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(Pacific Gas and Electric Company)

March 14, 2024

APPENDICES

Appendix A - Final Environmental Assessment and Statement of Findings for the Diablo Canyon Power Plant Intake Cover Dredging Project, Prepared by the U.S. Army Corps of Engineers. File No. SPL-2023-00468. December 12, 2023.

Appendix B - Diablo Canyon Power Plant Intake Cove Dredging Project, Final Biological Assessment, Prepared by SWCA Environmental Consultants. Project No. 82823. February 7, 2024.

Appendix C - Diablo Canyon Power Plant Intake Cove Dredging Project, Final Essential Fish Habitat Assessment, Prepared by Stantec Consulting Services Inc. Contract No. 3501324439. February 7, 2024.

Appendix D - Sampling and Analysis Plan Results Report: Morro Bay Harbor 2023 Environmental and Geotechnical Investigation. Prepared by Diaz Yourman and Associates Geotechnical Services, GeoPentech, and Kinnetic Laboratories Joint Venture. USACE Contract No. W912PL20D0003. January 2023

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT
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CESPL – RGN (File Number SPL-2023-00468) 12 December 2023

MEMORANDUM FOR RECORD

SUBJECT: **Department of the Army Environmental Assessment and Statement of Findings for the Above-Referenced Standard Individual Permit Application**

1.0 Purpose

This document constitutes the Environmental Assessment, Section 404(b)(1) Guidelines Evaluation, Public Interest Review, and Statement of Findings for the subject application.

2.0 Conclusion

The permit action will not have a significant impact on the quality of the human environment. The proposed discharge complies with the 404(b)(1) Guidelines and the activity is not contrary to the public interest, provided the permittee complies with the special conditions identified in Section 12.2

3.0 Introduction and Overview

Information about the proposal subject to one or more of the United States Army Corps of Engineers' (Corps') regulatory authorities is provided in Section 3, detailed evaluation of the activity is found in Sections 4 through 12 and findings are documented in Section 13 of this memorandum. Further, summary information about the activity including administrative history of actions taken during project evaluation is attached (ORM2 Summary) and incorporated in this memorandum.

3.1 Applicant name

Pacific Gas and Electric Company, Attn: Mr. Thomas Jones

3.2 Activity location

Pacific Gas and Electric Company (PG&E) proposes to dredge accumulated sand and sediment from the intake cove of the Diablo Canyon Power Plant (DCPP) located nine miles northwest of the city of Avila Beach, San Luis Obispo, California 93424 (35.2074° N, 120.8564° W). DCPP is situated on a coastal terrace in central California, midway between the coastal communities of Los Osos and Avila Beach. The DCPP Site is within a 750-acre Nuclear Regulatory Commission (NRC) licensed boundary located nine miles northwest of Avila Beach. The DCPP Site is surrounded by the owner-controlled area which consists of lands between the Port San Luis gate and Security

Gate A, bounded by the eastern hills directly adjacent to the site access road and the northern evacuation route, and bounded to the west by the Pacific Ocean. The DCPP draws water from Pacific Ocean via the intake structure located within the intake cove.

The intake cove is approximately 10 acres in size and is formed by two breakwaters that protect the intake structure for the DCPP. The proposed project consists of a singular dredging event within the intake cove of the DCPP, as well as placement of the dredge material at the U.S. Army Corps of Engineers (Corps) Nearshore Placement Area located south of the entrance to Morro Bay and west of Morro Bay State Park (35.3425°N, 120.8691°W). The placement area is approximately 11 miles north (measured along the shoreline) from the DCPP intake cove.

3.3 Description of activity requiring permit

Dredging of up to 70,000 cubic yards of accumulated material at the intake structure located at the north end of the intake cove at the DCPP, and placement of the dredge material at the U.S. Army Corps of Engineers (Corps) Nearshore Placement Area located south of the entrance to Morro Bay and west of Morro Bay State Park.

3.3.1 proposed avoidance and minimization measures

The following avoidance and minimization measures are proposed by the applicant:

An environmental awareness training program shall be presented to all dredging project personnel by a qualified biologist prior to start of any proposed activities.

To ensure anchors avoid hard-bottom habitat and associated kelp beds or algae covered rocks, marine vessel anchors will be lowered in a controlled manner and will be recovered vertically through the water column. An Anchoring Plan will be developed by the dredging contractor and will be submitted to involved regulatory agencies prior to commencement of dredging.

The project's Turbidity Management Plan will be implemented to minimize the effects of turbidity on sensitive resources. Thresholds for turbidity exceedance in accordance with the California Ocean Plan and the Central Coast Regional Water Quality Control Board's Central Coast Basin Plan (Basin Plan) will be followed and Construction Environmental Monitors will be employed who have the authority to impose "Stop Work" orders on contractors should thresholds be reached.

Standard dredge specifications include an Oil Spill Prevention and Response Plan, employee training, and the staging of materials on site to prevent accidental spills to the extent feasible and provide for quick response in the event of a spill, in accordance with regulatory requirements.

Noise levels of the dredge operation shall not exceed the limits established by the San Luis Obispo County Noise Element of the General Plan.

Standard conditions of San Luis Obispo County Air Pollution Control District regulations shall be met to reduce criteria pollutant emissions during the project.

Best Management Practices will be implemented to ensure that dust is controlled.

The project's Biological Resources Monitoring Plan will be implemented for the completion of pre- and post-project biological surveys (eelgrass, *Caulerpa*, and black abalone), and measures followed during project activities to avoid or minimize adverse effects to biological resources. Operational controls to reduce impacts on marine species include pre-construction diver surveys, clearing the dredging footprint of crabs and other slower invertebrates (non-special-status species) through relocation, and surveying for fish present within or near the dredging footprint, with the goal of ensuring that the dredging footprint is devoid of animals when dredging commences. The following general marine operations and listed marine wildlife protection measures will be implemented:

- Dredging equipment shall be inspected by the operator daily to ensure that equipment is in good working order and no fuel or lubricant leaks are present.
- Vessels shall reduce speeds to be no greater than 5 knots if listed marine wildlife species are visually observed in the vessel's vicinity.
- Vessels will avoid listed marine mammal species by avoiding work areas if listed marine wildlife species are present within the work area. Vessels will not be used to encourage listed marine wildlife species to move.
- If a suction dredge is utilized, impingement of marine life will be avoided to the extent practicable by using the smallest suction head possible for the work and limiting the rotation speed to as slow as is feasible for the conditions at the time of dredging. A suction pipe/hose has to be primed by filling it with water before dredging commences. Once primed, the suction head can be placed directly in the sand before turning it on to minimize impingement. During suction hose priming, other controls include utilizing screens with large surface areas and very fine openings to reduce priming velocities and impingement impacts. Priming impacts would be minimized by filling the hose (with screens installed) distant from areas supporting concentrations of fish.

Operators of dredge equipment shall not harass any marine mammal or waterfowl in the proposed project area and shall follow measures included in the project's Marine Wildlife Contingency Plan. Pursuant to this Plan, Marine Wildlife Observers (MWOs) shall be present during project operations to establish specified exclusion zones for eliminating risk of impacts to marine wildlife. MWOs shall complete pre-construction surveys and monitoring daily during dredging operations to ensure marine wildlife are being avoided and allowed to leave the work area on their own volition.

Installation/placement (mobilization) and removal (demobilization) of dredged material equipment shall be coordinated with involved regulatory agencies. The dredging contractor would, to the extent possible, limit large scale truck trips of equipment to off peak commute periods and avoid sensitive receptor areas, schools, hospitals, convalescent homes, and residential areas.

The contractor shall notify the Commander, 11th U.S. Coast Guard District, at least 2 weeks before the start of activity through a Notice to Mariners.

If previously unknown cultural resources are identified during dredging operations, all activity would cease in the area of the find. If, during construction activities, items are observed that may have historic or archaeological value (e.g., anchors, shipwrecks, Native American human remains or associated objects are discovered), such observations shall be reported immediately to the Contracting Officer so that the appropriate authorities may be notified. The Contractor shall cease all activities in the area of the find until the requirements of 36 CFR 800.11, Properties Discovered During Implementation of an Undertaking are met. The Contractor shall prevent employees from trespassing on, removing, or otherwise disturbing such resources.

3.3.2 proposed compensatory mitigation

The proposed project would not result in the permanent loss of waters of the United States, therefore compensatory mitigation is not required.

3.4 Existing conditions and any applicable project history

The shoreline perimeter of the intake cove consists of a combination of granite boulder riprap, concrete tribars that form the breakwaters, natural bedrock, and the concrete sea wall of the intake structure. The seabed of the intake cove consists of sand and soft sediments, boulder fields, low rock ridges, and emergent rocks during low tides. The seabed between the entrance to the intake cove and the intake structure largely consists of sand and is influenced by onshore currents generated by operation of the DCPP cooling water intake. The depth of the center portions of the intake cove varies from -16-feet mean lower low water (MLLW) in the back (eastern) part of the cove to -33-feet MLLW in front of the intake structure.

The dredged material placement site is adjacent to the 4.5-mile-long (approximately 1,020-acre) sandspit within Montaña de Oro State Park. The majority of the sandspit is managed by California State Parks and the northern tip is managed by the City of Morro Bay. The placement of the dredged material would occur within the ocean adjacent to the sandspit. The sandspit has an elevation range from sea level to 100 feet, with topography consisting of rolling sand dunes with some steep sandy and vegetated slopes. The characteristic shoreline habitat type of the nearshore placement site is sandy beach.

The onshore placement site proposed for Off-site Alternative 1 is situated on a coastal terrace approximately 1.3 miles northwest of the DCPP power block. The area is located between the ocean and Pecho Valley Road and has a slight grade of approximately 4 percent. The vegetation in this area consists primarily of non-native grassland, with some native needle grasses and annual herbaceous species.

Construction of DCPP facilities began in the late1960's. Maintenance dredging of the intake cove has not been previously conducted, and there are no connections to other projects or regulatory actions at the intake cove or alternative onshore placement site. The nearshore placement site (proposed for all on-site alternatives) is the same placement site utilized for the Morro Bay Harbor Maintenance Dredging project Six Year Program.

3.4.1 Jurisdictional Determination

Is this project supported by a Jurisdictional Determination? No Jurisdictional Determination has been issued. The project would occur within the Pacific Ocean, a navigable Water of the United States.

3.5 Permit authority Select the appropriate option to identify whether the proposed activity is regulated under the Corps' regulatory authorities; more than one option may be selected. Use "Section 10 of the Rivers and Harbors Act (33 USC 403) for projects covered under "Section 10 of the Rivers and Harbors Act (33 USC 403), including as extended by the Outer Continental Shelf Lands Act (43 USC 1333(e))".

Table 1 – Permit Authority	
Section 10 of the Rivers and Harbors Act (33 USC 403)	X
Section 404 of the Clean Water Act (33 USC 1344)	X
Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 USC 1413)	

4.0 Scope of review for National Environmental Policy Act (i.e., scope of analysis), Section 7 of the Endangered Species Act (i.e., action area), and Section 106 of the National Historic Preservation Act (i.e., permit area)

4.1 Determination of scope of analysis for National Environmental Policy Act (NEPA)

The scope of analysis always includes the specific activity requiring a Department of the Army permit that is located within the Corps' geographic jurisdiction. In addition, we have applied the four factors test found in 33 CFR Part 325, Appendix B to determine if there are portions of the larger project beyond the limits of the Corps geographic jurisdiction where the federal involvement is sufficient to turn these portions of an essentially private action into a federal action.

Based on our application of the guidance in Appendix B, we have determined that the scope of analysis for this review includes only the Corps' geographic jurisdiction.

Final description of scope of analysis: The Corps' scope of analysis includes the approximately 2.87-acre dredge footprint plus a 100-foot buffer, and the approximately 113-acre placement site footprint plus a 100-foot buffer.

4.2 Determination of the Corps action area for Section 7 of the Endangered Species Act (ESA)

The Corps' action area for Section 7 of the ESA includes the approximately 2.87-acre dredge footprint and the approximately 113-acre placement site footprint, plus a 100-foot buffer around each of these areas where indirect noise, turbidity and other indirect impacts could occur during project construction.

4.3 Determination of Corps permit area for Section 106 of the National Historic Preservation Act (NHPA)

The permit area includes only those areas comprising waters of the United States that will be directly affected by the proposed work or structures. Activities outside of waters of the United States are not included because all three tests identified in 33 CFR 325, Appendix C(g)(1) have not been met.

Final description of the permit area: The permit area includes the approximately 2.87-acre dredge footprint and the approximately 113-acre placement site.

5.0 Purpose and Need

5.1 project purpose and need

project purpose and need for the project as provided by the applicant and reviewed by the Corps: The purpose of the project is to remove accumulated sand and sediment from the intake cove at the entrance of the intake structure of DCPP to maintain safe and reliable plant operations.

5.2 Basic project purpose

Basic project purpose, as determined by the Corps: The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the Corps to determine whether the applicant's project is water dependent (i.e., requires access or proximity to or siting within the special aquatic site to fulfill its basic purpose). Establishment of the basic project purpose is necessary only when the proposed activity would discharge dredged or fill material into a special aquatic site (e.g., wetlands, pool and riffle complex, mudflats, coral reefs). Because no fills are proposed within special aquatic sites, identification of the basic project purpose is not necessary. The basic project purpose for the proposed project is to dredge accumulated material at the DCCP intake structure.

5.3 Water dependency determination

The activity requires dredging around the offshore intake structure and is therefore water dependent.

5.4 Overall project purpose

Overall project purpose, as determined by the Corps: The overall project purpose serves as the basis for the Corps' 404(b)(1) alternatives analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals for the project, and which allows a reasonable range of alternatives to be analyzed. The overall project purpose for the proposed project is to dredge accumulated material at the DCCP intake structure to allow proper functioning of the intake structure.

6.0 Coordination

6.1 Public Notice Results

The results of coordinating the proposal on public notice are identified below, including a summary of issues raised, any applicant response and the Corps' evaluation of concerns.

Were comments received in response to the public notice? No.

Were comments forwarded to the applicant for response? N/A.

Was a public meeting and/or hearing requested, and if so, was one conducted?

No public hearing or meeting was requested.

Additional discussion of submitted comments, applicant response and/or Corps' evaluation: N/A.

6.2 Additional issues raised by the Corps

N/A.

6.3 Comments regarding activities and/or effects outside of the Corps' scope of review

N/A.

7.0 Alternatives Analysis

(33 CFR Part 325 Appendix B, 40 CFR 230.5(c), 40 CFR 1501, and RGL 88-13). An evaluation of alternatives is required under NEPA for all jurisdictional activities. NEPA requires discussion of a reasonable range of alternatives, including the no action alternative, and the effects of those alternatives. An evaluation of alternatives is required under the Section 404(b)(1) Guidelines for projects that include the discharge

of dredged or fill material to waters of the United States. Under the Section 404(b)(1) Guidelines, practicability of alternatives is taken into consideration and no alternative may be permitted if there is a less environmentally damaging practicable alternative.

7.1 Site selection/screening criteria

In order to be practicable, an alternative must be available, achieve the overall project purpose (as defined by the Corps), and be feasible when considering cost, logistics and existing technology.

Criteria for evaluating alternatives as evaluated and determined by the Corps:

Alternatives are compared and evaluated based on: (1) their ability to achieve the overall project purpose; (2) criteria related to safety (i.e., considering potential impacts on DCPP intake structure equipment and plant operational safety and reliability); (3) technology (i.e., whether existing technology is available to address site constraints); (4) logistics (i.e., whether there would be access/timing issues, or issues related to staffing/equipment resources); (5) and environmental constraints (i.e., impacts on sensitive or listed plant and animal resources, including California red-legged frog, eelgrass, black abalone, and marine mammals, along with documented archaeological sites, known to occur at the DCPP site).

Alternatives to dredging, such as modifications to the intake structure or relocation of the intake structure, are not feasible due to technical, economic, and environmental constraints. Such alternatives would involve overcoming significant engineering hurdles, non-proportional cost implications, and adverse impacts to the surrounding terrestrial and marine environments. These alternatives could not be accomplished in time to address the current needs of existing DCCP infrastructure surrounding the intake cove. The required footprint of dredging is comparatively small and will have limited impacts to coastal and marine resources compared to any project that would modify or relocate the intake structure. As such, alternatives to dredging were deemed not practicable and were not evaluated further.

7.2 Description of alternatives This section should include reasonable alternatives that are being considered, including the no action alternative; any off-site alternatives including those that might have less adverse impacts to waters of the United States; any on-site alternatives in addition to the preferred alternative such as modified alignments, site layouts or design options that reduce impacts to waters of the United States; and any alternatives that may have greater impacts to waters of the United States but avoid other significant adverse environmental consequences. If impacts to waters of the United States in association with the preferred alternative have been reduced since the pre-application meeting or since the public notice, include those previously considered alternatives as well.

7.2.1 No action alternative

The No Action Alternative assumes that no Corps permit would be issued for the intake cove dredging and no project-related placement of dredged material at the nearshore dredge material placement area would occur. As a result, there would be continued accumulation of sand at the DCPP intake structure. A risk to facility operations and scuba divers working to maintain the intake structure can be expected if sediment clearance in front of the intake structure is not maintained. DCPP operations would be jeopardized. Based on recent California Energy Commission findings, this scenario would pose risks to the State's electricity reliability due to anticipated energy supply shortfalls during extreme weather events driven by climate change (Erne and Koostra 2023).

7.2.2 Off-site alternatives

Off-site alternative 1: One off-site alternative involving onshore dredged material placement was considered and is described below. This alternative is considered off-site because the dredged material placement site differs from all the on-site alternatives evaluated.

The Onshore Dredge Material Placement Alternative consists of a singular dredging event within the intake cove of the DCPP, consistent with the proposed project (On-site Alternative 1); however, placement of suitable dredge material would occur onshore within an approximately 20-acre area on the DCPP property.

The maximum total amount of sediment that is expected to be dredged is approximately 70,000 cubic yards (CY). For this alternative, dredging would take place approximately one day per week for 14 weeks (due to time required to allow the dredge material to decant prior to hauling); and the project would take approximately four to six months to complete.

The following is a list of the anticipated equipment for Off-site Alternative 1:

- barge equipped with a hydraulic suction dredge and/or clamshell bucket attachments
- scow barge and tug (to transport material)
- support vessel(s) for crew
- 300 series excavator(s)
- skip loader
- front-end rubber tired loader
- electrical pumps for de-watering
- dump trucks for hauling material

This alternative would require the material to be brought onshore at the intake cove and de-canted within a temporary de-watering area, then transported to the designated onshore dredged material placement area for placement. Under this alternative, a decanting area would be constructed within the intake cove parking area, which would allow for several thousand CY of sediment to be allowed to drain and de-water until it has sufficiently dried to allow for loading onto dump trucks for transfer to the onshore placement area. Water draining from the decanting area would be filtered prior to return to the intake cove. The decanted dredge material would be loaded onto 10-wheel dump trucks and transported to the onshore dredged material placement area, located approximately 3 miles northwest of the intake cove (and approximately 1.3 miles northwest of the DCPP developed site limits).

At the onshore placement site, the material would be off-loaded and spread out at a depth of 2 feet over an approximately 20-acre area. The placed material would be compacted, stabilized utilizing sediment and erosion control devices (e.g., silt fencing, straw wattles), amended, and seeded to promote vegetative growth.

7.2.3 On-site alternatives

On-site alternative 1 (applicant’s preferred alternative):

On-site Alternative 1 consists of a singular dredging event within the intake cove of the DCPP, as well as placement of suitable dredge material within an existing nearshore dredged material placement site offshore of Montaña de Oro State Park, near Morro Bay, California.

The maximum total amount of sediment that is expected to be dredged is 70,000 CY. It is anticipated that total mobilization, dredging, and demobilization would take approximately one to three months to complete. The precise schedule is contingent upon a variety of factors, including weather, wave action, wildlife stoppages, and equipment availability.

