor, and the barge route and disposal sites (HOODS and HNPSA), it will have no effect on nesting marbled murrelets, eggs, or juveniles in nests, which occur in large old-growth trees.

2) Given the level of boat activity at the Humboldt Bay Harbor entrance and channels, the marbled murrelet is not expected to regularly utilize the Harbor itself. Along the barge route and at disposal sites (HOODS and HNPSA) there could be intermittent disturbance, but any birds present in the area would likely move a small distance away to forage. Additionally, the action area represents a very small portion of the total nearshore habitat area available for marbled murrelet foraging, and therefore impacts to potential foraging are considered insignificant and discountable.

3) Sedimentation from dredge activities at the bar and in the entrance channel of Humboldt Bay could obscure and reduce visibility within the water column where murrelets may forage. Humboldt Bay waters, which are naturally quite turbid, are in continuous motion and will disperse suspended sediments restoring ambient water quality conditions shortly after the disturbance event. Because the Corps assumes sediments are expected to settle rapidly and locally, adverse impacts from a reduction in water quality to murrelets are not anticipated.

4) Sediment deposited at the HNPSA will be clean dredge materials (>80% sand), thus the likelihood of any contaminants being contained in the dredge materials and subsequently shifting into the nearshore environment, where they could impact food sources for the murrelet, is considered insignificant and discountable.

This concludes our informal consultation on the actions described in your Assessment received on January 13, 2025. It will be necessary to contact our office if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this consultation; (3) a new species is listed or critical habitat designated that may be affected by the action; or (4) the Project proponent is unable to implement all of the conservation measures as proposed in the Assessment.

In future communications or if you have any questions regarding this letter, please contact Bradley Nissen at bradley_nissen@fws.gov.

Sincerely,

Vicky Ryan
Acting Field Supervisor

Appendix E. Endangered Species Act, Biological Opinion, National Marine Fisheries Service

From:	Matt Goldsworthy - NOAA Federal
To:	Fahning, Savannah R CIV USARMY CESPK (USA)
Cc:	Jeffrey Jahn - NOAA Federal; Covington, Ellie L CIV USARMY CESPN (USA); Eng, Christopher K CIV USARMY CESPN (USA)
Subject:	[Non-DoD Source] Re: Permitting Structure: Humboldt Nearshore Placement Pilot
Date:	Friday, November 22, 2024 9:47:59 AM

Good Morning Savannah: we reviewed the existing Biological Opinion (NMFS #: WCRO-2022-00817), which covers the Corps' Humboldt Harbor and Bay Ops and Maintenance Dredging from 2021 through 2025. The Corps proposed action indicated an intent to place suitable sandy dredged material at a nearshore sand placement site (NSPS), and NMFS evaluated the effects of placement of dredged materials at a NSPS in the BiOP. It sounds like the terminology may have changed from NSPS to HNPPP, but the activity of placing suitable material in a nearshore location has already been contemplated by NMFS in the Biological Opinion. The use of the HNPPP during 2025 would not cause new or different effects than those we have already evaluated, and therefore, NMFS does not find it appropriate to reinitiate formal consultation. Amendments or separate consultations do not appear to be necessary. I will note this Biological Opinion expires at the end of 2025.

Thank you,
Matt

On Thu, Nov 21, 2024 at 3:34 PM Fahning, Savannah R CIV USARMY CESPK (USA) <Savannah.R.Fahning@usace.army.mil> wrote:

> Hi folks,
>
> I hope this email finds you well & you're staying warm throughout this incredible winter storm! As you may recall, the USACE is planning to include a pilot nearshore placement with the maintenance dredging in Humboldt Harbor & Bay in 2025. In our resource agency kickoff meeting summer 2023, we began strategizing how to organize environmental compliance for the pilot; I wanted to loop back on that here.
>
> Do you have a preference to permit the Humboldt Nearshore Placement Pilot Project (HNPPP) through
>
> a. An amendment to the existing operations & maintenance dredging permit *(Biological Opinion, can be provided upon request)* or,
> b. A separate consultation?
>
> Would love your thoughts on the permitting structure, let me know if you'd like to schedule a meeting to discuss more. I can meet anytime 11/25 and 11/26.
>
> Thank you,

Savannah Fahning

Environmental Manager

U.S. Army Corps of Engineers, San Francisco District

601 Startare Dr #100, Eureka, CA 95501

Office: (415) 503-2900

savannah.r.fahning@usace.army.mil

Pronouns: she, her, hers

--

Matt Goldsworthy
Fisheries Biologist
National Marine Fisheries Service
(707) 357-1338 (cell ony)