A maximum of 70,000 CY of sand and sediment would be dredged in the intake cove of the DCPP, covering an area of approximately 125,000 square feet at the north end of the intake cove. The removal is anticipated to result in approximately 60,175 CY of sand and sediment to a depth of 36 feet MLLW, with up to 2 feet of over-dredge to a maximum depth of -38 feet MLLW, resulting in an additional 9,089 CY. The following is a list of the anticipated equipment for the On-site Alternative 1:

- barge with a hydraulic suction dredge and/or clamshell bucket dredging equipment
- scow barge(s) and tug(s) to transport material
- support vessel(s) for crew

On-site Alternative 1 would include placement of the dredge material at an existing nearshore dredged material placement site (placement site) located south of the entrance to Morro Bay and west of Montaña de Oro State Park. The geographic location of the approximate center of the placement site is 35°20’33.1” N and -120°52’8.7” W (NAD 83). The placement site is the location utilized by the Corps for the Morro Bay Six

Year Federal Maintenance Dredging Program in San Luis Obispo County, California. The placement site is directly south of the Morro Bay harbor entrance and just offshore in approximately -20 to -40 feet MLLW depth. The placement site footprint is approximately 1,115 feet in width perpendicular to the beach, and 4,430 feet in length, running parallel to the beach.

The primary staging area would be located at the Morro Bay Harbor, within the City of Morro Bay, with secondary staging areas within the parking area near the intake structure and Port San Luis as an alternate location.

The small dock within the intake cove is available for the dredging contractor as a light-duty marine access area for transfer of personnel, if needed. The dredge barge(s) and scow(s) are anticipated to be secured overnight within the intake cove.

The dredging crew would park vehicles at the intake cove parking area and transfer to the dredging barge via a tender.

On-site alternative 2: Reduced Dredging Footprint.

On-site Alternative 2 would involve the same approach defined under On-site Alternative 1. However, On-site Alternative 2 would only remove accumulated sediment from the area nearest to the intake structure, or approximately 20,000 CY of material.

7.3 Alternatives evaluation under the Section 404(b)(1) Guidelines and NEPA

A summary of the alternatives evaluation is provided in the table below:

Alternative	Does the Alternative Meet the Screening Criteria? (Yes/No)				
	project Purpose	Safety	Technology	Logistics	Environmental Impacts
Off-Site Alternative 1 (Onshore Placement)	Yes	Yes	Yes	No	No
On-Site Alternative 1 (Preferred)	Yes	Yes	Yes	Yes	Yes
On-Site Alternative 2 (Reduced Footprint)	No	Yes	Yes	No	Yes
No Action Alternative	No	No	No	No	No

Off-site Alternative 1 (Onshore Dredged Material Placement) is deemed not practicable due to impacts to sensitive biological and cultural resources that would occur, including impacts to documented archaeological sites and habitat considered occupied by the federally listed California red-legged frog. As such, the Environmental Impacts screening criterion is not met. In addition, this alternative would pose significant impacts and logistical constraints related to trucking the dredged material (e.g., over 4,660 trips by 10-wheel dump trucks with 15 CY capacity) to haul 70,000 CY of material. Traffic impacts from trucking dredged material on access roads through the plant to the onshore placement site would likely pose significant logistical challenges and would negatively affect regular plant operations. As such, the Logistics screening criterion is not met.

On-site Alternative 1 was deemed to be practicable, as all screening criteria would be met. The alternative would safely achieve the project objectives while minimizing environmental impacts.

On-site Alternative 2 (Reduced Dredging Footprint) is deemed not practicable and would not meet the project objectives. Limiting the footprint of dredging to areas immediately surrounding the intake structure would not fully address the project purpose and need and would result in more frequent maintenance dredging events to be conducted (which could result in greater overall environmental impacts). Moreover, reducing the dredging footprint would not measurably reduce potential impacts on marine biological resources, due to the limited duration required for dredging and the anticipated time required to mobilize, demobilize, and barge dredged sediments to the nearshore placement site. It is logistically not feasible and more environmentally impactful to conduct smaller, routine maintenance events.

The No Action Alternative is not practicable as it represents an unreasonable risk to safe and reliable DCPP operations. DCPP is a critical California power resource for stability of the State of California's electrical grid system. In February 2023, the California Energy Commission released a staff report recommending the State pursue extended operations of DCPP through October 31, 2030, to ensure electricity reliability. The determination was based on recent data showing California risks energy supply shortfalls during extreme weather events driven by climate change. There are currently no technologies readily available to provide reliable replacement power on the scale of DCPP, and currently available alternative energy sources (or those procured through long-term purchase agreements) would likely be associated with significant environmental impacts (such as greenhouse gas emissions from fossil fuel-based energy sources).

7.4 Least environmentally damaging practicable alternative under the Section 404(b)(1) Guidelines

On-site Alternative 1 is the only practicable alternative that meets all screening criteria. On-site Alternative 1 is therefore considered the least environmentally damaging practicable alternative.

8.0 Evaluation for Compliance with the Section 404(b)(1) Guidelines

The following sequence of evaluation is consistent with 40 CFR 230.5.

8.1 Practicable alternatives

Practicable alternatives to the proposed discharge consistent with 40 CFR 230.5(c) are evaluated in Section 7

The statements below summarize the analysis of alternatives:

In summary, based on the analysis in Section 7 above, the no-action alternative, which would not involve discharge into waters of the United States, is not practicable.

For those projects that would discharge into a special aquatic site and are not water dependent, the applicant has demonstrated there are no practicable alternatives that do not involve special aquatic sites.

It has been determined that there are no alternatives to the proposed discharge that would be less environmentally damaging (Subpart B, 40 CFR 230.10(a)).

The proposed discharge in this evaluation is the practicable alternative with the least adverse impact on the aquatic ecosystem, and it does not have other significant environmental consequences.

8.2 Candidate disposal site delineation (Subpart B, 40 CFR 230.11(f))

Each disposal site shall be specified through the application of these Section 404(b)(1) Guidelines:

Pursuant to the results of sediment sampling and analyses, the dredged material is appropriate for disposal at the identified Corps nearshore placement site, which is an approved placement site for sandy dredged material. The site is located approximately 11 miles from the intake cove and is the closest approved dredged material placement site to the project location, reducing impacts associated with hauling the dredged material to further disposal sites. Ocean currents and wave action are likely to disperse the deposited dredged material consistent with natural coastal sand deposition processes.

The onshore disposal site identified under Off-Site Alternative 1 would involve significant environmental consequences relating to endangered species, cultural resources, and greenhouse gas emissions from trucking and placing the dredged material. As such, the placement site identified under the preferred alternative would be environmentally superior.

8.3 Potential impacts on physical and chemical characteristics of the aquatic ecosystem (Subpart C 40 CFR 230.20-40 CFR 230.25)

The following has been considered in evaluating the potential impacts on physical and chemical characteristics (see Table 2):

Table 2 – Potential Impacts on Physical and Chemical Characteristics

Physical and Chemical Characteristics	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect

Table 2 – Potential Impacts on Physical and Chemical Characteristics

Physical and Chemical Characteristics	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Substrate			x			
Suspended particulates/ turbidity				x		
Water			x			
Current patterns and water circulation		x				
Normal water fluctuations		x				
Salinity gradients		x				

Discussion:

Substrate: The sediments along the DCPP coastline are sand-dominated and contaminants do not typically adhere to large-grained sands; therefore, contaminants are not expected in the dredged material. Because of both the general lack of pollutant sources typical of the larger commercial harbors, and the type of littoral drift material, the effects of these activities are expected to be either minimal or absent. Dredging would temporarily remove excess benthic material and sediment from the dredging footprint within the intake cove, but not alter the substrate itself. Therefore, the effects on substrate from placing dredged sediments at the nearshore placement site would be negligible.

Suspended particulates/turbidity: The proposed project's effect on suspended particulates (littoral transport) would be minor and short term. The predominant littoral process would transport suspended particulates down coast in a southerly direction. The DCPP and the intake cove do not interrupt the north-to-south sediment transport process. A general goal of both beach and nearshore placement of dredged material is to place the dredged material in such a manner that the material remains available to the littoral system as beach replenishment. Suitable dredged material placed at the site would continue to move with currents and wave action to adjacent beaches downcoast. Suitable dredged material would temporarily replenish sand of nearby beaches since wave action and currents would transport some of the placed dredged material downcoast. Littoral transport would return to pre-accumulation conditions upon completion of the proposed project. Therefore, the proposed project would have a temporary and short-term impact on the physical environment and littoral transport. Increased turbidity from dredging and placing the sediment would result in a temporary decrease in light penetration and cause a general decline in aquatic primary productivity for eelgrass and canopy kelp. An appreciable turbidity increase may cause clogging of respiratory and feeding apparatuses of fish and filter feeders, but the proposed project is not anticipated to result in prolonged durations of increased turbidity that would lead to such effects.

Disturbances resulting from placement of dredged material at the placement site (and natural sediment deposition from Morro Bay, Chorro Creek, and Osos Creek) would not significantly degrade the value of intertidal and subtidal beach habitats (such as eelgrass and canopy kelp) along the sandspit and beyond.

Water: Temporary, localized physical and chemical changes in water quality characteristics may result due to the resuspension of bottom sediments during dredging activities. The bottom sediments also do not contain high levels of pathogenic bacteria, including total coliform, fecal coliform, and enterococcus. The marine sands surrounding DCPP are usually well aerated and do not provide an environment suitable for the survival of pathogenic bacteria. Beaches adjacent to DCPP that are nourished using marine sands also do not show up on state water monitoring lists as impacted by pathogenic bacteria and dredging would not result in beach closures or advisories. The water from the beaches north and south of the DCPP are within the state standards of pathogenic bacteria. Water quality would return to pre-project conditions upon completion of the project. Therefore, the effects on water quality from the proposed project would be negligible.

Current patterns and water circulation*:* The Morro Bay region is exposed to high energy, turbulent water and wave action due partly to its position along the Pacific Coast. Therefore, suitable dredged material placed at this site tends to be highly dispersive, transitory, and subject to significant movement from wave action. Wave action would not be altered by a single dredging event and remain at pre-accumulation conditions upon completion of the proposed project. Therefore, proposed project would not result in an effect on wave action.

Normal water fluctuations: The primary dredged material placement site is above Mean Higher High-Water level (MHHW, +5 feet of the MLLW) and is the most desirable location for the purposes of beach nourishment and minimizing return of sediment into the intake cove from the littoral processes (National Oceanic and Atmospheric Administration, 2003). Normal water fluctuations would not be altered by a single placement event and remain at pre-accumulation conditions upon completion of the proposed project. Therefore, the proposed project would have no effect on normal water fluctuations.

Salinity gradients*:* The proposed project is sited in the Pacific Ocean and would not be interacting with any fresh or river water. Therefore, the salinity gradient would not be affected by a single dredging event and would remain at pre-accumulation conditions upon completion of the proposed project.

8.4 Potential impacts on the living communities or human uses (Subparts D, E and F)

8.4.1 Potential impacts on the biological characteristics of the aquatic ecosystem (Subpart D 40 CFR 230.30)

The following has been considered in evaluating the potential impacts on biological characteristics (see Table 3):

Table 3 – Potential Impacts on Biological Characteristics						
Biological characteristics	**N/A**	**No Effect**	**Negligible Effect**	**Minor Effect (Short Term)**	**Minor Effect (Long Term)**	**Major Effect**
Threatened and endangered species			x			
Fish, crustaceans, mollusk, and other aquatic organisms				x		
Other wildlife				x		

Discussion:

Threatened and endangered species: The proposed project would have a negligible effect on threatened and endangered species because avoidance and minimization measures would be implemented during dredging of the intake cove. Each threatened or endangered species with potential to occur at or in the vicinity of the project site is discussed further below.

Black Abalone. No direct effects to black abalone or its Critical Habitat are expected as a result of project activities because there are no anticipated impacts to the rocky intertidal habitat this species occupies. Rocky intertidal habitat would be avoided during dredging activities within the intake cove. Indirect effects may occur to black abalone and its Critical Habitat due to temporary increased turbidity created during dredging and vessel anchoring to the seabed. However, the turbidity plume is expected to be localized, with heightened levels of suspended sediment occurring only immediately adjacent to the dredge. In addition, turbidity levels are expected to subside to ambient levels almost immediately after completion of the proposed dredging operation. Furthermore, potential temporary increases in turbidity would be minimized to the extent feasible with implementation of the avoidance and minimization measures described in Section 3.3.1. No direct or adverse modifications to black abalone habitat would result from project activities. As such, the project is expected to have no effect to black abalone and its Critical Habitat.

Southern Sea Otter. Southern sea otters are frequently observed within the intake cove. Direct effects to southern sea otter due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines if present in the vicinity of project activities. However, southern sea otters are fast and agile swimmers and are typically accustomed to vessel activity. Most sea otters occurring in the Action Area and general vicinity are accustomed to regular vessel traffic/anchoring lines associated with Morro Bay and Port San Luis and would be expected to temporarily avoid areas occupied by the barge/scow for the dredging project. In addition, DCPP scientific divers regularly operate small boats in the intake cove. Further, direct effects to southern sea otter would be avoided through implementation of the avoidance and minimization measures described in Section 3.3.1, which includes employing MWOs to actively monitor the intake cove and project activities and have the authority to execute a stop work if southern sea otters are within the project area. Indirect effects may include temporary displacement/habitat avoidance due to the movement of dredging and support vessels. Such indirect effects would not be expected to result in adverse effects to southern sea otter given the presence of additional habitat in the general vicinity and short duration of proposed project activities. As discussed above, temporarily increased turbidity within the Action Area would be minimized and not likely to have any lasting effects on habitat quality within the Action Area. Areas supporting concentrations of kelp and eelgrass within the intake cove would be avoided during proposed dredging activities, and no permanent or adverse effects to southern sea otter habitat would result from the proposed project. With the implementation of the measures described in Section 3.3.1, the proposed project may affect, but is not likely to adversely affect, southern sea otter.

Fish, crustaceans, mollusk, and other aquatic organisms: The following information is mostly based on underwater aquatic surveys of the intertidal areas and subtidal areas within the intake cove performed in 2020 by Tenera Environmental biologists. The results of the surveys are summarized in the Tenera Environmental Marine Biological Resources Assessment for the Diablo Canyon Decommissioning project (Tenera 2020b). The subtidal habitat within the intake cove and along the western and eastern breakwaters provides muddy substrate, sandy substrate, and rocky benthic habitats for subtidal biological communities, including algae, invertebrates, and fish. Intertidal biological communities include macroalgae that use solid surfaces to firmly affix themselves and invertebrate animal species that clamp tightly to rocky surfaces to stabilize themselves from wave action and for protection from predators. The proposed project would have a minor, short-term effect on fish, crustacean, mollusk, and other aquatic species because the proposed project is a singular dredging event and no rocky surfaces would be disturbed or altered.

Algae. The proposed project includes dredging sediments within the proposed dredge area of the intake cove southwest of the intake structure (see Figure 2: intake cove and proposed dredge area). The vast majority of the substrate within proposed dredge area is sand and soft sediments; however, the intertidal and subtidal areas along the edges of the intake cove contain hard structures and rocky bottom areas with attached kelp and other macroalgae. Any attached kelp and macroalgae within the immediate dredging area could be impacted by the dredging activities. The dredging footprint would avoid areas supporting concentrations of giant kelp and eelgrass. Adverse impacts on macroalgae, kelp, and eelgrass from the proposed project alternatives are not expected. In addition, any macroalgae incidentally impacted during the dredging process is expected to rapidly recolonize the breakwater and hard bottom areas. Therefore, incidental impacts on attached macroalgae within the intake cove would be minimal, localized, temporary, and would not result in an adverse impact.

No impacts on marine macroalgae and kelp are expected from placement of dredge materials in the nearshore dredged material placement area because there is no suitable rocky habitat for macroalgae or kelp to attach to in the sandy bottom area and macroalgae and kelp are not present (USACE 1995, CCC 2011). In addition, kelp surveys performed by USACE to evaluate the impacts of the City of Morro Bay's harbor maintenance dredging projects found that nearby kelp beds adjacent to Morro Rock were unlikely to be impacted by the proposed sediment placement because they are far enough away, and if sediment were to reach the kelp beds, it would already be dispersed in low concentrations (USACE 1995, CCC 2011). Finally, CDFW evaluated nearshore habitats in its review of the new MPA in Estero Bay and found that there is no sensitive nearshore habitat in the vicinity of the nearshore dredged material placement area, which reduces the potential for adverse impacts on the marine environment at the nearshore dredged material placement area (USACE 1995, CCC 2011).

Invertebrates. Dredging within the proposed dredge area is expected to result in removal, disturbance, and redistribution of bottom sediments in the dredged area, and impacts are expected to persist for the duration of the dredging operation and for a few weeks afterwards while benthic sediments redistribute and reorganize. Benthic invertebrates within the dredge area are expected to be removed, relocated, smothered, buried, or otherwise impacted. Dredging impacts on invertebrates would include direct or indirect mortality, temporary reductions in invertebrate population densities within the proposed dredge area, and temporary reductions in growth and reproduction of invertebrates that may survive the dredging operation within the proposed dredge area. Invertebrate species expected to be in the sandy bottom dredge area are limited to bottom-dwelling polychaete worms, tube worms, bivalves, and benthic crabs. Most of the invertebrate species observed in the intertidal and subtidal areas are not expected to be present in the proposed dredge area.

Temporary impacts on invertebrates near the proposed dredge area may include increased suspended sediments and turbidity resulting in clogging of gills and suspension feeding apparatuses, depressed filtration rates, and increased mucous secretion to cope with increased suspended sediment during the dredging operations, which could reduce growth and reproduction of adjacent invertebrate populations. Some invertebrate mortality would provide food for opportunistic shorebirds or other aquatic organisms, while some relocated invertebrates would survive after relocation to the nearshore dredged material placement area. Overall, impacts on invertebrates are expected to be temporary and minor since the sediments in the proposed dredge area are composed primarily of sands which are not expected to contain a diverse invertebrate species assemblage or large numbers of invertebrates. In addition, invertebrate populations affected by the dredging operation are expected to recolonize affected areas and recover from the disturbance upon completion of the project.

Potential impacts on invertebrates in the nearshore dredged material placement area from placement of dredged material may include burying and disturbance of benthic invertebrates. Additional impacts would include temporary turbidity and suspended sediment increases within the nearshore dredged material placement areas which could clog gills and filter-feeding apparatuses of invertebrates in and near the nearshore dredged material placement area. Impacts on invertebrates are expected to be temporary as the sands redistribute in the nearshore dredged material placement area. In addition, the turbidity and suspended sediment increases are expected to be temporary and inconsequential because the dredged material deposited would be composed mostly of sands, with less silts that would cause high turbidity, and wave action and ocean currents are expected to dissipate the suspended sediments quickly (USACE 1995, CCC 2011). Overall, impacts on invertebrates and habitat in the nearshore dredged material placement area are expected to be minimal, temporary, and would not result in an adverse impact.

Fish. The proposed project could affect fish species in the intake cove in a variety of ways. Dredging disturbance is expected to disperse benthic fish species and pelagic fish species that are resting, foraging, or feeding in the immediate dredge area of the intake cove. Fish mortality may occur from interactions with the dredge equipment, such as suction into the suction dredge or injury from the clamshell bucket mechanism, or burial with sediments. Temporary displacement of fish in the dredging area and adjacent areas of the intake cove is expected because most fish are expected to avoid the noise, disturbance, and increased turbidity that will result from dredging activities. Increased turbidity from dredging activities is expected to decrease visibility for sight-feeding fish, and these species are expected to avoid the turbidity plume. However, some fish species may be attracted to the dredging activities to forage on benthic organisms suspended by the dredging. Noise effects of the dredging may be indirectly beneficial, causing fish to avoid the operating mechanical activities of the dredge. Noise impacts from dredging are not expected to be adverse because dredging will not produce short, high-intensity noises similar to pile-driving that can cause startle responses or physical injury in fish. Displaced fish species are expected to reoccupy the dredging areas once dredging activities are complete, and turbidity returns to baseline levels. Impacts on fish species in the dredging area are expected to be minor, temporary and would not result in an adverse impact. Fish species are expected to avoid the nearshore dredged material placement area during the placement of dredged substrates because of the disturbance and increased turbidity. However, dredged material placement could release invertebrates and other fauna into the water column at the nearshore dredged material placement area, temporarily enhancing fish feeding activities. Disturbance, suspended sediment impacts, and turbidity increases are expected to be temporary, and minor because dredged material deposited would be composed mostly of sand, and less silt that would cause high turbidity, and wave action and ocean currents are expected to dissipate the suspended sediments quickly (USACE 1995, CCC 2011). Overall impacts on fish from placement of dredged materials in the nearshore dredged material placement area are expected to be minor, temporary, and would not result in an adverse impact.

***Marine Mammals*.** California sea lions and harbor seals (pinnipeds) are known to haul-out on the breakwater structures of the intake cove and sea otters have also been observed in the intake cove. However, pinnipeds and sea otters commonly observed at the DCPP are expected to avoid the intake cove during dredging activities because of human activity, noise, and disturbance. Disruption of foraging, feeding, and other behaviors of pinnipeds and sea otters during dredging activities is expected to be temporary and not adverse, and the behaviors of pinnipeds and otters in and near the intake cove is expected to return to normal after dredging is complete. The intake cove is a very small portion of the coastal areas available for these mammal species. Dolphin and whale species observed at the DCPP are typically open ocean species and are not expected to occur near the intake cove during dredging activities or be affected by dredging activities. Marine mammals, including pinnipeds and seas otters, are expected to avoid human activities, noise, and disturbance at the nearshore dredged material placement area during placement of dredged materials. Placement of dredged material is also not expected to adversely affect foraging, feeding, and movement behaviors of marine mammals in this area. Any short-term disruptions to foraging, feeding, or movement behaviors would be temporary and not significant, as mammal activities would return to normal after placement of dredged materials is complete. Overall, impacts on marine mammals from dredging activities at the intake cove and placement of dredged material at the nearshore dredged material placement area are expected to be temporary, minor, and would not result in an adverse impact.

Other Wildlife: The proposed project is unlikely to cause any adverse effects to terrestrial wildlife species and would have a minor, short-term effect on other wildlife because marine species are expected to avoid human activities and disturbance during the project.

8.4.2 Potential impacts on special aquatic sites (Subpart E 40 CFR 230.40)

The following has been considered in evaluating the potential impacts on special aquatic sites (see Table 4):

Table 4 – Potential Impacts on Special Aquatic Sites

Special Aquatic Sites	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Sanctuaries and refuges	x					
Wetlands	x					
Mud flats	x					
Vegetated shallows			x			
Coral reefs	x					
Riffle pool complex	x					

Discussion:

Sanctuaries and refuges: The project does not include any activities that take place within sanctuaries and refuges.

Wetlands: The project does not include any activities that take place within wetlands.

Mud flats: The project does not include any activities that take place within mud flats.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines because they are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses. Beds of eelgrass, a type of protected seagrass, occur in the eastern half of the intake cove. All the protected eelgrass beds in the intake cove are not within the proposed dredge area footprint and are at sufficient distance from the dredging area such that impacts would not occur.

The project does not include any activities that take place within coral reefs.

The project does not include any activities that take place within a riffle pool complex.

8.4.3 Potential impacts on human use characteristics (Subpart F 40 CFR 230.50)

The following has been considered in evaluating the potential impacts on human use characteristics (see Table 5):

Table 5 – Potential Impacts on Human Use Characteristics

Human Use Characteristics	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Municipal and private water supplies	x					
Recreational and commercial fisheries			x			
Water-related recreation			x			
Aesthetics				x		
Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves			x			

Discussion:

Municipal and private water supplies: The project does not involve any municipal and/or private water supplies.

Recreational and commercial fisheries: The dredge equipment would not obstruct recreational and commercial fisheries because recreational and commercial vessels for fishing do not have access to the intake cove. A temporary increase in marine traffic will occur during dredging activities. Communication on behalf of the project and local port authorities would occur and the number of barges and trips required, along with timing, will be coordinated. Commercial and recreational vessel operators may have navigational aids and can adjust course due to potential delays. If there are vessels around the dredged material placement equipment, the navigational impacts could be minimized by properly marking buoys so that boaters can safely avoid the immediate project area. Based on the above, and with the implementation of the proposed avoidance and minimization measures, impacts to recreational and commercial fisheries would not result in an adverse impact and can be considered negligible.

Water-related recreation: Dredging would not interfere with land-based and water-based recreational activities surrounding the immediate vicinity of the project because the DCPP is restricted to the public. The recreational activities within a few miles of the DCPP and near the placement site include boating, beaches, coastal hiking trails, fishing, surfing, tidepool viewing, and whale watching, and other beach recreation. The potential environmental impacts and disturbances to such activities are expected to be negligible, as there is regular vessel traffic in the vicinity of the placement site. Dredged material placement is expected to be completed prior to the peak recreation summer months. Water-related recreational uses are heaviest in the summer and are not expected to be adversely impacted. Furthermore, the intake cove and placement site are not located within areas that are regularly utilized for water-related recreational uses. Minor impacts to the recreation areas surrounding the DCPP (such as slightly increased noise and views of dredging vessels and/or barges operating offshore of Montaña de Oro State Park) would be temporary and localized and would not be expected to have any adverse effect on recreation. Beach replenishment off the dredged material placement site would enhance recreational use for Montaña de Oro State Park.

Aesthetics: The scenic and visual resources of the proposed project area are primarily the beaches, coastline, rocky reefs, kelp forests, intertidal zones, and the Pacific Ocean. Due to the distance and topographic obstructions, DCPP and intake cove are not readily viewable to the public. However, the dredging crane boom within the intake cove may be visible from the from the Point Buchon Trail at the Windy Point and Trail Terminus/Turn-Around Point scenic outlooks. The nearshore dredged material placement site is adjacent to the Montaña de Oro State Park sandspit, which has scenic and visual resources of beaches, coastline, the Pacific Ocean, and Morro Rock. Vessel traffic occurs daily in and around Morro Bay. In general, dredging entails temporary construction activities and vessel traffic. The presence of dredging equipment and supporting vessels would not permanently affect views of the beach or the Pacific Ocean. Equipment use may temporarily degrade aesthetics locally at the placement site, but the aesthetic would not be substantially impaired. The public is not permitted access to the DCPP beach and intake cove and can only view the DCPP from the scenic outlooks on Point Buchon Trail approximately two miles from the dredging area; the change to aesthetic qualities would be difficult to disseminate from miles away. Overall, any impacts caused by project implementation would be temporary and localized. Aesthetics, including the views of the beach and the Pacific Ocean, would return to pre-project conditions upon completion of dredging activities. Therefore, the proposed project would not result in an adverse impact on aesthetics. All effects would be minor (short term). The proposed project would not permanently:

- block or alter bluewater views;
- alter views to open space, rural areas, or inland hillsides and mountains;
- alter landform through grading and earthwork;
- change the character and/or compatibility with, and subordination to, surrounding areas; and
- alter nighttime lighting and glare.

Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves: The barge transit route between the intake cove and the placement site is within the Point Buchon State Marine Reserve, which is a Marine Protected Area (MPA). MPAs are established to help conserve biological diversity, provide a sanctuary for marine life, and enhance recreational and educational opportunities (CDFW 2023b). The DCPP is located within an NRC licensed area and aa Natural Resource Conservation zoning area and recreational access is restricted on most of the Diablo Canyon Lands apart from two public trails. The two trails are outside of the NRC licensed area (which includes all lands immediately surrounding the intake cove) and access is limited to certain hours of the day. For the Point Buchon Trail, visitors are required to sign in and out and trail usage is monitored. The Point Buchon Trail is located on the northern end of the Diablo Canyon Lands and extends south from Coon Creek within Montaña de Oro State Park to the turn-around area past Windy Point. The Pecho Coast Trail is located on the south end of the Diablo Canyon Lands and extends out and back from Port San Luis Lighthouse. Hikes on Pecho Coast Trail are docent led. The nearshore dredged material placement site is located adjacent to the Montaña de Oro State Park sandspit. Dredging would not interfere with Montaña de Oro State Park or any national seashores because project activities occurring at DCPP are restricted to the public and dredged material barging and placement would occur in offshore areas. There would be no adverse environmental impacts or disturbances to parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves.

8.5 Pre-testing evaluation (Subpart G, 40 CFR 230.60)

The following has been considered in evaluating the biological availability of possible contaminants in dredged or fill material (see Table 6):

Table 6 – Possible Contaminants in Dredged/Fill Material	
Physical substrate characteristics	x
Hydrography in relation to known or anticipated sources of contaminants	
Results from previous testing of the material or similar material in the vicinity of the project	x
Known, significant sources of persistent pesticides from land runoff or percolation	
Spill records for petroleum products or designated (Section 331 of CWA) hazardous substances	
Other public records or significant introduction of contaminants from industries, municipalities, or other sources	x

Table 6 – Possible Contaminants in Dredged/Fill Material	
Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	

Discussion:

Physical substrate characteristics: The sand and sediments to be dredged have been shown to be compatible with the criteria set forth for the placement site. The sediments to be dredged are approximately 87 percent sand and does not exceed any chemical contamination threshold established for the placement site. Sediments in Morro Bay, near the placement site, also have elevated background levels for certain heavy metals, including nickel and chromium, because those heavy metals are naturally occurring within the geological profile of the underlying area, the Jurassic-Cretaceous Franciscan Formation (California Coastal Commission [CCC] 2011). Although the sediments along the coast have higher concentrations of nickel and chromium, the sediments are not contaminated; chemical contaminants typically adhere to finer sediment, but not to sandy sediment.

Results from previous testing of the material or similar material in the vicinity of the project: Five core samples were collected within the dredging footprint on July 12, 2023. Grain size analyses and chemical analyses demonstrate that the sediments to be dredged are approximately 87 percent sand and do not exceed any chemical contamination threshold established for the placement site.

Other public records or significant introduction of contaminants from industries, municipalities, or other sources: The County of San Luis Obispo Environmental Health Services' Beach Water Quality Monitoring Program is a continuous water quality data program in the region. The closest Beach Water Quality monitoring station to the DCPP is six miles downcoast (southeast) at Olde Port Beach in Avila Beach and the second-closet monitoring station is over 11 miles upcoast (northwest) in Morro Bay. Water quality is monitored and sampled once a week for fecal indicator bacterial (enterococcus and fecal coliform). Beach water quality reports, which includes bacteria monitoring/sampling results, are published every 30 days. The most recent beach water quality testing results report found water quality was within state standards (County of San Luis Obispo 2023d).

It has been determined that testing is not required because the proposed material is not likely to be a carrier of contaminants because it is comprised of sand, gravel or other naturally occurring inert material based on testing completed in 2023.

8.6 Evaluation and testing (Subpart G, 40 CFR 230.61)

Discussion: The dredged material is suitable for in-water disposal because the sediments along the DCPP coastline and Montaña de Oro State Park sandspit are sand-dominated and the sand and sediment to be dredged within the intake cove have been shown to be compatible with the criteria set forth for the placement site (Central Coast RWQCB 2002).

8.7 Actions to minimize adverse impacts (Subpart H)

The following actions, as appropriate, have been taken through application of 40 CFR 230.70-230.77 to ensure no more than minimal adverse effects of the proposed discharge (see Table 7):

Table 7 – Actions to Ensure Adverse Effects are Minimized	
Actions concerning the location of the discharge	x
Actions concerning the material to be discharged	
Actions controlling the material after discharge	
Actions affecting the method of dispersion	
Actions affecting plant and animal populations	
Actions affecting human use	

Discussion:

The placement site and the surrounding nearshore aquatic environment are composed of fine-grained, poorly graded sand and fine sediments, similar to material found within the intake cove. No rocky reefs or other sensitive ocean habitat, such as kelp or seagrass beds, is present at the placement site (Corps 1995, CCC 2011). The placement site has been used for other dredging projects performed by the Corps and has been approved as a dredged material placement area for multiple dredging projects. The placement site is in a high-energy wave environment where sandy sediment is expected to be transported onshore and fine sediments are expected to be dispersed and carried offshore. Based on previous surveys for other dredging projects in the Morro Bay Harbor, there are no known sensitive nearshore habitats in the vicinity of the nearshore dredged material placement area (Corps 1995, CCC 2011).

Because of the shifting sand and fine sediment substrates, and lack of rocky reefs that algae can attach to, no algal or kelp species are expected to be present in the nearshore dredged material placement area. Benthic invertebrates expected in the sandy bottom area include clams (*Donax* spp. and *Tivela stultorum*), polychaete worms (*Serpulidae*), and mole crabs (*Blepharipoda occidentalis*). Because of the lack of algae and kelp cover in the nearshore dredged material placement area, coastal pelagic fish species and some nearshore bottom fish species are expected to be present as transients, and in low numbers. Fish species expected in nearshore dredged material placement area include surf perch (*Embiotoca lateralis* and *Embiotoca jacksoni*), northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), Jack mackerel (*Trachurus symmetricus*), skates (*Raja binoculata*, *Raja inornata*, and *Raja rhina*), rays (*Myliobatis californica*), and an occasional shovel-nose guitar fish (*Rhinobatos productus*).

8.8 Factual Determinations (Subpart B, 40 CFR 230.11)

The following determinations are made based on the applicable information above, including actions to minimize effects and consideration for contaminants (see Table 8):

Table 8 – Factual Determinations of Potential Impacts

Site	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Physical substrate				x		
Water circulation, fluctuation and salinity		x				
Suspended particulates/turbidity				x		
Contaminants		x				
Aquatic ecosystem and organisms				x		
proposed disposal site			x			
Cumulative effects on the aquatic ecosystem			x			
Secondary effects on the aquatic ecosystem			x			

Discussion:

Physical substrate: The placement site and the surrounding nearshore aquatic environment are composed of fine-grained, poorly graded sand and fine sediments, similar to material found within the intake cove. Therefore, placement of the suitable dredged material would not have any adverse effects on physical substrates within the project areas.

Water circulation, fluctuation and salinity: Currents in the project area are predominately downcast (southeast) and have an average speed of 0.17 feet per second. The general current pattern near DCPP provides good circulation and is comprised of three currents: the constant current, the smoothed current, and the residual current. The placement process is exposed to a high energy, turbulent water environment. Sand removed from the dredged footprint is expected to eventually be replenished via natural sediment transport. Sand deposited adjacent to the sandspit would be dispersed by high energy waves and currents down-coast and would not result in any impact. With the implementation of the proposed avoidance and minimization measures, the proposed project would not interfere with tidal circulation. Therefore, potential impacts from the proposed project placement of dredged material at the nearshore placement site would not result in an impact on natural fluctuations or salinity levels.

Suspended particulates/turbidity: Temporary, localized physical and chemical changes in suspended particulates/turbidity may result due to the resuspension of bottom sediments during dredging activities. Dredging activities may include impacts to turbidity, suspended solids, and dissolved oxygen (DO) in the immediate vicinity of the dredging and dredged material placement operations; however, these impacts would be temporary and minor. Increased turbidity would result in a decrease in light penetration and cause a general decline in aquatic primary productivity for eelgrass and canopy kelp. An appreciable turbidity increase may cause clogging of respiratory and feeding apparatuses of fish and filter feeders, but the turbidity increase is not expected to be sustained long enough to cause such effects and measures will be implemented to minimize turbidity plumes. Suspended particulates and turbidity would return to pre-project conditions upon completion of project; therefore, the proposed project would not result in an adverse impact to water quality.

Contaminants: There are no known sources of pollutants other than potential leakages from boats using the intake cove and occupying the surrounding waters. In general, the water quality of the Pacific Ocean adjacent to the DCPP is being degraded by agricultural runoff beyond the DCPP property and public and private sewage treatment systems. Marine sands do not contain high levels of pathogenic bacteria, including total coliform, fecal coliform, and enterococcus because marine sands are usually well aerated and do not provide an environment suitable for the survival of pathogenic bacteria. Beaches that are nourished using marine sands do not show up on state monitoring lists as impacted by pathogenic bacteria and dredging does not result in beach closures or advisories; the DCPP's coastline is not listed as impacted. In addition, the beaches north and south of the DCPP are within the state standards of pathogenic bacteria. Contaminants would not be introduced by a singular dredging and placement event.

Aquatic ecosystem and organisms: The aquatic ecosystem would return to pre-project condition upon completion of the project. Thus, impacts would be short term and minor. Local species (such as fish, seabirds, and mammals) are expected to avoid the nearshore dredged material placement area during the placement of dredged substrates because of the disturbance and increased turbidity and would likely return after project completion. The project would also avoid impacts to areas supporting sensitive habitats, such as concentrations of giant kelp and eelgrass.

proposed disposal site: Although dredging the intake cove has not occurred to date, the proposed nearshore dredged material placement area has been a dredged material placement site since 1980 serving as the placement site for routine maintenance dredging in Morro Bay (Bailey 1982). The Corps has had a routine Dredging Program to maintain existing navigation channels in Morro Bay since 1942 (Bailey 1982). Dredged material placement activities frequently occurred nearshore and south of Morro Bay, adjacent to the sandspit within Montaña de Oro State Park. This placement site is known to be a high-energy wave environment that should quickly carry sandy material to the beach and fine material offshore. The effects from the DCPP intake cove dredging placement would be negligible due to the high-energy wave environment along with the relatively small volume of sediment to be placed compared with the annual amount of sediment that has historically been placed and is planned to be placed at the site as part of routine Morro Bay dredging operations.

Cumulative effects on the aquatic ecosystem: Dredging and the discharge of dredged material placement would not result in cumulative impacts to the aquatic ecosystem.

Secondary effects on the aquatic ecosystem: Discharges are governed by regulations implemented by the Central Coast Regional Water Quality Control Board (RWQCB). Additional regulations are in place to manage water quality. The Central Coast RWQCB Basin Plan establishes regional water quality objectives for managing the surface and ground waters in the Central Coast Region, including the County (Central Coast RWQCB 2019). The Basin Plan incorporates objectives contained in the Ocean Plan which was adopted in 1972 by the State Water Resources Control Board (SWRCB). The Ocean Plan sets standards for the discharge of waste to the ocean waters of the State and provides measurable thresholds with respect to turbidity generation during construction/demolition activities (SWRCB 2019). Section 401 of the Clean Water Act (CWA) requires every applicant for a Section 404 permit for an action that may result in a discharge of dredged or fill material into “waters of the United States,” to obtain a State Water Quality Certification (WQC) or waiver that the proposed activity will comply with established effluent limitations and state water quality standards (i.e., beneficial uses, water quality objectives, and anti-degradation policy). The singular dredging event would follow the Ocean Plan, Basin Plan, and therefore, not add any secondary effects on the aquatic ecosystem.

8.9 Findings of compliance or non-compliance with the restrictions on discharges (40 CFR 230.10(a-d) and 230.12)

Based on the information above, including the factual determinations, the proposed discharge has been evaluated to determine whether any of the restrictions on discharge would occur (see Table 9):

Table 9 – Compliance with Restrictions on Discharge

Subject	Yes	No
1. Is there a practicable alternative to the proposed discharge that would be less damaging to the environment (any alternative with less aquatic resource effects, or an alternative with more aquatic resource effects that avoids other significant adverse environmental consequences?)		x
2. Will the discharge cause or contribute to violations of any applicable water quality standards?		x
3. Will the discharge violate any toxic effluent standards (under Section 307 of the Act)?		x
4. Will the discharge jeopardize the continued existence of endangered or threatened species or their critical habitat?		x
5. Will the discharge violate standards set by the Department of Commerce to protect marine sanctuaries?		x
6. Will the discharge cause or contribute to significant degradation of waters of the United States?		x

Table 9 – Compliance with Restrictions on Discharge		
Subject	**Yes**	**No**
7. Have all appropriate and practicable steps (Subpart H, 40 CFR 230.70) been taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem?	x	

Discussion:

1. Is there a practicable alternative to the proposed discharge that would be less damaging to the environment (any alternative with less aquatic resource effects, or an alternative with more aquatic resource effects that avoids other significant adverse environmental consequences?) No, the singular dredging event is the most practical alternative to remove the excess sediment buildup in the intake cove.

2. Will the discharge cause or contribute to violations of any applicable water quality standards? No, there are no violations of any applicable water quality standards in Morro Bay. The singular discharge event will not cause a violation because the material to be dredged and subsequently placed at the placement site has been shown to be within the physical and chemical standards established for the placement site and the project would not conflict with any applicable water quality standards.

3. Will the discharge violate any toxic effluent standards (under Section 307 of the Act)? No, the singular discharge event will not violate any toxic effluent standards because the sediment is not considered toxic under Section 307 of the Act.

4. Will the discharge jeopardize the continued existence of endangered or threatened species or their critical habitat? Although the placement site is designated critical habitat for black abalone and leatherback sea turtle, the discharge will take place at an existing dredged material placement site that is not known to be occupied by threatened or endangered species. Wildlife occurring in the vicinity are anticipated to avoid the dredged material placement footprint and adverse effects on listed species would be avoided through implementation of avoidance and minimization measures. No more than negligible, temporary effects on marine habitat would occur.

5. Will the discharge violate standards set by the Department of Commerce to protect marine sanctuaries? No, the singular discharge event will not take place in a marine sanctuary.

6. Will the discharge cause or contribute to significant degradation of waters of the United States? No, the singular discharge event will not contribute to the degradation of waters of the United States because the dredging event is not reoccurring, the sediment is not considered toxic, and the dredged sediment will have a similar composition to the placement site.

7. Have all appropriate and practicable steps (Subpart H, 40 CFR 230.70) been taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem?

Yes, all appropriate and practical steps have been taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem. The discharge would not affect any colonial nesting habitat or habitat occupied by sensitive bird species. Foraging birds are expected to avoid work areas. As a result, there would be no adverse impacts to coastal bird species. Impacts to other species, such as invertebrates, would not be considered substantial because impacts would be temporary and localized, and these organisms are anticipated to be able to recolonize affected areas immediately after dredging is completed. The planktonic stage of these organisms' life cycles is expected to contribute greatly to the recolonization of this newly exposed substrate, as would contributions by the migration of juvenile and adult individuals from adjacent undisturbed areas. Oliver et al. (1977) found that shallow water communities inhabiting naturally highly variable and frequently disrupted physical environments rebounded or recovered more quickly from experimental disturbances than those found in less variable and more benign conditions, and field studies of dredged areas have shown that recolonization typically begins as early as two weeks after dredging stops. With the implementation of the proposed avoidance and minimization measures, the impact of the proposed project on the aquatic ecosystem would not be adverse.

9.0 General Public Interest Review (33 CFR 320.4 and Regulatory Guidance Letter 84-09)

The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest as stated at 33 CFR 320.4(a). To the extent appropriate, the public interest review below also includes consideration of additional policies as described in 33 CFR 320.4(b) through (r). The benefits which reasonably may be expected to accrue from the proposal are balanced against its reasonably foreseeable detriments.

9.1 Public interest factors review

All public interest factors have been reviewed and those that are relevant to the proposal are considered and discussed in additional detail (see Table 10):

Table 10 – Public Interest Factors

Factor	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
1. Conservation						x
2. Economics:						x

Table 10 – Public Interest Factors

Factor	**None**	**Detrimental**	**Neutral (mitigated)**	**Negligible**	**Beneficial**	**Not Applicable**
3. Aesthetics: See discussion below.				x		
4. General Environmental Concerns: See discussion below.				x		
5. Wetlands						x
6. Historic Properties						x
7. Fish and Wildlife Values: See discussion below				x		
8. Flood Hazards						x
9. Floodplain Values						x
10. Land Use						x
11. Navigation: See discussion below.				x		
12. Shoreline Erosion and Accretion: See discussion below.					x	
13. Recreation: See discussion below.				x		
14. Water Supply and Conservation						x
15. Water Quality: See discussion below.				x		
16. Energy Needs: See discussion below.					x	
17. Safety: See discussion below.					x	
18. Food and Fiber Production						x
19. Mineral Needs						x
20. Consideration of Property Ownership						x
21. Needs and Welfare of the People: See discussion below.					x	

Additional discussion of effects on factors above:

Aesthetics: The intake cove is not observable from any public trails and barging of dredged material would represent a negligible, temporary increase in vessel traffic along the coastline. The project would not obstruct any scenic views and project-related vessel activity would be viewable for short durations. Impacts on aesthetics caused by project implementation would be temporary and localized.

General Environmental Concerns: . The project would not result in any permanent or adverse effects to the environment and the benefits of the project are within the public interest (ensuring safe and reliable operations of a critical component of California's electricity supply).

Fish and Wildlife Values: The direct, indirect, and cumulative effects of the activity on the public's interest of fish and wildlife values would be negligible given the small footprint of the project and limited duration of project activities. Most fish and wildlife are expected to avoid the intake cove and the nearshore dredged material placement area during dredging and the placement of dredged material. There would be localized and temporary disturbances to marine habitat, including increased turbidity, noise, and human activity.

Navigation: DCPP is located between San Francisco Bay (containing the Port of Oakland), and Los Angeles (containing the Port of Long Beach [POLB] and Port of Los Angeles [POLA]). Offshore marine traffic is comprised of commercial and recreation traffic. This includes sport fishing, recreational boating, and vessel traffic (e.g., containerships, oil tankers, auto carriers and other miscellaneous bulk carriers). DCPP is also located nearby the Port San Luis Harbor District, Morro Bay Harbor, and Estero Bay. Cargo traffic between the San Francisco Bay and POLB and POLA typically occurs 10 miles outward from the coast. Recreational fishers typically reside within 50 miles of the coast. Pleasure crafts and sailing activity mostly occurs within 50 miles of the coast.

Morro Bay Harbor is designated as a navigational waterway of the United States. There are 125 moorings within the Morro Bay Harbor, 50 are privately owned, and an estimated 400 to 500 boats within the harbor. The harbor has vessel size limitations. This is due to sandbars and other obstructions in the channel, mooring, and slip areas. The Harbor has two City T-piers which can be used for tie-up for large vessels and transient mariners. Estero Bay, approximately 4.5 miles north, is used for recreational boating and commercial fishing. Estero Bay is also used by commercial fishing vessels to pass through on the way to open water.

Mobilization and demobilization would include the movement of the barges, tug, dredging equipment, and support vessels. Dredging would include the operation of dredging equipment, support vessels, tugboat and scow which would transport up to 70,000 CY of dredged material up the coast. Barges will be moored directly to the intake structure and loaded with equipment. Once loading is complete, a tugboat will remove the barge. A temporary increase in marine traffic will occur during the project. Communication on behalf of the project and local port authorities could be beneficial to facilitate the number of barges and trips required. Prior communication could avoid longer wait times, congestion, and reduced safety for port users. Commercial and recreational vessel operators may have navigational aids and can adjust course due to potential delays. Therefore, commercial and recreational vessels are considered low sensitivity receptors and the risk to existing vessel traffic is considered to be negligible.

Shoreline Erosion and Accretion: The direct, indirect, and cumulative effects of the activity on the public's interest of shoreline erosion and accretion would be beneficial because suitable dredged material moved off-site would replenish sand on Montaña de Oro State Park beaches. The nearshore dredged material would not cause or contribute to the erosion of existing downcoast beaches and should result in temporary beach accretion because the primarily sandy dredged material would be returned to the intertidal zone nearshore to Montaña de Oro State Park at an existing dredged material placement site.

Recreation: The direct, indirect, and cumulative effects of the activity on the public's interest of recreation would be negligible. Dredging and dredged material placement would not interfere with land-based or water-based recreational activities surrounding the immediate vicinity of the project. The project would not prevent access to any recreation areas or have significant impacts on any recreation areas. Minor temporary indirect effects, such as increased noise and localized increases in turbidity near the placement site, would be expected.

Water Quality: The direct, indirect, and cumulative effects of the activity on the public's interest of water quality would be negligible. Temporary, localized physical and chemical changes in water quality characteristics may result due to the resuspension of bottom sediments during dredging activities, but not effect water quality for public consumption or recreation.

Energy Needs: The direct, indirect, and cumulative effects of the activity on the public's interest of energy needs would be beneficial because the project would allow for DCPP to continue to produce energy for the State of California. DCPP is a critical California power resource for the stability of the State of California's electrical grid system that does not rely on fossil fuels.

Safety: The direct, indirect, and cumulative effects of the activity on the public's interest of safety would be beneficial because the project would reduce the risk of a plant shutdown. The project aims to restore operational intake cove depths because accumulated sand and sediment is raising the risk of seawater system fouling, inadvertent plant shutdown, and the DCPP's inability to properly cool nuclear operations. Public safety would benefit from the project maintaining safe and reliable plant operations.

Needs and Welfare of the People: The direct, indirect, and cumulative effects of the activity on the needs and welfare of the people would be beneficial because the project has beneficial effects to safety and energy needs and no environmental justice (EJ) communities within the vicinity of the proposed project. No EJ communities would be disproportionately impacted (positively or negatively) by the project.

9.2 Public and private need

The relative extent of the public and private need for the proposed structure or work:

The purpose of the proposed project is to remove the accumulated sediment from the intake cove at the entrance of the intake structure at DCPP. If the accumulated sediment is not removed, the intake structure could become inundated with sediment. Differential pressure across seawater components can result in unexpected derating of the power plant or shutdown, risking DCPP's ability to provide energy for the public. Rising steam plant water temperature parameters (due to shallower water in the intake Channel) can affect generator cooling and condenser performance, thereby posing a risk to the overall cooling system. Unprecedented sand and sediment buildup has been observed in seawater equipment, resulting in equipment challenges and increased risk of shutdown. Shallow intake Channel depths are promoting additional kelp and algal growth, thereby raising the risk of seawater system fouling and inadvertent plant shutdown. As such, sand and sediment buildup in the intake Channel is a direct, immediate threat to the reliable and safe operations of DCPP, which is a critical California power resource for stability of the State of California's electrical grid system and its recipients.

9.3 Resource use unresolved conflicts

If there are unresolved conflicts as to resource use, explain how the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work was considered.

There were no unresolved conflicts identified as to resource use.

9.4 Beneficial and/or detrimental effects on the public and private use

The extent and permanence of the beneficial and/or detrimental effects that the proposed work is likely to have on the public and private use to which the area is suited is described below:

Detrimental effects are expected to be minimal and temporary.

Beneficial effects are expected to be more than minimal and permanent.

Dredging of the intake cove has not occurred since operation of the DCPP began in 1985 and 1986, Unit 1 and 2, respectively. Therefore, it is not envisioned that dredging of the intake cove would need to occur again during DCPP operations, including the proposed extended operations through October 31, 2030, consistent with Senate Bill 846. The potential detrimental effects of dredging such as temporarily increased turbidity and disturbance to local wildlife species would be limited to the project's relatively small footprint and short timeline. Therefore, the detrimental effects would be minimal in content and temporary in occurrence. Completion of this project would reduce the risk of a plant shutdown (beneficial effect) by improving the performance of the intake system to cool the nuclear reactors, Unit 1 and Unit 2. The project would also strengthen DCPP's ability to provide clean energy to the State of California's electrical grid system (beneficial effect). The project would also allow for DCPP to continue to provide approximately 9% of the State's electricity supply.

9.5 Climate Change

The proposed activities within the Corps' federal control and responsibility likely will result in a negligible release of greenhouse gases into the atmosphere when compared to global greenhouse gas emissions. Greenhouse gas emissions have been shown to contribute to climate change. Aquatic resources can be sources and/or sinks of greenhouse gases. For instance, some aquatic resources sequester carbon dioxide whereas others release methane; therefore, authorized impacts to aquatic resources can result in either an increase or decrease in atmospheric greenhouse gas. These impacts are considered de minimis. Greenhouse gas emissions associated with the Corps federal action may also occur from the combustion of fossil fuels associated with the operation of construction equipment, increases in traffic, etc. The Corps has no authority to regulate emissions that result from the combustion of fossil fuels. These are subject to federal regulations under the Clean Air Act and/or the Corporate Average Fuel Economy (CAFE) Program. Greenhouse gas emissions from the Corps action have been weighed against national goals of energy independence, national security, and economic development and determined not contrary to the public interest. The applicant voluntarily provided the Corps with an analysis of greenhouse gas emissions that they produced for other local, state, and/or federal requirements, entitled *Diablo Canyon Dredging Construction of De-watering Area Detailed Report* dated June 27, 2023 (Stantec Consulting Services Inc., 2023). project-specific calculations for the On-site Alternative 1 were derived from the report using the OFFROAD2021 (v1.0.5) Emissions Inventory output model. The portions of that document pertaining to the actions within the Corps federal control and responsibility are incorporated by reference.

10.0 Mitigation

(33 CFR 320.4(r), 33 CFR Part 332, 40 CFR 230.70-77, 40 CFR 1508)

10.1 Avoidance and minimization

Avoidance and Minimization: When evaluating a proposal including regulated activities in waters of the United States, consideration must be given to avoiding and minimizing effects to those waters. Avoidance and minimization are described in Section 3.3.1 above.

Describe other mitigative actions including project modifications implemented to minimize adverse project impacts? (See 33 CFR 320.4(r)(1)(i))

The project was modified to allow for different dredging equipment to be used, as appropriate, to minimize environmental impacts. The project approach of utilizing hydraulic suction dredging and/or clamshell bucket dredging, when and where appropriate within the dredging footprint, allows for increased efficiency and limits the project duration (and associated temporary impacts). It also allows the project to minimize turbidity, and limit disturbance to sensitive habitats.

10.2 Compensatory mitigation requirement

Is compensatory mitigation required to offset environmental losses resulting from proposed unavoidable impacts to waters of the United States? No.

Provide rationale: The project would not result in the permanent loss of Waters of the U.S., and compensatory mitigation is therefore not required.

11.0 Consideration of Cumulative Effects

(40 CFR 1508 & RGL 84-9) Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor direct and indirect but collectively significant actions taking place over a period of time. A cumulative effects assessment should consider how the direct and indirect environmental effects caused by the proposed activity requiring DA authorization (i.e., the incremental impact of the action) contribute to the aggregate effects of past, present, and reasonably foreseeable future actions, and whether that incremental contribution is significant or not.

11.1 Identify/describe the direct and indirect effects which are caused by the proposed activity:

The project is expected to result in removal, disturbance, and redistribution of bottom sediments in the dredged area, and minor impacts are expected to persist for the duration of the dredging operation and for a few weeks afterwards while benthic sediments redistribute and reorganize. Most direct and indirect effects caused by the proposed project would be related to marine life. Benthic invertebrates within the proposed dredge area are expected to be removed, relocated, smothered, buried, or otherwise impacted. Dredging impacts on invertebrates would include direct or indirect mortality, temporary reductions in invertebrate population densities within the proposed dredge area, and temporary reductions in growth and reproduction of invertebrates that may survive the dredging operation within the proposed dredge area. Indirect effects may also include temporarily increased turbidity created during dredging and vessel anchoring. However, the turbidity plume is expected to be localized, with heightened levels of suspended sediment occurring only immediately adjacent to the dredge activities. Many marine species potentially occurring in the project area, such as southern sea otters, are fast and agile swimmers and are typically accustomed to vessel activity in the region. Direct effects to southern sea otter and other marine mammals would be avoided through implementation of the avoidance and minimization measures described in Section 3.3.1, which includes employing MWOs to actively monitor the intake cove and project activities and have the authority to stop work if sensitive species are within the project area or identified avoidance buffers. Indirect effects may include temporary displacement/habitat avoidance due to the movement of dredging and support vessels. Such indirect effects would not be expected to result in adverse effects to southern sea otter or other marine mammals given the presence of additional habitat in the general vicinity and short duration of project activities.

11.2 The geographic scope for the cumulative effects assessment is:

The geographic scope of the project takes place within Estero Bay Hydrologic Unit 10 and two watersheds. The dredging activity will take place within the Irish Hills Coastal Watershed, which ranges from the inland Irish Hills to the Avila Beach community south of DCPP. The dredged material placement will take place within the Morro Bay Watershed. .

11.3 The temporal scope of this assessment covers:

The temporal scope of this assessment covers 10 years prior to the proposed project (2013) and 10 years from the proposed project (2033). The proposed project will be short-term in nature, completed in the near-term with no permanent impacts. The analysis considers similar, recently completed, or short-term projects that have contributed to the current affected environment and environmental baseline. Dredging of the intake cove has not been previously conducted, and there are no other projects or regulatory actions at the intake cove expected to occur in the next 5 to10 years. The nearshore placement site has been utilized in the past for the placement of dredged material from the Morro Bay Harbor maintenance dredging project and is reasonably expected to be repeatedly used as a placement site in the future. .

11.4 Describe the affected environment:

The affected environment consists of nearshore environments along the central California coast. The geographic scope of analysis includes primarily open water, rocky tidal ecosystems, sandy beaches, and undeveloped lands. Partially developed areas include the Morro Bay harbor, DCPP, and Port San Luis harbor. The watershed subject to cumulative effects analysis would be Estero Bay Hydrological Unit 10. The land uses in this watershed include agriculture, public recreation, military activities, natural resource preservation, and grazing. There are no past losses of wetlands, streams, or other aquatic resources of concern from DCPP and in the geologic area of analysis that are relevant to this one-time dredging project. There are no aquatic resources of concern related to the project.

11.5 Determine the environmental consequences:

No cumulative effects of the project activities would add, modify, or reverse the effects on the resources of concern. No new development will occur in the intake cove, so potential impacts to open water and land would be minimal. Biological resource impacts would remain consistent since all Least Environmentally Damaging Practicable Alternative (LEDPA) factors that led to the nearshore dredged material placement area being designated as the suitable dredged material placement area would remain the same. The dredging from the proposed project (up to 70,000 CY) would be a small fraction of the dredged material authorized to be placed at the placement site compared to the routine Morro Bay Harbor Dredging project Six Year Program, which dredges and places up to approximately 400,000 CY annually; therefore, cumulative dredged material placement effects would be considered negligible. The project would have no measurable cumulative effects relative to reasonably foreseeable future activities, such as the decommissioning of DCPP, as all effects from the intake cove Dredging project would be short-lived; the environmental baseline would return to pre-project activities prior to any reasonably foreseeable future actions. Although temporary biological resource impacts and water quality turbidity may occur, it would achieve equilibrium after the placement of suitable dredged material. Littoral material (substrate) would remain the same in the future as it has been in the past and future in Morro Bay, since the amount of littoral transport that travels along the coastline from north to south in Morro Bay has remained relatively consistent over time. In addition, no impacts to recreation and land use are expected due to the limited timeframe of the dredging operation. Therefore, cumulative impacts from the proposed project would be temporary and localized and would not result in adverse impacts to air quality, biological resources, land use and recreation, vessel operations, and water quality.

11.6 Conclusions regarding cumulative impacts:

When considering the direct and indirect impacts that will result from the proposed activity, in relation to the overall direct and indirect impacts from past, present, and reasonably foreseeable future activities, the incremental contribution of the proposed activity to cumulative impacts in the area described in section 11.2, are not significant. Compensatory Mitigation will not be required to offset the impacts of the proposed activity to eliminate or minimize its incremental contribution to cumulative effects within the geographic area described in Section 11.2. Mitigation required for the proposed activity is discussed in Section 10.0.

12.0 Compliance with Other Laws, Policies and Requirements

12.1 Section 7(a)(2) of the Endangered Species Act (ESA)

Refer to Section 4.2 for description of the Corps action area for Section 7.

12.1.1 Lead federal agency for Section 7 of the ESA

Has another federal agency been identified as the lead agency for complying with Section 7 of the ESA with the Corps designated as a cooperating agency and has that consultation been completed? No.

12.1.2 Listed/proposed species and/or designated/proposed critical habitat

Are there listed or proposed species and/or designated critical habitat or proposed critical habitat that may be present or in the vicinity of the Corps' action area? Yes. The Biological Assessment (BA) prepared for the project reported that southern sea otter (*Enhydra lutris*) is known to utilize habitat in the intake cove and may be present in the action area during project construction. Critical habitat has not been designated for this species. Black abalone (*Haliotis cracherodii*) has been observed at the DCPP site on the breakwaters outside the intake cove. The DCPP site occurs within Specific Area 10 of designated critical habitat for black abalone.

Effect determination(s), including no effect, for all known species/habitat, and basis for determination(s):

According to the BA prepared for the project, an established population of black abalone occurs at the DCPP site. During intertidal transect surveys conducted in 2020, one black abalone was observed on the seaward side of east breakwater and three were observed on the seaward side of the west breakwater (PG&E 2020b). The likelihood of black abalone occurring inside the intake cove along the breakwaters and rocky habitat adjacent to the intake structure is low and the species is not expected within the dredging footprint. A focused pre-dredging black abalone survey was conducted by Tenera divers within the intake cove on September 7, 2023. No black abalone were detected within the intake cove survey area, including the dredging footprint and adjacent rocky habitats.

No direct effects to black abalone or its critical habitat are expected as a result of project activities because there are no anticipated impacts to rocky intertidal habitats known to be occupied by the species. This species was not detected within or immediately adjacent to the dredging footprint during focused diver surveys conducted on September 7, 2023. Rocky intertidal habitat would be avoided during dredging activities within the intake cove. Temporary turbidity increases may occur in the project vicinity during dredging and vessel anchoring to the seabed. However, the turbidity plume is expected to be localized, with heightened levels of suspended sediment occurring only immediately adjacent to the dredge. In addition, turbidity levels are expected to subside to ambient levels almost immediately after completion of the proposed dredging operation. Furthermore, potential temporary increases in turbidity would be minimized to the extent feasible with implementation of Conservation Measure BIO-3 in the applicant's Turbidity Management Plan. No direct or adverse modifications to black abalone habitat would result from project activities. In consideration of the above information the Corps determined the project would have no effect on black abalone or its critical habitat.

According to the project BA, southern sea otters are commonly observed in the intake cove with groups of up to approximately 30 southern sea otters regularly occurring within the intake cove (PG&E 2020b). These animals typically stay overnight within the cove and disperse to offshore foraging areas during the day. Preferred rafting locations in the immediate vicinity of the DCPP include the protected areas of the intake cove. As such, southern sea otters may be present within and/or adjacent to the action area during project activities.

Direct effects to southern sea otter due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines if present in the vicinity of project activities. However, southern sea otters are fast and agile swimmers and are typically accustomed to vessel activity. Most sea otters occurring in the action area and general vicinity are accustomed to regular vessel traffic/anchoring lines associated with Morro Bay and Port San Luis and would be expected to temporarily avoid areas occupied by the barge/scow for the dredging project. In addition, DCPP scientific divers regularly operate small boats in the intake cove. Further, direct effects to southern sea otter would be avoided through implementation of the conservation measures defined in Section 6 of the BA, which include employing marine wildlife observers to actively monitor the intake cove and project activities and have the authority to execute a stop work if southern sea otters are within the project area. Indirect effects may include temporary displacement/habitat avoidance due to the movement of dredging and support vessels. Such indirect effects would not be expected to result in adverse effects to southern sea otter given the presence of additional habitat in the general vicinity and short duration of proposed project activities. As discussed above, temporarily increased turbidity within the action area would be minimized and not likely to have any lasting effects on habitat quality within the action area. Areas supporting concentrations of kelp and eelgrass within the intake cove would be avoided during proposed dredging activities, and no permanent or adverse effects to southern sea otter habitat would result from the proposed project. In consideration of the above information, the Corps has determined the project *may affect, but is not likely to adversely affect*, southern sea otter.

12.1.3 Section 7 ESA consultation

Informal consultation with the U.S. Fish and Wildlife Service (USFWS) was initiated on September 29, 2023. The USFWS provided their written concurrence with the Corps' determination in a letter dated November 15, 2023.

12.2 Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Stevens Act), Essential Fish Habitat (EFH)

12.2.1 Lead federal agency for EFH provisions of the Magnuson-Stevens Act

Has another federal agency been identified as the lead agency for complying with the EFH provisions of the Magnuson-Stevens Act with the Corps designated as a cooperating agency and has that consultation been completed? No.

12.2.2 Magnuson-Stevens Act

Did the proposed project require review under the Magnuson-Stevens Act? Yes.

Were EFH species or complexes considered? Yes. Based on the EFH Assessment provided by PGE for the project, there are four Fishery Management Plans (FMP) that have managed species with designated habitat areas that occur in the DCPP intake cove. The four FMPs include the Coastal Pelagic Species (CPS) FMP, the Pacific Coast Groundfish (PCG) FMP, the Pacific Coast Salmon (PCS) FMP, and the Highly Migratory Species FMP. Additionally, the intake cove supports Canopy Kelp Habitat Area of Particular Concern (HAPC), Eelgrass HAPC, and Rocky Reefs HAPC.

Effect determination and basis for that determination:

The district engineer determined the proposed activity may adversely affect EFH but would not result in substantial adverse effects to EFH. Therefore, pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1996, the Corps initiated EFH consultation for the proposed project on September 25, 2023. Because the project would result in work involving dredging activities, the Corps requested conservation recommendations for individual Abbreviated Consultation (50 CFR 600.920(h)).

The following effects analysis is summarized from the EFH Assessment provided by the applicant.

Dredging and its disposal are known to have the following potential effects on EFH: loss and alteration of habitat; altered hydrology and geomorphology; sedimentation, siltation, and turbidity; release of contaminants; direct impacts to organisms; and noise.

Potential effects to EFH associated with the proposed dredging and dredge material placement activities include the following: habitat alteration, behavioral disturbance, turbidity, direct burial, and entrainment or impingement of fish. Direct effects are expected to be minor and temporary in nature with habitat alteration being the longest lasting minor effect. The purpose of the dredging activity is to retain the utility of the intake structure by dredging accumulated material to achieve operational depth, so change of habitat within the dredging footprint is inherent in the action. Habitat alteration in areas around the intake structure would occur as a result of sandy substrate removal and would not result in permanent elimination or conversion of habitat types. Nearshore processes, including along-shore and cross-shore currents that drive both the down and upwelling events, are expected to gradually deposit some sand back into this area over time.

The proposed dredge area in the northwestern portion of the intake cove consists primarily of sand, as compared to soft sediments that occur in the eastern part of the cove. Dredging of sandy sediment would result in a shorter duration of turbid conditions and lesser turbidity effects compared to dredging of soft sediments. Turbidity can have negative effects on EFH and HAPCs from plume production associated with temporarily suspended sediments, which can result in smothering of habitat and organisms in extreme cases as particles settle. However, the dredged material in the action area is comprised primarily of sand, such that turbidity effects associated with plume production are expected to be minimal.

Mechanical disturbance and noise from the proposed dredging activities may result in behavioral disturbances for fish species present in the action area during dredging operations. Fish species are expected to temporarily move out of the disturbance area when heavy equipment work commences.

Entrainment or impingement of fish in suction dredge equipment is a potential risk. However, the limited duration of the proposed dredging activities and implementation of appropriate measures, such as fish screens, would minimize adverse effects.

Effects on EFH dredge material placement at the nearshore disposal site may include direct burial of benthic communities, and temporary increases in turbidity. While some benthic organisms and habitat may be lost due to direct burial, these communities are expected to recolonize the area following project construction. Because the dredged material consists primarily of sand, turbidity increases and duration are expected to be minimal and temporary.

The proposed project occurs within the canopy kelp HAPC in the Action Area, however, the dredging footprint has been sited away from known giant kelp (*Macrocystis pyrifera*) concentrations within the intake cove. Observed eelgrass beds in the vicinity of the Action Area occur primarily in the eastern half of the intake cove. Dredging is proposed in the western half of the cove, away from mapped eelgrass beds. Previous mapping was conducted in 2020. If approved, the Corps permit would be conditioned to require pre-construction eelgrass surveys. Areas containing rocky substrates within and around the intake cove are outside the proposed dredge footprint and would therefore not be directly impacted.

Based on the above information the Corps determined the project would result in minor adverse effects to EFH.

12.2.3 National Marine Fisheries Service consultation

Consultation with the National Marine Fisheries Service (NMFS) was initiated on September 25, 2023. In an email dated November 22, 2023, the NMFS stated that as long as the applicant implements the conservation measures contained in the Dredging Oil Spill Response Plan, Marine Wildlife Contingency Plan, Turbidity Monitoring Plan, and Biological Resources Monitoring Plan for the project, and with implementation of the Corps permit Special Condition requiring pre- and post-project eelgrass surveys, NMFS believes the proposed project will result in impacts that are not substantial and had no additional EFH Conservation Recommendations to provide. The Corps has thereby completed the required EFH consultation for the project.

12.3 Section 106 of the NHPA

Refer to Section 4.3 for permit area determination.

12.3.1 Lead federal agency for Section 106 of the NHPA

Has another federal agency been identified as the lead federal agency for complying with Section 106 of the NHPA with the Corps designated as a cooperating agency and has that consultation been completed? No.

12.3.2 Historic properties

Known historic properties present? No.

Effect determination and basis for that determination:

The proposed project has no potential to cause effects on historic properties because there are no historic resources within the project area of potential effect. There are a total of 26 previously recorded resources within a 0.5-mile buffer around the intake cove and the onshore dredged material location, however there are no known resources within the dredging footprint or nearshore dredged material placement area.

12.3.3 Consultation with the appropriate agencies, tribes and/or other parties for effect determinations

N/A.

12.4 Tribal Trust Responsibilities

12.4.1 Tribal government-to-government consultation

Was government-to-government consultation conducted with Federally-recognized Tribe(s)? No.

Provide a description of any consultation(s) conducted including results and how concerns were addressed. N/A

12.4.2 Other Tribal consultation

Other Tribal consultation including any discussion of Tribal Treaty rights?

N/A.

12.5 Section 401 of the Clean Water Act – Water Quality Certification (WQC)

12.5.1 Section 401 WQC requirement

Is an individual Section 401 WQC required, and if so, has the certification been issued or waived?

An individual water quality certification is required and was issued by the California Regional Water Quality Control Board on October 4, 2023 (Certification No. 34023WQ30).

12.5.2 401(a)(2) Process

If the certifying authority granted an individual WQC, did the United States Environmental Protection Agency make a determination that the discharge ‘may affect’ water quality in a neighboring jurisdiction? No.

12.6 Coastal Zone Management Act (CZMA)

12.6.1 CZMA consistency concurrence

Is a CZMA consistency concurrence required, and if so, has the concurrence been issued, objected, or presumed?

An individual CZMA consistency concurrence is required and has not been issued, objected, or presumed to date. A provisional permit will be provided to the applicant.

12.7 Wild and Scenic Rivers Act

12.7.1 National Wild and Scenic River System

Is the project located in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system? No.

12.8 Effects on Corps Civil Works projects (33 USC 408)

12.8.1 Permission requirements under Section 14 of the Rivers and Harbors Act (33 USC 408)

Does the applicant also require permission under Section 14 of the Rivers and Harbors Act (33 USC 408) because the activity, in whole or in part, would alter, occupy, or use a Corps Civil Works project?

No, there are no federal projects in or near the vicinity of the proposal.

12.9 Corps Wetland Policy (33 CFR 320.4(b))

12.9.1 Wetland Impacts

Does the project propose to impact wetlands? No.

12.9.2 Wetland impact public interest review

Based on the public interest review herein, the beneficial effects of the project outweigh the detrimental impacts of the project.

12.10 Other (as needed)

N/A

12.11 Compliance Statement

The Corps has determined that it has fulfilled its responsibilities under the following laws, regulations, policies, and guidance:

Table 13 – Compliance with Federal Laws and Responsibilities		
Laws, Regulations, Policies, and Guidance	**Yes**	**N/A**
Section 7(a) (2) of the ESA	x	
EFH provisions of the Magnuson-Stevens Act	x	
Section 106 of the NHPA	x	
Tribal Trust	x	
Section 401 of the CWA	x	
CZMA	x	
Wild and Scenic Rivers Act		x
Section 408 - 33 USC 408		x
Corps Wetland Policy (33 CFR 320.4(b))		x
Other: N/A.		

13.0 Special Conditions

13.1 Special conditions requirements

Are special conditions required to ensure minimal effects, ensure the authorized activity is not contrary to the public interest and/or ensure compliance of the activity with any of the laws above? Yes.

13.2 Required special condition(s)

Coastal Zone Management Act:

1. This permit is contingent upon the issuance of a Coastal Zone Management Act (CZMA) consistency certification by the California Coastal Commission. The Permittee shall abide by the terms and conditions of the CZMA consistency certification. The Permittee shall submit the CZMA consistency certification to the Corps Regulatory Division (preferably via email) within two weeks of receipt from the issuing state agency. The Permittee shall not proceed with construction until receiving an email or other written notification from Corps Regulatory Division acknowledging the CZMA consistency certification has been received, reviewed, and determined to be acceptable. If the California Coastal Commission fails to act on a request for concurrence with your certification within six months after receipt, please notify the Corps so we may consider whether to presume a concurrence pursuant to 33 CFR 325.2(b)(2)(ii).

Disposal Conditions for Morro Bay Nearshore Placement Area:

1. If dredging occurs during the month of May, the Permittee will coordinate with Corps Project Manager Blake Horita at blake.m.horita@usace.army.mil, and the Corps Dredge Yaquina, regarding the Corps' annual maintenance dredging of Morro Bay. The Yaquina dredges Morro Bay every May, and places the dredge material at the Morro Bay Nearshore Placement site. The Permittee shall provide written confirmation (email) of coordination from Mr. Horita as part of the request for Notice to Proceed pursuant to Dredging Condition number 4.

Dredging Conditions:

1. The Permittee is prohibited from conducting dredging operations and disposing material in navigable waters of the United States that has not been tested and determined by the Corps Regulatory Division, in consultation with the U.S. Environmental Protection Agency (EPA), to be suitable for disposal in ocean waters. Sampling and testing of previously tested sediment or previously dredged areas is required after three years from the date of initial sediment sampling and testing unless the Corps deems that conditions warrant another testing duration be formulated with EPA consultation. This time limit is subject to change at the discretion of the Corps Regulatory Division if any event causes previously determined suitable material to become potentially unsuitable. The applicant must demonstrate the proposed dredged materials are chemically and physically suitable for disposal in ocean waters according to the provisions of the Inland Testing Manual (ITM) or Ocean Disposal Manual (ODM) and the Corps Regional Guidance Letter (RGL) 06-02, as appropriate. If the material does not meet the physical and chemical criteria for unconfined disposal in ocean waters, the dredged material shall be disposed at a Corps approved upland disposal location. The applicant shall submit to the Corps Regulatory Division and EPA a draft Sampling and Analysis Plan (SAP). Sampling may not commence until the final SAP is approved, in writing, by the Corps Regulatory Division, in consultation with EPA. Further the SAP Results (SAPR) must also be reviewed and approved and the Permittee must receive a written authorization to proceed.

2. DREDGING QUALITY MANAGEMENT PROGRAM COMPLIANCE
Dredging and dredged material disposal and monitoring of dredging projects using the National Dredging Quality Management (DQM) system shall be implemented for this permit. The permittee's DQM system must have been certified by the DQM Support Center within one calendar year prior to the initiation of the dredging/disposal. Questions regarding certification should be addressed to the DQM Support Center at 1-877-840-8024. Additional information about the DQM System can be found at https://dqm.usace.army.mil. The permittee is responsible for ensuring that the DQM system is operational throughout the dredging and disposal project and that project data are submitted to the DQM Support Center in accordance with the specifications provided at the aforementioned website. The data collected by the DQM system shall, upon request, be made available to the U.S. Army Corps of Engineers Los Angeles

District Regulatory Division project manager [add PM name and email address].

3. OPERATIONS PLAN
At least 15 calendar days before initiation of any dredging operations authorized by this permit, the Permittee shall submit a dredging and disposal Operations Plan to the Corps Regulatory Division and EPA, with the following information:

A) A list of the names, addresses and telephone numbers of the Permittee's project manager, the contractor's project manager, the dredging operations inspector, the disposal operations inspector and the captain of each tug boat, hopper dredge or other form of vehicle used to transport dredged material to the designated disposal site.

B) A list of all vessels, dredging equipment and electronic positioning systems or navigation equipment to be used for dredging and disposal operations, including: the capacity, load level and acceptable operating sea conditions for each hopper dredge or disposal barge or scow.

C) A schedule describing when the dredging project is planned to begin and end.

D) A pre-construction dredging bathymetric survey (presented as a large format plan view drawing), taken within thirty (30) days before the dredging begins, accurate to 0.5-foot with the exact location of all soundings clearly defined on the survey chart. The pre-dredge survey chart shall be prepared showing the following information:
i) The entire dredging area, including the toe and top of all side-slopes, and typical cross sections of the dredging areas. To ensure that the entire area is surveyed, the pre-dredge condition survey should cover an area at least 50 feet outside the top of the side-slope or the boundary of the dredging area.
ii) Areas shallower than the dredging design depth shall be shaded green, areas between the dredging design depth and overdredge depth shall be shaded yellow, and areas below overdredge depth that will not be dredged shall be shaded blue.
iii) The pre-dredging survey chart shall be signed by the Permittee to certify that the data are accurate and that the survey was completed within thirty (30) days before the proposed dredging start date.

E) A debris management plan to prevent unauthorized disposal of large debris or other unsuitable materials. The debris management plan shall include: sources and expected types of debris if known, debris separation and retrieval methods and equipment to be used, debris disposal location(s), and debris disposal methods (e.g., recycling, landfill, hazardous/toxic/radioactive materials/munitions disposal sites, etc.).

4. NOTICE TO PROCEED
The Permittee shall not commence dredging or disposal operations unless and until the Permittee receives a Notice to Proceed, in writing (letter or email), from the Corps Regulatory Division.

5. MAINTAIN PRINTED COPY OF PERMIT ON-BOARD

The Permittee and its contractors and subcontractors shall maintain a copy of this permit at the work site, and on all vessels used to dredge, transport and dispose of dredged material authorized under this permit.

6. CAPTAIN LICENSING
The Permittee shall ensure that the captain of any hopper dredge, tug or other vessel used in the dredging and disposal operations, is a licensed operator under U.S. Coast Guard regulations and follows the Inland and Ocean Rules of Navigation or the U.S. Coast Guard Vessel Traffic Control Service. All such vessels, hopper dredges or disposal barges or scows, shall have the proper day shapes (mast head signals which indicate vessel operational status), operating marine band radio, and other appropriate navigational aids.

7. RADIO CHANNEL MONITORING
The Permittee's contractor(s) and the captain of any vessel covered by this permit shall monitor VHF-FM channels 13 and 16 while conducting dredging operations.

8. INSPECTIONS
Upon request, the Permittee and its contractor(s) shall allow inspectors from the Corps Regulatory Division (may include other Corps Divisions), EPA, and(or) the U.S. Coast Guard to inspect all phases of the dredging and disposal operations. Upon request, the Permittee and its contractor(s) retained to perform work authorized by the permit or to monitor compliance with this permit shall make available to inspectors from the Corps EPA, and(or) the U.S. Coast Guard the following: dredging and disposal operations inspectors' logs, the vessel track plots and all disposal vessel logs or records, any analyses of the characteristics of dredged material, or any other documents related to dredging and disposal operations.

9. INTERFERENCE WITH NAVIGATION
During disposal and dredging operations the permitted activity shall not interfere with the public's right to free navigation on all navigable waters of the United States.

10. NON-COMPLIANCE NOTIFICATION
If non-compliance of the permit occurs, the Permittee shall report the details of the permit non-compliance to the Corps Regulatory Division within twenty-four (24) hours. If the Permittee retains any contractors to perform any activity authorized by this permit, the Permittee shall instruct all such contractors that any permit non-compliance of any permit condition must be reported to the Permittee immediately who must then report to the Corps Regulatory Division.

11. HOPPER DREDGE OPERATION
When using a hopper dredge, water/slurry flowing through the weirs shall not exceed 10 minutes during dredging operations (to prevent overflow/overload). When using a hopper dredge, the fill level of the hopper dredge shall not exceed the load line to prevent any dredged material or water from spilling over the sides at the dredging site or during transit from the dredging site to the disposal site. No hopper dredge shall be

filled above this predetermined level. Before each hopper dredge is transported to the disposal site, the dredging site inspector shall certify that it is filled correctly. If a dredging or disposal operation does not require a hopper dredge than disregard this special condition.

12. BARGE OR SCOW OPERATIONS
When using a disposal barge or scow, no water shall be allowed to flow over the sides throughout the dredging and disposal operations. The fill level of the disposal barge or scow shall not exceed the load line to prevent any dredged material or water from spilling over the sides during all operations. No disposal barge or scow shall be filled above this predetermined level or load line (vessel frame/plating). Before each disposal barge or scow is transported to the disposal site, the Permittees dredging site inspector shall certify that it is filled correctly.

13. ELECTRONIC POSITIONING SYSTEM NAVIGATION
The Permittee shall use an electronic positioning system to navigate throughout all dredging, hauling, disposal, and discharge operations. The electronic positioning system shall have a minimum accuracy and precision of +/- 10 feet (or 3 meters). If the electronic positioning system fails or navigation problems are detected, all dredging operations shall cease until the failure or navigation problems are corrected.

14. POST-CONSTRUCTION REPORTING
The Permittee shall submit a post-construction/project completion report to the Corps Regulatory Division within 30 calendar days after completion of each dredging event to document compliance with all general and special conditions in this permit. The report shall include all information collected by the Permittee, the dredging operations inspector and the disposal operations inspector or the disposal vessel captain. One post-construction report (instead of separate reports) should be submitted for all activities conducted under the permit. The report must describe whether or not all general and special conditions were met. The report shall include:
A) project Name and Corps file number (eg. SPL-1980-12345-wtf).
B) Start date (month/day/year) and completion date of dredging and disposal operations.
C) The disposition and total cubic yards of all material disposed or discharged at each site or location.
D) Dredging method (e.g., hopper dredge, suction dredge, clamshell, dragline, etc.).
E) Mode of transportation.
F) Frequency of disposal and plots of all trips to the disposal or discharge site(s).
G) Tug boat or other disposal vessel logs documenting contact with the U.S. Coast Guard before each trip to the disposal or discharge site(s).
H) A detailed post-dredging bathymetry survey drawing of the dredging area. The survey drawing shall show areas above the dredging design depth shaded green, areas between the dredging design depth and overdredge depth shaded yellow, areas below overdredged depth that were not dredged or areas that were deeper than the overdredge depth before the project began as indicated on the pre-dredging survey shaded blue, and areas dredged below the overdredge depth or outside the project

boundaries shaded red. The methods used to record the post-construction dredging survey drawing shall be the same methods used in the pre-construction dredging survey drawing. The survey drawing shall be signed by the Permittee certifying that the data are accurate.
I) A description of any navigation problems and corrective measures implemented.
J) Copies of all completed Scow Certification Checklists for ocean disposal.

Section 10 (Work and Structures in Navigable Waters of the United States):

1. INTERFERENCE WITH NAVIGATION: The permitted activity shall not interfere with the right of the public to free navigation on all navigable waters of the United States as defined by 33 C.F.R. Part 329.

2. DISCHARGES: [REGULATOR: keep this condition if permitting non-dredging, Section 10 only activities. If the permit activities include dredging projects remove and use the dredging special conditions found in ORM]. No discharges of dredge or fill material is authorized by this permit.

3. CLEAN CONSTRUCTION PRACTICES: The Permittee shall discharge only clean construction materials suitable for use in the oceanic environment. The Permittee shall ensure no debris, soil, silt, sand, sawdust, rubbish, cement or concrete washings thereof, oil or petroleum products, hazardous/toxic/radioactive/munitions from construction or dredging or disposal shall be allowed to enter into or placed where it may be washed by rainfall or runoff into waters of the United States. Upon completion of the project authorized herein, any and all excess material or debris shall be completely removed from the work area and disposed of in an appropriate upland site.

4. OBSTRUCTIONS: The Permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the Permittee will be required, upon due notice from the Corps of Engineers Regulatory Division, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

5. U.S. COAST GUARD NOTIFICATION: To ensure navigational safety, the Permittee shall provide appropriate notifications to the U.S. Coast Guard as described below:

Local Notice to Mariners, 11th Coast Guard District
TEL: (510) 437-2980
Email: d11LNM@uscg.mil
Website: https://www.pacificarea.uscg.mil/Our-Organization/District-11/Prevention-Division/LnmRequest/

U.S. Coast Guard, District 11, LA-LB Sector
Captain of the Port (COTP)
Email: d11-SMB-SectorLALB-WWM@uscg.mil

A) The Permittee shall notify the U.S. Coast Guard, Commander, 11th Coast Guard District (dpw) and the U.S. Coast Guard, Sector LA-LB (COTP) (contact information shown above), not less than 14 calendar days prior to commencing work and as project information changes. The notification shall be provided by email with at least the following information, transmitted as an attached Word or PDF file:

1) project description including the type of operation (i.e. dredging, diving, construction, etc).
2) Location of operation, including Latitude / Longitude (NAD 83).
3) Work start and completion dates and the expected duration of operations. The U.S. Coast Guard needs to be notified if these dates change.
4) Vessels involved in the operation (name, size and type).
5) VHF-FM radio frequencies monitored by vessels on scene.
6) Point of contact and 24 -hour phone number.
7) Potential hazards to navigation.
8) Chart number for the area of operation.
9) Recommend the following language be used in the Local Notice to Mariners: "Mariners are urged to transit at their slowest safe speed to minimize wake, and proceed with caution after passing arrangements have been made."

B) The Permittee and its contractor(s) shall not remove, relocate, obstruct, willfully damage, make fast to, or interfere with any aids to navigation defined at 33 C.F.R. chapter I, subchapter C, part 66. Not less than 30 calendar days in advance of operating any equipment adjacent to any aids to navigation that require relocation or removal, the Permittee shall notify, in writing, the Eleventh U.S. Coast Guard District and the Corps Regulatory Division. The Permittee and its contractor(s) are prohibited from relocating or removing any aids to navigation until authorized to do so by the Corps Regulatory Division and the U.S. Coast Guard.

C) The Permittee is prohibited from establishing private aids to navigation in navigable waters of the United States until authorized to do so by the Corps Regulatory Division and the U.S. Coast Guard. Should the Permittee determine the work requires the temporary placement and use of private aids to navigation in navigable waters of the United States, the Permittee shall submit a request in writing to the Corps Regulatory Division and the U.S. Coast Guard.

D) The COTP may modify the deployment of marine construction equipment or mooring systems to safeguard navigation during project construction. The Permittee shall direct questions concerning lighting, equipment placement, and mooring to the appropriate COTP.

8. COMMENCEMENT AND COMPLETION NOTIFICATION: The Permittee shall notify

the Corps Regulatory Division of the date of commencement of work in navigable waters of the United States (within 10 calendar days prior to the start of construction) and completion of the activity (within 10 calendar days following the end of construction) using the enclosed forms.

9. CAULERPA PRE-CONSTRUCTION SURVEY: [REGULATOR: Delete this condition IF the project is in a Caulerpa-free system, is an individual, privately-owned boat dock or related structure and permitted activities are limited to structural repairs, replacement, modification, and pile-driving and do not include dredging or other significant bottom disturbing activities pursuant to the Caulerpa Control Protocol. More information about Caulerpa and efforts to prevent and control its spread, including the Control Protocol, a list of certified Caulerpa surveyors, and a list of infected systems go to: - https://www.fisheries.noaa.gov/west-coast/habitat-conservation/caulerpa-species-west-coast#caulerpa-control-protocol] A pre-construction survey of the project area for Caulerpa sp. (Caulerpa) shall be conducted by a certified Caulerpa surveyor in accordance with the Caulerpa Control Protocol (see https://media.fisheries.noaa.gov/2021-12/caulerpa-control-protocol-v5.pdf) not earlier than 90 calendar days prior to planned construction and not later than 30 calendar days prior to construction. The results of this survey shall be furnished to the Corps Regulatory Division, NOAA Fisheries, and the California Department of Fish and Wildlife (CDFW) at least 15 calendar days prior to initiation of work in navigable waters. In the event that Caulerpa is detected within the project area, the Permittee shall not commence work until such time as the infestation has been isolated, treated, and the risk of spread is eliminated as confirmed in writing by the Corps Regulatory Division, in consultation with NOAA Fisheries and CDFW.

10. EELGRASS SURVEYS: To determine if eelgrass is present, the permittee shall perform a pre-construction survey of the dredge area. Should any eelgrass be found, it will be avoided to the maximum extent practicable, and a post-construction survey will be conducted. If post-construction surveys indicate a loss of eelgrass as a result of this project, the Corps will coordinate with NMFS to mitigate the impacts in accordance with the California Eelgrass Mitigation Policy.

Cultural Resources:

Pursuant to 36 C.F.R. section 800.13, in the event of any discoveries during construction within waters within the Corps Permit Area of either human remains, archaeological deposits, or any other type of historic property, the Permittee shall notify the Corps Regulatory project Manager (Lisa Mangione, (805) 585-2150) and the Corps' Archaeology Staff (Daniel Grijalva, (213) 215-3228) within 24 hours. The Permittee shall immediately suspend all work in any area(s) where potential cultural resources are discovered. The Permittee shall not resume construction in the area surrounding the potential cultural resources until the Corps Regulatory Division re-authorizes project construction, per 36 C.F.R. Section 800.13.

Endangered Species Act:

1. This Corps permit does not authorize you to take any threatened or endangered species, in particular the southern sea otter, or adversely modify its designated critical habitat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you must comply). Pursuant to the FWS not likely to adversely affect concurrence letter dated November 15, 2023, including the required conservation measures, the Corps Regulatory Division has determined and the FWS has concurred that your activity is not likely to adversely affect the above species. Your authorization under this Corps permit is conditional upon your compliance with all of the required avoidance and minimization measures, which are incorporated by reference in this permit. Failure to comply with the required conservation measures would constitute non-compliance with your Corps permit.

2. Prior to initiation of project construction, the Permittee shall notify the U.S. Fish and Wildlife Service in writing of the intended project initiation date and anticipated duration of the construction period. The notification shall include verification of compliance with special condition 1.

NOAA Fisheries Mandatory Condition

1. In the unlikely event that any individuals of species listed by NOAA Fisheries under the Endangered Species Act appear to be entangled, injured, or killed as a result of the structures or work in navigable waters of the United States authorized by this permit, the permittee or designated representative shall immediately report the event to Lisa Mangione, Regulatory project Manager at the Regulatory Office of the Los Angeles District of the U.S. Army Corps of Engineers at (805) 585-2150 AND NOAA's Entanglement hotline 1-877-767-9425 or NOAA's West Coast Region Stranding hotline 1-866-767-6114. If you have any trouble contacting these hotlines, please immediately NOAA's Regional Stranding Coordinator, Justin Viezbicke, at 562-506-4315 or NOAA's Assistant Stranding Network Coordinator, Justin Greenman, at 707-496-7230. The finder should leave the plant or animal alone, make note of any circumstances likely causing the death or injury, note the location and number of individuals involved and, if possible, take photographs. Adult animals should not be disturbed unless circumstances arise where they are obviously injured or killed by discharge exposure, or some unnatural cause. The finder may be asked to carry out instructions provided by NOAA Fisheries to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

Rationale: Implementation of the above special conditions is required to facilitate avoidance and minimization of adverse effects associated with the proposed project.

14.0 Findings and Determinations

14.1 Section 176(c) of the Clean Air Act General Conformity Rule Review:

The proposed permit action has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities proposed under this permit will not exceed *de minimis* levels of direct or indirect emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps' continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons a conformity determination is not required for this permit action.

14.2 Presidential Executive Orders (EO)

14.2.1 EO 11988, Floodplain Management

This action is not located in a floodplain.

14.2.2 EO 12898, Environmental Justice

14.2.2.1 Provide details regarding screening and mapping tools and available information utilized during the review.

The United States Census Bureau's American Community Survey 5-Year Estimates for Selected Economic Characteristics and Hispanic-or-Latino Origin by Race were utilized during EJ review. The Federal CEQ guidelines for EJ were also used and identified minority groups as Asian, American Indian and Alaskan Native, Native Hawaiian and Pacific Islander, Black or African American, and Latino (CEQ 1997). CEQ further notes that a minority population (disadvantaged population) may be present if minorities exceed 50 percent of the existing population within an area or if a minority group comprises a meaningfully greater percentage of the local population than in the general population (CEQ 1997). A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds (CEQ 1997)..

14.2.2.2 Have disadvantaged communities been identified within the vicinity of the proposed project? No.

Although the DCPP is equidistant from the unincorporated communities of Los Osos and Avila Beach, the discharge staging area is in the City of Morro Bay and the discharge placement site is between the City of Morro Bay (Morro Bay) and the unincorporated community of Los Osos. Therefore, Los Osos, Avila Beach, Morro Bay, and the County were selected to look at EJ factors.

Both the EO and the CEQ definitions of EJ and minority groups assist in describing the pre-existing demographic conditions of the communities adjacent to the DCPP's proposed project area. Avila Beach, Los Osos, and Morro Bay serve as the EJ demographic references for population and minority groups. The County of San Luis Obispo was selected as the threshold reference for population and minority groups as it would presumably reflect an overall representative picture of the minor groups for all the residences in the County. The percentages of White population in Avila Beach, Los Osos, and Morro Bay are higher than the County average of 65.5 percent. The percentage of Hispanic or Latino populations in Avila Beach, Los Osos, and Morro Bay are lower than the County average of 23.8 percent. Based on the Federal CEQ guidelines, Avila Beach, Los Osos, and Morro Bay are not considered EJ communities.

14.2.3 EO 13112, Invasive Species, as amended by EO 13751

Through special conditions, which are listed in this evaluation, the permittee will be required to control the introduction and spread of exotic species.

14.2.4 EO 13212 and EO 13302, Energy Supply and Availability

The review was expedited and/or other actions were taken to the extent permitted by law and regulation to accelerate completion of this energy related project while maintaining safety, public health, and environmental protections.

14.3 Findings of No Significant Impact

Having reviewed the information provided by the applicant and all interested parties and an assessment of the environmental impacts, I find that this permit action will not have a significant impact on the quality of the human environment. Therefore, an environmental impact statement will not be required.

14.4 Compliance with the Section 404(b)(1) Guidelines

The proposed discharge complies with the Guidelines.

14.5 Public interest determination

Having reviewed and considered the information above, I find that the proposed project is not contrary to the public interest. The permit will be issued with appropriate conditions included to ensure minimal effects, ensure the authorized activity is not contrary to the public interest and/or ensure compliance of the activity with any of the authorities identified in Section 11.

PREPARED AND APPROVED BY:

Lisa Mangione

Date: December 12, 2023

Lisa Mangione
Senior project Manager

REVIEWED BY:

Date:

Crystal L.M. Huerta
Senior Project Manager
North Coast Branch
Regulatory Division

Diablo Canyon Intake Cove Dredging Project

Biological Assessment

Prepared for PG&E

By

SWCA Environmental Consultants
Project Number: 82823

Sara Snyder	8/21/2023
Prepared by	Date
Brian Dugas	8/21/2023
Checked by	Date
Brian Dugas	8/21/2023
Approved by	Date

Change History Log

Revision	Author(s)	Date	Description of Change
Rev0	Bo Gould (PG&E)	9-19-23	Included references to pre-dredging surveys conducted September 7, 2023.
Rev1	Bo Gould (PG&E)	9-21-23	Section 2 revisions, consolidated alternative methodologies
Rev2	Bo Gould (PG&E)	2-7-24	Revised Section 2.2 to more fully describe contingent clamshell dredging method included under Alternative 1

Table of Contents

List of Attachments

List of Acronyms and Abbreviations

Name	Description
BA	Biological Assessment
BIA	Biologically Important Area
CRLF	California Red-legged Frog
CY	Cubic Yards
DCPP	Diablo Canyon Power Plant
DNA	Deoxyribonucleic Acid
DPS	Distinct Populations Segment
ENP	Eastern North Pacific
ERM	Environmental Resource Management
ESA	Endangered Species Act
FIAER	Farallon Institute Advanced Ecosystem Research
FR	Federal Register
FT	Feet/Foot
MBRA	Marine Biological Resources Assessment
MLLW	Mean Lower Low Water
MWCP	Marine Wildlife Contingency Plan
MWO	Marine Wildlife Observer
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PBF	Physical and Biological Features
PG&E	Pacific Gas and Electric Company
TBRA	Terrestrial Biological Resources Assessment
Tenera	Tenera Environmental
Terra Verde	Terra Verde Environmental Consulting
TMP	Turbidity Management Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WNP	Western North Pacific

1. Introduction

The purpose of this Biological Assessment (BA) is to review the Proposed Project in sufficient detail to determine to what extent the Diablo Canyon Power Plant (DCPP) Intake Cove dredging (Proposed Action or Proposed Project) may affect endangered and/or threatened species that may occur in the Action Area (defined in Section 1.5, Action Area). The Action Area includes the Intake Cove, vessel path between the Intake Cove and the offshore dredged material placement site, and the offshore dredged material placement site. The information provided in this BA was prepared in accordance with legal requirements set forth under Section 7 of the Federal Endangered Species Act (ESA) (16 USC 1536 [c]), and follows the standards established in the United States Fish and Wildlife Services (USFWS) Endangered Species Consultation Handbook (USFWS and NMFS 1998 as amended in 2019). This BA is supporting the United States Army Corps of Engineers (USACE) effects determination on federally listed species. Species evaluated include both terrestrial and marine federally listed species that may occur within or around the Action Area. Species information pertaining to this BA were collected during the surveys and research conducted for the Terrestrial Biological Resources Assessment (TBRA; PG&E 2020a) and Marine Biological Resources Assessment (MBRA; PG&E 2020b) commissioned by PG&E for the DCPP Decommissioning Project. Additionally, focused marine surveys were conducted by Tenera Environmental, Inc. (Tenera) within the Intake Cove in September 2023.

The ten species analyzed in this BA are black abalone (*Haliotus cracherodii*), southern sea otter (*Enhydra lutris nereis*), humpback whale (*Megaptera novaeangliae*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), gray whale (*Eschrichtius robustus*), leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), western snowy plover (*Charadrius nivosus nivosus*), and California red-legged frog (*Rana draytonii;* CRLF). Federally designated Critical Habitat for four species occurs within or immediately adjacent to the Action Area: black abalone, humpback whale, leatherback sea turtle, and western snowy plover.

With the implementation of the proposed Conservation Measures (Section 6), the Project is expected to have **no effects** on black abalone, humpback whale, blue whale, fin whale, gray whale, leatherback sea turtle, green sea turtle, western snowy plover, and CRLF. The ESA-listed species that may be affected by the Proposed Action is the southern sea otter. As analyzed herein, the Proposed Action **may affect, but is not likely to adversely affect**, the southern sea otter.

1.1. Completed Biological and Habitat Studies

Biological and habitat studies were completed between 2017 and 2022 in support of the DCPP Decommissioning Project which describe both the marine and terrestrial baseline for the DCPP site. The results of these studies were included in an MBRA completed Tenera and Environmental Resource Management (ERM) in 2020 (PG&E 2020b) and a TBRA completed by Terra Verde Environmental Consulting, LLC (now SWCA Environmental Consultants [SWCA]) and ERM in 2020 (PG&E 2020a). In addition, a CRLF (*Rana draytonii*) Survey Report was completed by Terra Verde (now SWCA) in 2020 and 2022 (Terra Verde 2020 and 2022). Focused abalone, kelp, eelgrass, and

Caulerpa surveys were also completed by Tenera in early September 2023 to fulfill pre-dredging survey commitments. These studies were relied upon to support the development of this BA.

1.2. Project Location

DCPP is situated on a coastal terrace in central California, midway between the coastal communities of Los Osos and Avila Beach (Appendix A – Figure 1). The DCPP Site is within a 750-acre Nuclear Regulatory Commission licensed boundary located nine miles northwest of Avila Beach. It is accessible via a security entrance at the end of Avila Drive and then by travelling approximately seven miles on a primary access road to the DCPP Site. The DCPP Site is surrounded by the owner-controlled area which consists of lands between the Port San Luis gate and Security Gate A, bounded by the eastern hills directly adjacent to the site access road and the northern evacuation route, and bounded to the west by the Pacific Ocean.

The Intake Cove is approximately 10 acres in size and is formed by two breakwaters that protect the Intake Structure for the DCPP. The shoreline perimeter of the Intake Cove consists of a combination of granite boulder riprap, concrete tribars that form the breakwaters, natural bedrock, and the concrete sea wall of the Intake Structure. The seabed of the Intake Cove consists of sand and soft sediments, boulder fields, low rock ridges, and emergent rocks during low tides. While large areas of the seabed in the back portions of the cove to the east furthest away from the entrance consist of soft, unconsolidated sediments, the seabed between the entrance to the Intake Cove and the Intake Structure largely consists of sand and is influenced by onshore currents generated by operation of the DCPP cooling water intake. The depth of the center portions of the Intake Cove varies from -16 feet (FT) mean lower low water (MLLW) in the back (eastern) part of the cove to -33 FT MLLW in front of the Intake Structure.

1.3. Purpose and Need

The purpose of the Project is to remove the accumulated sand and sediment from the Intake Cove at the entrance of the Intake Structure of the DCPP. Seawater enters the Intake Structure, passes through a series of bar racks and screens and water tunnels, and then enters the DCPP where it is used to condense steam for the reactors. Over the last decade, shoaling of sand and sediment has occurred in front of the base of the Intake Structure's bar racks; recently the rate of accumulation has increased. If the accumulated sand and sediment is not removed, it could inundate the Intake Structure. The proposed Project is intended to address the following:

- Sand and sediment buildup in the Intake Channel is a direct, immediate threat to the reliable and safe operations of DCPP, which is a critical California power resource for stability of the State of California's electrical grid system.
    - For unknown reasons, the rate of sand and sediment buildup has radically increased based on historical observations – PG&E has not needed to dredge, nor has it observed this sedimentation phenomena in over four decades.
    - Differential pressure across seawater components can result in unexpected derating of the power plant or shutdown.

- Rising steam plant water temperature parameters (due to shallower water in the Intake Cove) can affect generator cooling and condenser performance, posing a risk to the overall cooling system.
- Unprecedented sand and sediment buildup has been observed in seawater equipment resulting in equipment challenges and increased risk of shutdown.
- Shallow Intake Channel depths are promoting additional kelp and algal growth, thereby raising the risk of seawater system fouling and inadvertent plant shutdown.

- In addition, the shallow Intake Channel depths now pose significant safety risk to scuba divers performing required critical maintenance activities of the Intake Structure.

Figure 2 shows the Intake Cove and Proposed Dredge Area.

1.4. Background

DCPP is a nuclear-powered steam electric generating facility that began commercial operation on May 7, 1985, for Unit 1 and March 13, 1986, for Unit 2. Each unit is powered by a Westinghouse pressurized water reactor. At full capacity, Unit 1 and Unit 2 each has a thermal rating of 3,411 megawatt thermal, with corresponding gross electrical outputs of 1,190 megawatt electrical. The design net electrical capacities are 1,138 and 1,147 megawatts-electric for Units 1 and 2, respectively. Maintenance dredging of the Intake Cove has not been previously conducted.

1.5. Action Area

The Action Area is defined in 50 C.F.R. § 402.02 as "all areas to be directly or indirectly affected by the federal action and not merely the immediate area involved in the action." Under Section 7, the effects include effects of other actions interrelated or interdependent of the action (50 CFR 402.2). USFWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries considers an activity to be interrelated or interdependent with a federal action if the activity would not occur "but for" the federal action under consultation (USFWS and NMFS 1998). Past and present effects of other federal, state, and private actions, as well as anticipated effects of activities that have already been subject to Section 7 consultation, are part of the environmental baseline and are not considered effects of the action (50 CFR 402.02). Due to the coastal nature of the Proposed Action and overlapping ranges of the listed species analyzed herein, the Action Area is under the jurisdiction of both NOAA Fisheries and the USFWS.

The Action Area consists of the Intake Cove and the offshore placement site, along with the vessel path between the two sites. The Intake Cove has a surface area of approximately 10 acres and dredging will occur within an approximately 125,000 square FT area at the north end of the Intake Cove. The offshore placement site is located directly south of the Morro Bay Harbor entrance and just offshore of the sand spit at Montaña de Oro State Park. The placement site footprint is approximately 1,115 FT in width perpendicular to the beach, and 4,430 FT in length, running parallel to the beach (Appendix A – Figure 3). Lastly, because direct and indirect effects from vessel activity are included in this BA, the vessel activity between the Intake Cove, Morro Bay Harbor, and the offshore placement site falls within NOAA Fisheries jurisdiction and is considered part of the

Action Area. Due to the presence of southern sea otter, which is under the jurisdiction of USFWS, the USFWS Action Area is the same as the NOAA Action Area described above.

1.6. Previous Projects

Aside from the construction of the Intake Cove and Intake Structure, there are no previous projects. No maintenance dredging with the Intake Cove has occurred.

2. Proposed Project and Alternatives Considered

2.1. Authorization

Dredging of the Intake Cove would require authorization by the USACE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act.

2.2. Alternatives Considered

The following alternatives were considered for the Proposed Action:

- Alternative 1 (Preferred): Proposed Project (Full Dredging Footprint with Nearshore Dredge Placement Location)
- Alternative 2: Reduced Dredging Footprint (Reduced Footprint)
- Alternative 3: Alternative Disposal Location (Onshore Dredged Placement Location)
- Alternative 4: No Action (No Dredging)

Alternatives to dredging, such as modifications to the Intake Structure or relocation of the Intake Structure, are not feasible due to technical, economic, and environmental constraints. Such alternatives would involve overcoming significant engineering hurdles, non-proportional cost implications, and adverse impacts to the surrounding marine environment. These alternatives could not be accomplished in time to address the current needs of existing DCCP infrastructure surrounding the Intake Cove. The required footprint of dredging will have limited impacts to coastal and marine resources compared to any project that would modify or relocate the Intake Structure. As such, alternatives to dredging were not evaluated further.

The Alternatives considered are as follows:

2.2.1. Proposed Project (Alternative 1)

The Proposed Project (Alternative 1) consists of a singular dredging event within the Intake Cove of the DCPP, as well as placement of suitable dredge material within the USACE nearshore area offshore of Montaña de Oro State Park, near Morro Bay, California. It is anticipated that total mobilization, dredging, and demobilization would take approximately one to three months to complete. The precise schedule is contingent upon a variety of factors, including weather, wave action, wildlife stoppages, and equipment availability.

2.2.1.1. Dredging

A maximum of 70,000 cubic yards (CY) of sand and sediment would be dredged in the Intake Cove of the DCPP, covering an area of approximately 125,000 square FT at the north end of the Intake Cove. The removal is anticipated to result in approximately 60,175 CY of sand and sediment to a depth of -36 FT MLLW, with up to 2 FT of over-dredge to -38 FT MLLW, resulting in an additional 9,089 CY.

The following is the anticipated list of equipment for the Proposed Project (Alternative 1):

- barge equipped with a hydraulic suction dredge and/or environmental clamshell bucket (as a contingent approach)
- scow barges and tugs (to transport material)
- support vessel(s) for crew

2.2.1.2. Placement of Suitable Dredged Material Area(s)

The Proposed Project (Alternative 1) would include placement of dredge material at USACE Nearshore Placement Area located south of the entrance to Morro Bay and west of Montaña de Oro State Park. The geographic location of the approximate center of the proposed placement Site is 35° 20' 33.1" and -120° 52' 8.7" (NAD 83). The placement site is the location found in the USACE Draft Environmental Assessment Morro Bay Six Year Federal Maintenance Dredging Program San Luis Obispo County, CA (USACE 2013). The proposed placement site is directly south of the Morro Bay harbor entrance and just offshore in approximately -20 to -40 FT MLLW depth. The placement site footprint is approximately 1,115 FT in width perpendicular to the beach, and 4,430 FT in length, running parallel to the beach (Appendix A – Figure 3).

2.2.1.3. Staging Area(s)

The primary staging area would be located at the Morro Bay Harbor, within the City of Morro Bay, with secondary staging areas within the parking area near the Intake Structure and possibly Port San Luis.

2.2.1.4. Equipment Mooring

The small dock within the Intake Cove is available for the dredging contractor as a light-duty marine access area for transfer of personnel, if needed. The dredge barge and scow are anticipated to be secured overnight within the Intake Cove, pursuant to the Anchoring Plan which is being developed and will be submitted to permitting agencies prior to start of dredging activities.

2.2.1.5. Dredging Crew Parking

The dredging crew would park vehicles at the Intake Cove parking area and transfer to the dredging barge via a tender.

2.2.1.6. Dredging Methodology

To minimize turbidity impacts in the immediate vicinity of the Intake Structure, a suction dredge barge would work within the dredging footprint and convey the sediment via a pipe/hose to the scow barge and tug. This would allow for the dredged sand and sediment to be discharged into the scow barge away from the Intake Structure, as shown approximately in Exhibit A, below.

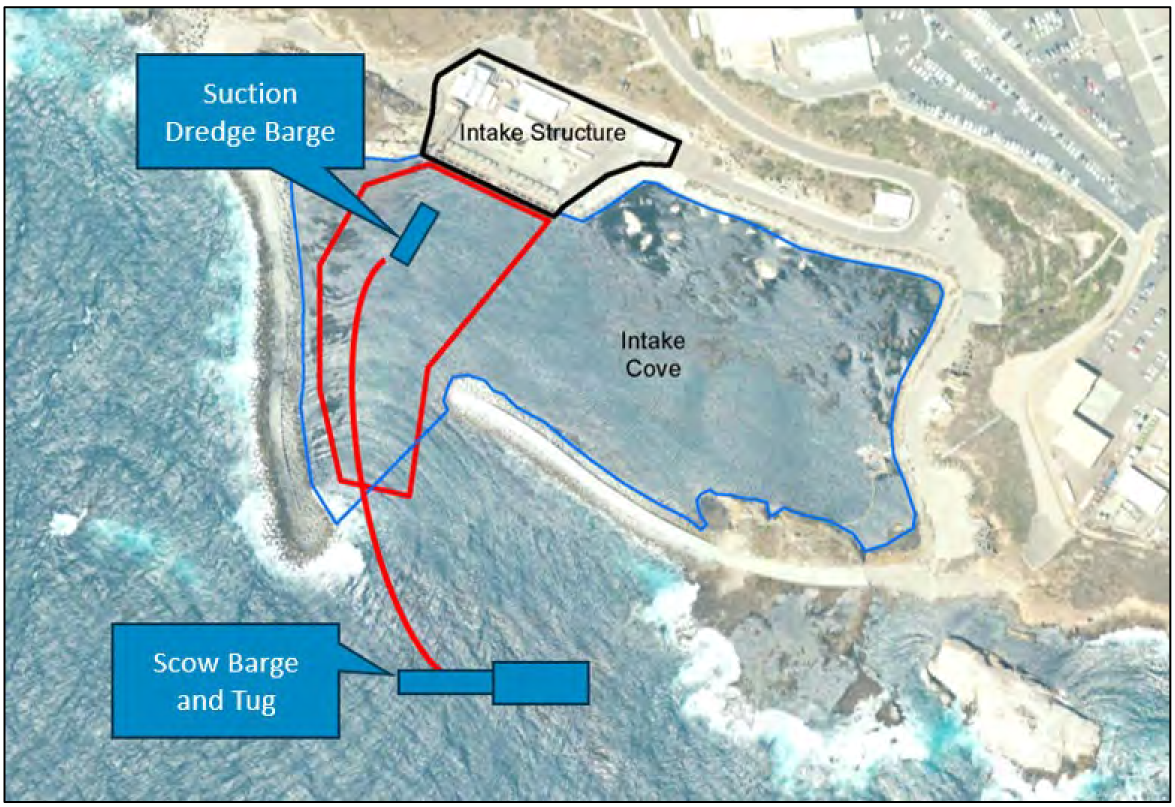

Exhibit A: Conceptual Suction Dredge Layout

As part of Alternative 1, PG&E proposes to have environmental clamshell dredging equipment available as a contingent method, to be used (1) if sediments are encountered that would warrant usage of clamshell bucket dredging for increased efficiency or less disturbance to the surrounding environment and/or DCPP infrastructure or (2) if there are operational issues with the hydraulic suction dredge equipment and the environmental clamshell bucket would have similar effectiveness and no greater environmental impacts. The environmental clamshell bucket allows for a much more controlled dredging operation than standard mechanical dredging, and fully encloses sediments within the bucket to minimize turbidity that could result from using standard mechanical dredging equipment. Downward pressure ensures that each bucket is full of material and not water, resulting in a reduction of the turbidity at the dredge site, and the volume of water in the dump scows; eliminating, or at a minimum drastically reducing, the need to decant large amounts of water prior to transferring the scows to the disposal site. To prevent material from being spilled, the sides of the environmental clamshell bucket have strong rubber seals. These seals form a tight bond, so when the clamshell is raised, material cannot escape, and turbidity is minimized.

If environmental clamshell dredging is utilized within the Intake Cove, a scow would be secured to the dredge barge and the clamshell bucket would place material into the scow until full, at which time it would be transported via tug to the disposal site. See Exhibit B, below, for a conceptual layout. Because the environmental clamshell bucket fully encloses the dredged sediment and minimizes captured water, there would be no need to decant large amounts of water within the Intake Cove, so there would be no decanting-associated turbidity effects.

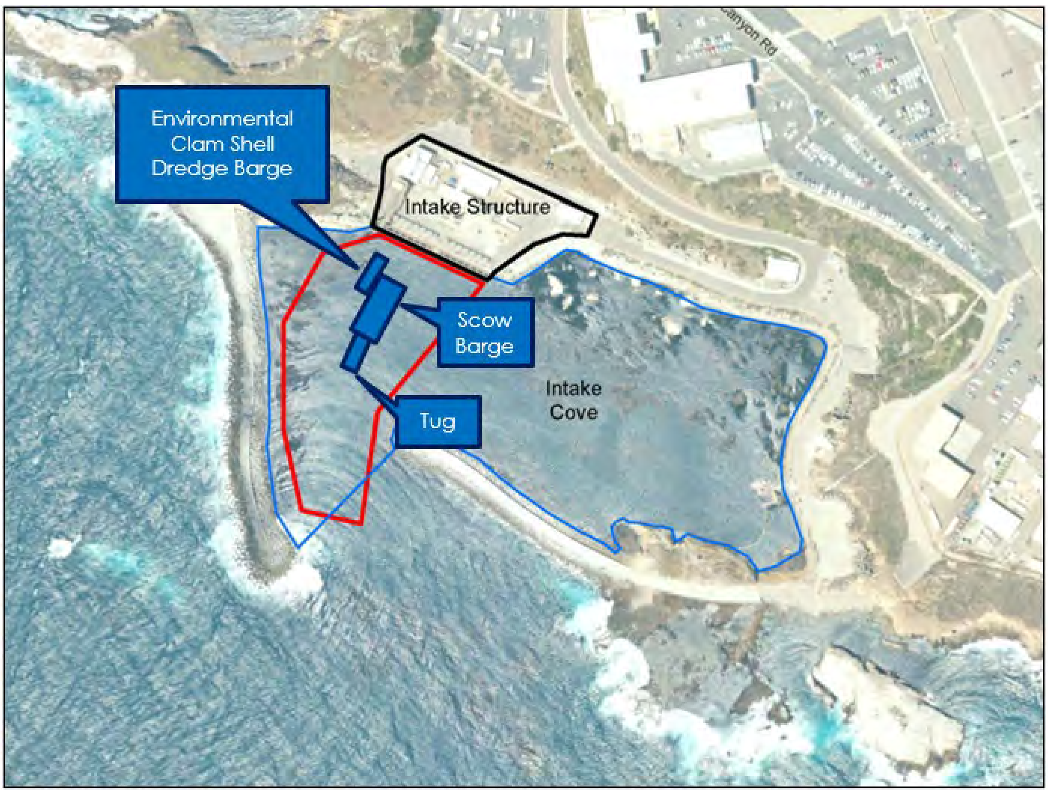

Exhibit B: Conceptual Clamshell Dredge Layout (Contingent Approach)

Note the precise layout and equipment/positions will be determined in coordination with the retained Dredging Contractor.

2.2.1.7. Scheduling Alternatives

Implementation of the Proposed Project (Alternative 1) would occur in Spring 2024 (weather permitting). There are no schedule alternatives since the Proposed Project is a short-term activity needed to address immediate threats to the reliable and safe operations of DCPP.

2.2.2. Reduced Dredging Footprint (Alternative 2)

This alternative would be similar to the approach described under Alternative 1; however, the footprint of the dredging area would be limited to the areas immediately surrounding the Intake Structure.

This alternative has been deemed not feasible due to the sand and sediment deposition dynamics within the Intake Cove. Limiting the footprint of dredging to areas immediately surrounding the Intake Structure would not fully address the Project purpose and need and would result in more frequent maintenance dredging events to be required. Moreover, reducing the dredging footprint would not measurably reduce potential environmental impacts, due to the limited duration required for dredging and the anticipated time required to mobilize, demobilize, and the barge transit time to the nearshore dredge placement area

2.2.3. Onshore Dredged Material Location (Alternative 3)

The Onshore Dredge Material Location Alternative (Alternative 3) consists of a singular dredging event within the Intake Cove of the DCPP, consistent with the Proposed Project (Alternative 1); however, placement of suitable dredge material would occur onshore within an approximately 20-acre area on the DCPP property (Appendix A – Figure 4).

The maximum total amount of sediment that is expected to be dredged is approximately 70,000 CY. For this alternative, dredging would take place approximately one day per week for 14 weeks (due to time required to allow the dredge material to decant prior to hauling); and total project would take approximately four to six months to complete.

In addition to the equipment needed for Alternative 1, the following additional equipment would be required for Alternative 3:

- 300 series excavator
- skip loader
- front-end rubber-tired loader
- electrical pumps for de-watering
- dump trucks for hauling material

2.2.3.1. De-watering and Placement of Dredge Material

This alternative would require the material to be brought onshore at the Intake Cove and de-canted within a temporary de-watering area, then transported to the designated onshore placement area for placement. Under this alternative, a decanting area would be constructed within the Intake Cove parking area, which would allow for several thousand cubic yards of sediment to be allowed to drain and de-water until it has sufficiently dried to allow for loading onto dump truck for transfer to the onshore placement area. Water draining from the decanting area would be filtered prior to return to the Intake Cove. The decanted dredge material would be loaded onto 10-wheel dump trucks (15 CY capacity) and transported to the placement area, located approximately 3 miles northwest of the Intake Cove.

At the placement site, the material would be offloaded and spread out at a depth of two feet over an approximately 20-acre area. The placed material would be compacted, stabilized utilizing sediment and erosion control devices (e.g., silt fencing, straw wattles), amended, and seeded to promote vegetative growth.

2.2.4. No Action Alternative

The No Action Alternative assumes that no Federal action would be undertaken to address the Intake Cove dredging and no Federal placement of suitable dredged material at the nearshore dredge material placement area would occur. The No Action Alternative (Alternative 4) is carried forward for evaluation and analysis in this BA in compliance with the National Environmental Policy Act. As a result, there would be continued accumulation of sand at the Intake Structure. A risk to facility operations and scuba divers working to maintain the Intake Structure can be expected if sediment clearance in front of the Intake Structure is not maintained. Based on recent California Energy Commission findings, this alternative is not feasible as it would pose risks to the State’s electricity reliability due to anticipated energy supply shortfalls during extreme weather events driven by climate change (Erne and Kootstra 2023).

2.3. Preferred Alternative

Alternative 1 is the preferred Project because it will adequately address the purpose and need of maintaining safe and reliable operation of the facility, while minimizing environmental impacts. Alternatives 2, 3, and 4 have been deemed not feasible or environmentally more damaging, as they would not address the project purpose and need, could result in additional impacts to listed species due to increased project time, onshore dredge material placement, and/or result in the need for frequent repeat dredging. As such, the analysis that follows focuses on the effects of implementing Alternative 1.

3. Environmental Baseline

3.1. Environmental Setting

The DCPP facility is situated on a coastal terrace in central California, midway between the coastal communities of Los Osos and Avila Beach. The region is characterized by a typical Mediterranean climate with warm, dry summers and mild, rainy winters. The site also receives significant marine influence, such as summer fog and strong onshore winds. The approximately 10-mile stretch of almost continuous rocky shoreline between Point Buchon and Point San Luis consists of wave-exposed headlands alternating with semi-protected coves. The Intake Cove is an artificial embayment between South Diablo Point (upcoast) and Intake Rock, a large rock approximately 30 FT high and 330 FT diameter. The artificial cove results from the confinement of a natural stretch of coastline between two breakwater structures created with concrete tribars. The shoreline consists of a granite boulder riprap-armored and graded road, a vertical concrete curtain wall forming the ocean-side of the Intake Structure, and some sections of natural rock upcoast of the Intake Structure. The depth of the center portions of the Intake Cove varies from -16 FT MLLW in the back (eastern) part of the cove to -33 FT MLLW in front of the Intake Structure. The seabed within the cove consists of sand and soft sediments, boulder fields, low rock ridges, and emergent rocks during low tides. Large areas of the seabed in the eastern back portions of the cove furthest away from the entrance consist of soft, unconsolidated sediments. The seabed between the entrance to the Intake Cove and the Intake Structure largely consists of sand and is influenced by onshore currents generated by operation of the DCPP cooling water intake.

The marine environment at the DCPP is representative of the typical California rocky nearshore intertidal and subtidal areas which is characterized by diverse assemblages of algae, invertebrates, and fishes (Ricketts et al. 1985, Foster et al. 1988, Foster and Schiel 2015). The algae are of ecological importance, serving as food and shelter for associated animals (Lubchenco 1978, Kitting 1980, Cubit 1984, Geller 1991, Foster and Schiel 2015). The high diversity of plants and animals, and their abundance and distributions within the different nearshore zones, results from variations in physical factors (temperature, elevation, wave exposure, open space, substrate type) and biological factors (grazing, predation, space competition, and recruitment episodes) (Dayton 1971, Connell 1972, Lubchenco and Menge 1978, McGuinness 1987, Menge et al. 1994).

The natural ecological setting and species composition in the nearshore area of DCPP have been previously described by Sparling (1977), Gotshall et al. (1984), North et al. (1989), and Tenera (Tenera 1988, 1997, 2002). It resembles other central California rocky nearshore habitats north of Point Conception (located 60 miles south of DCPP), as described by Ricketts et al. (1985) and Foster and Schiel (2015). Point Conception serves as a biogeographic transition point between warm-temperate organisms to the south and cool-temperate organisms to the north (Murray and Littler 1981, Haury et al. 1986, Hobson 1994). The entire area from approximately Monterey Bay south to San Diego is recognized as a biogeographic transition zone between the Oregonian Province north of Point Conception and the Californian Province that extends south to Magdalena Bay in southern Baja California (Morris et al. 1980). Although cool-temperate organisms predominate in the area around DCPP, the area also contains some organisms with primarily warm-temperate distributions (Abbott and North 1971). Abundances of many organisms in central California nearshore communities fluctuate during the year, particularly in response to winter storm waves, whereas fewer seasonal storm-related changes occur south of Point Conception.

The surrounding terrestrial landscape consists of relatively intact natural communities on rolling coastal hills and bluffs in a mosaic of grazed annual grassland, coast live oak woodland, riparian woodland, chaparral, and coastal scrub. A perennial man-made pond (e.g., "Tom's Pond") is present at the edge of the coastal bluff approximately 1.5 miles north of the DCPP facility and approximately 0.33 mile north of the Alternative 3 onshore placement site. Anthropogenic and ruderal areas are concentrated around the DCPP facility, with appurtenant facilities scattered across the site.

4. Listed Species Considered

This chapter provides discussion of the ten federally listed species analyzed in this BA. Western snowy plover is evaluated due to known onshore occurrences near the offshore placement site. In addition, CRLF is evaluated due to known occurrences near the facility, including near the onshore placement site in Alternative 3. Below are discussions of the protection status, physical description, habitat associations, behavior, geographic range, and other relevant information for each species.

4.1. Black Abalone

4.1.1. Status and Distribution

Black abalone have been listed as endangered under the ESA since 2009 (74 FR 1973). Black Abalone are plant-eating marine snails commonly found in rocky intertidal and subtidal reefs along the California and Baja California coast. They feed on macroalgae such as various forms of kelp and sea palm (NOAA 2023a).

The geographical range for black abalone extends generally from Point Arena (Mendocino County, California) south to Bahia Tortugas, Mexico. Adult black abalone are relatively sedentary, benthic gastropod mollusks (a type of snail) that can reach 8 inches long and can live up to 30 years. Black abalone is the only abalone species in California that primarily occurs in rocky intertidal habitat as adults; the remaining abalone species are found in subtidal habitat.

4.1.2. Threats and Reasons for Decline

The black abalone population began to decline in the late 1980s due to a disease called Withering Syndrome that is caused by a prokaryotic pathogen that is currently called *Candidatus Xenohaliotis californiensis* (NOAA 2018). Continued decline occurred through the 1990s with populations as far north as Cambria, north of DCPP at the northern border of San Luis County declining in abundance by more than 80 percent (NOAA 2018). Similar declines are well documented throughout California in scientific studies.

Black abalone are broadcast spawners and as a result, males and females must be within approximately 15 FT of one another to ensure successful fertilization. The combination of this reproductive strategy with the limited larval dispersal of black abalone and the low population density has caused breeding among closely related individuals in spatially constrained clusters/sub-populations throughout the species' range. The combination of these factors has caused current black abalone populations to have low levels of gene flow. Low gene flow can lead to more vulnerable populations and extinction as compared to a similar sized population with a higher level of gene flow.

4.1.3. Critical Habitat

Critical habitat for black abalone was designated in 2011 (76 FR 66806). The geographical extent, which includes the DCPP site, encompasses over 139 square miles of intertidal and shallow subtidal rocky habitat in California from Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula. It also includes habitat on the Farallon Islands, Año Nuevo Island, San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, Santa Barbara Island, and Santa Catalina Island (NOAA 2011). Within these geographical boundaries, the designation encompasses all rocky intertidal and subtidal habitats from the mean higher high-water line to a depth of 20 FT (relative to the MLLW), as well as coastal marine waters overlying this zone.

During development of the Final Rule (76 FR 66806), critical habitat was divided into 20 Specific Areas of roughly equal area that contain at least one essential physical and biological feature (PBF; previously primary constituent elements) that may require special management considerations or protection. The DCPP site occurs within Specific Area 10. This area includes rocky intertidal and subtidal habitats from Montaña de Oro, San Luis Obispo County to just south of Government Point, Santa Barbara County.

4.1.4. Recovery Plan

The final recovery plan for black abalone was published November of 2020 (NMFS 2020a). The objectives outlined in the recovery plan to restore black abalone populations in the wild such that the species can be downlisted to threatened are:

- Increase the abundance, productivity, local spatial structure/distribution, and genetic diversity of black abalone populations to levels that support the species' long-term survival, viability, and resilience to existing and emerging threats.
- Sufficiently address the threats of concern, including contaminant spills, spill response activities, illegal harvest, habitat loss, and potential introductions of new/emerging pathogens.

4.1.5. Black Abalone in the Project Area

An established population of black abalone occurs at the DCPP site. During intertidal transect surveys conducted in 2020, one black abalone was observed on the seaward side of east breakwater and three were observed on the seaward side of the west breakwater (PG&E 2020b). The likelihood of black abalone occurring inside the Intake Cove along the breakwaters and rocky habitat adjacent to the Intake Structure is low and the species is not expected within the dredging footprint. A focused pre-dredging black abalone survey was conducted by Tenera divers within the Intake Cove on September 7, 2023. No black abalone were detected within the Intake Cove survey area, including the dredging footprint and adjacent rocky habitats.

4.2. Southern Sea Otter

4.2.1. Status and Distribution

The southern sea otter is a federally threatened marine dwelling member of the weasel family (Mustelidae) (USFWS 2015). They are known to live along the California coast from San Mateo County to Santa Barbara County (USFWS 2019). Southern sea otters mainly consume marine invertebrates and utilize rocks as tools to break into mollusk shells as their main source of food. Based on the habitat surrounding DCPP, the rocky substrate and algal growth supports sea otter food resources, which include abalone, rock crabs, sea urchins, kelp crabs, clams, turban snails, mussels, octopus, barnacles, scallops, sea stars, and chitons (USFWS 2019).

4.2.2. Threats and Reasons for Decline

During the 18th and early 19th century, sea otters were hunted for their pelts to the point of near extinction. In 1911, protections for the southern sea otter were established and as a result, populations have gradually expanded from a small number of surviving individuals near Bixby Creek in Monterey County. Recently, large mortality events were caused by domoic acid poisoning due to red tide events (naturally occurring phytoplankton blooms). Currently, white shark attacks are the single most important cause of mortality for southern sea otter, accounting for more than 50 percent of recovered carcasses. The reasons for the increase in shark bites are not well understood, but it may be related to the white shark behavior and distribution associated with increasing populations of northern elephant seals and California sea lions along the California coastline.

4.2.3. Critical Habitat

Critical habitat has not been designated for southern sea otter.

4.2.4. Recovery Plan

Last revised in 2003 (USFWS), the southern sea otter recovery plan identifies the following goals:

- monitoring and analyzing sea otter population demographics and life history parameters with a biannual population census
- protection of the sea otter population
- reduce or eliminate threats due to human activities
- implementation of education and outreach efforts which focus on sea otters and their survival

4.2.5. Southern Sea Otter in the Project Area

Southern sea otters are commonly observed in the Intake Cove with groups of up to approximately 30 southern sea otters historically observed (PG&E 2020b). These animals typically stay overnight within the cove and disperse to offshore foraging areas during the day. Preferred rafting locations in the immediate vicinity of the DCPP include the protected areas of the Intake Cove, North Diablo Cove, and Lion Rock. As such, southern sea otters may be present within and/or adjacent to the Action Area during Project activities.

4.3. Humpback Whale

4.3.1. Status and Distribution

Humpback whales (*Megaptera novaeangliae*) are a common Mysticete species which live along the northern and central California coastline. Humpback whales listed as endangered (Central American distinct population segments [DPS]) and threatened (Mexico DPS) under the ESA occur in California waters, including waters adjacent to the DCPP site (NOAA 2021a). Humpback whales from these two DPS commonly occur in California waters during their feeding season (summer and fall). Whales from the Central American DPS tend to be more frequently observed in the southern parts of the feeding grounds than the Mexico DPS whales. It is expected that almost all the Central American DPS whales feed in California and Oregon. Whales from the Mexico DPS also feed in Washington and Alaskan waters. Whales from the Hawaii DPS, which is unlisted under the ESA, have also been observed feeding in California waters; however, these whales primarily feed in Southeast Alaska, Northern British Columbia, northern Gulf of Alaska, and the Bering Sea (NOAA 2021a).

4.3.2. Threats and Reasons for Decline

Prior to the established moratorium on commercial whaling in 1985 in the U.S., humpback whale populations were reduced by over 95 percent (NOAA 2023b). Accidental vessel strikes, entanglement in fishing gear, and inadvertent vessel-based harassment are among the top listed threats to the species. Additionally, the extent of impacts to humpback whales from climate change are unknown but are considered a potential threat to population numbers.

4.3.3. Critical Habitat

NOAA Fisheries published the final rule to designate critical habitat for the endangered Western North Pacific DPS the endangered Central America DPS, and the threatened Mexico DPS of humpback whales (*Megaptera novaeangliae*) pursuant to Section 4 of the ESA (NOAA 2021a). Specific areas designated as critical habitat under 81 FR 62260 are for the Western North Pacific DPS of humpback whales contain approximately 59,411 square nautical miles (nmi^2) of marine habitat in the North Pacific Ocean, including areas within the eastern Bering Sea and Gulf of Alaska (NOAA 2021a). Specific areas designated as critical habitat for the Central America DPS of humpback whales contain approximately 48,521 nmi^2 of marine habitat in the North Pacific Ocean within the portions of the California Current Ecosystem off the coasts of Washington, Oregon, and California. Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nmi^2 of marine habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem (NOAA 2021a).

Critical habitat for humpback whale begins approximately 0.6 miles from the DCPP site. It is unlikely that humpback whale would occur near the Intake Cove; however, there is higher likelihood that humpback whale may occur in waters surrounding the vessel route.

4.3.4. Recovery Plan

The humpback whale recovery (NMFS 1991) plan outlines the following recommended actions:

- reduction or elimination of injury and mortality caused by fisheries, fishing gear, and vessel collisions
- minimization of effects from vessel disturbance
- continuation of the international moratorium on commercial whaling
- expansive data collection efforts from dead whales through the NOAA Marine Mammal Health and Stranding Program

4.3.5. Humpback Whale in the Project Area

Humpback whales are observed regularly from the DCPP site, typically 0.6 to 1.2 miles offshore of the facility and most commonly from late summer through early winter (PG&E 2020b). Whales have been observed feeding as close to the DCPP site as the seaward side of Diablo Rock (less than 1,640 FT from the discharge) on at least one occasion (J. Steinbeck [Tenera] pers. obs.) and have been observed on 52 occasions on transects completed within 37 miles of the DCPP site between 1987 and 2015 (FIAER et al. 2017). They are regularly observed from the DCPP site, although their distribution remains offshore of the facility, and they do not come close to the Intake Cove (PG&E 2020b). Due to their offshore presence, humpback whales may encounter vessels traveling between the site, Morro Bay Harbor, and/or the offshore placement site.

4.4. Blue Whale

4.4.1. Status and Distribution

Blue whale (*Balaenoptera musculus*) is listed as endangered under the ESA throughout their range. The Eastern North Pacific stock predominates in the Gulf of Alaska, and the west coast of the U.S., including California waters. Due to commercial whaling, it is estimated that between 1905 and 1971, approximately 3,411 blue whales were removed from the population. Population estimates for data collected in 2018 suggest the population is around 1,898.

Blue whales spend the summer season feeding in northern latitudes and migrate to tropical and subtropical regions in the winter to breed and calve. The Eastern North Pacific Stock also have two distinct populations (NOAA 2022a). The highest abundance of blue whale occurred in the mid-1990s, with colder weather conditions (NOAA 2022a). Due to warming waters, the population distribution is seeing a northern shift. Though overall distribution and migration patterns vary, it is known that their presence is mostly determined by the availability of food (NOAA 2022a). Blue whales primarily attain their nutrients from krill.

4.4.2. Threats and Reason for Decline

Since protections have been put in place by NOAA to preserve the species and ban commercial whaling practices in the U.S. (1985), the main threat and reason for decline to blue whale are vessel strikes. Most observed vessel strikes to blue whales have occurred in southern California or near the San Francisco Bay Area, where blue whales seasonally congregate to feed on krill (Berman-Kowalewski et al. 2010). In relation to effects from vessels on the species, underwater noise from vessel activities can cause behavior threats and noise associated with sonar use can cause alternations in diving and feeding behavior (NOAA 2022a).

Another main threat to blue whales is entanglement in fishing gear (NOAA 2022a). Once entangled, blue whales either swim away with the gear still attached or become anchored and trapped. Blue whales have been known to become entangled in varying gear types such as traps, pots, and nets. Entanglement can lead to cascading negative effects on feeding ability, injury, and reproductive success, leading to fatigue and potentially death (NOAA 2022a).

4.4.3. Critical Habitat

While there is no designated critical habitat for blue whales, there are nine identified feeding areas (also referred to as Biologically Important Areas [BIAs]) along California's coast (NOAA 2022a). These feeding areas represent both nearshore and offshore areas which overlap with existing anthropogenic activities (shipping, oil and gas extraction, and military activities) in the region. The U.S. west coast is considered a biologically important area for blue whale in the summer and fall for feeding (NOAA 2022a). The closest BIA to the Action Area is the Point Conception/Arguello BIA, which is approximately 21 miles south of the Action Area (Calambokidis et al. 2015). None of the BIAs intersect with the Action Area.

4.4.4. Recovery Plan

The blue whale recovery plan (NMFS 2020) identifies six objectives to recover the species:

- Coordinate federal and international measures to maintain international regulation of whaling for blue whales.
- Determine blue whale taxonomy, population structure, occurrence, distribution, and range.
- Estimate population size and monitor trends in abundance.
- Identify, characterize, protect, and monitor habitat important to blue whale populations.
- Investigate human-caused potential threats and, should they be determined to be limiting blue whale recovery, take steps to minimize their occurrence and severity.
- Maximize efforts to acquire information from dead, stranded, and entangled or entrapped blue whales.
- Increase resiliency by managing or eliminating significant anthropogenic threats.

4.4.5. Blue Whale in the Project Area

There are no known occurrences of blue whales immediately offshore of the DCPP site; however, data available from GPS satellite tags (Bailey et al. 2009) indicate the persistent presence of blue whales within approximately 40 miles of the DCPP site for at least the period from August through September. Blue whales have been observed on 15 occasions on transects completed within 37 miles of the DCPP site between 1987 and 2015 (FIAER et al. 2017). Due to their offshore presence, blue whales may encounter vessels traveling between the site, Morro Bay Harbor, and/or the offshore placement site.

4.5. Fin Whale

4.5.1. Status and Distribution

Fin whales (*Balaenoptera physalus*) are a Mysticete whale listed as endangered under the ESA throughout its range (35 FR 12222). Fin whales are distributed throughout California waters and are abundant near the Action Area within the summer and fall months. Fin whales also have varying migration patterns which are often fueled by prey abundance and optimization of foraging patches (NOAA 2022b). The animals are primarily distributed farther offshore in comparison to blue whale.

According to the NOAA fin whale California/Oregon/Washington Stock report, the best estimate of the population size was reported in 2018 at approximately 11,065 (NOAA 2022b).

4.5.2. Threats and Reason for Decline

Anthropogenic activities are the main threats and reasons for decline in fin whales. Recent data between 2015 and 2019 indicates that there have been three observed serious injuries from entanglement of fishing gear and seven deaths of fin whale from vessel strikes (NOAA 2022b).

4.5.3. Critical Habitat

Critical habitat has not been designated for fin whales.

4.5.4. Recovery Plan

The fin whale recovery plan (NMFS 2010) identifies seven objectives to recover the species:

- Reduce or eliminate injury or death caused by ship collision.
- Reduce or eliminate injury or death caused by fisheries and fishing gear.
- Protect habitats essential to the survival and recovery of the species.
- Minimize effects of vessel disturbance.
- Continue the international ban on hunting and other direct take.
- Monitor the population size and trends in abundance of the species.
- Maximize efforts to free entangled or stranded fin whales and get scientific information from dead specimens.

4.5.5. Fin Whale in the Project Area

During surveys completed from 2017 through 2020 at DCPP, there were no observations of fin whale within the Action Area (PG&E 2020b). Fin whales have been observed on eight occasions on transects completed within 37 miles of the DCPP between 1987 and 2015 (FIAER et al. 2017). Due to their offshore presence, fin whales may encounter vessels traveling between the site, Morro Bay Harbor, and/or the offshore placement site.

4.6. Gray Whale

4.6.1. Status and Distribution

Gray whale (*Eschrichtius robustus*) are listed as endangered for the Western North Pacific (WNP) DPS which includes Islands of Asia and the Bering Sea. However, the Action Area falls within the Eastern North Pacific (ENP) DPS, which encapsulates waters of the U.S. west coast, Canada, and south to Baja California. The ENP DPS was once listed under the ESA but has been delisted since 1994 (NOAA 2021b). Though these are two distinct populations, some WNP whales have been identified in the ENP region, thus their inclusion in this BA.

During migrations, gray whales typically stay within 6 miles of the shore unless navigating around islands. Most ENP gray whales migrate south through California during the winter months away from feeding grounds between Alaska and Russia (Chukchi, Beaufort, and northwestern Bering seas) to winter in lagoons in Baja California (NOAA 2021b). Pregnant females and those with calves concentrate in the lagoons throughout winter and typically migrate north to feeding grounds from February through the early summer. A small number of whales feed in waters between Alaska and northern California (NOAA 2021b).

4.6.2. Threats and Reason for Decline

The main threats to gray whales are entanglement in fishing gear, vessel strikes, disturbance from whale watching activities, underwater noise, habitat degradation from offshore infrastructure, and climate change (NOAA 2021b). Due to their near-shore migration tendencies, gray whales are more likely to come in contact with nearshore vessel traffic than some other whale species, increasing likelihood of interaction with anthropogenic activities.

4.6.3. Critical Habitat

Critical habitat has not been designated for gray whales.

4.6.4. Recovery Plan

After the ban on commercial whaling in the U.S. in 1985, gray whale populations, especially in the ENP DPS began to recover. The recovery of this species in the ENP lead to the delisting of the population in 1994. As such, there is no recovery plan for gray whale, however, NOAA Fisheries is continually monitoring the species to ensure continuous population growth. NOAA has plans in place to reduce vessel collisions to gray whales through collaboration with the U.S. Coast Guard and NOAA Sanctuaries. Collaboration with the shipping industry has led to better communication and tracking of vessel strikes and progress towards mitigation.

4.6.5. Gray Whale in the Project Area

Due to the nearshore migration patterns of gray whales, particularly during their northerly migration when many females migrate with calves, they are often observed from the DCPP site. Since 2017, Tenera has observed 37 gray whales during biweekly clifftop surveys for marine mammals at several locations along the Action Area (PG&E 2020b).

4.7. Leatherback Sea Turtle

4.7.1. Status and Distribution

Leatherback sea turtles (*Dermochelys coriacea*) are listed as threatened under the ESA throughout their distribution. Leatherback sea turtles are a species of marine turtle found in the Pacific Ocean, across the Caribbean, the Atlantic Ocean, and the Gulf of Mexico (NMFS and USFWS 1998). Leatherbacks that occur in California waters migrate to California to feed from nesting areas in both the western Pacific and Central America (Benson et al. 2011). Potentially half the global population of adult female leatherback sea turtles nest on the west coast of Mexico (Benson et al. 2011). Leatherbacks are estimated to be the most common sea turtle in U.S. Pacific waters. Sightings along the coast of California peak in August (Benson et al. 2011).

4.7.2. Threats and Reasons for Decline

The main threats to leatherback turtle are incidental take from fisheries, accidental killing of nesting females, and destruction of eggs at nesting beaches (NOAA 2012). There are no nesting leatherbacks within the NOAA Pacific jurisdiction of this species (NOAA 2012), which means there is no nesting habitat within the Action Area.

4.7.3. Critical Habitat

Critical habitat within the Action Area for leatherback turtle was designated in 2012 (77 FR 4170-4201). The geographical extent includes waters adjacent to the states of California, Oregon, and Washington. In California, the critical habitat encompasses coastal waters from the shoreline to the 10,000 FT depth contour between Point Arena and Point Arguello.

The one essential PBF for leatherbacks is the occurrence of prey species, primarily *scyphomedusae* (jellyfishes) of the order *Semaeostomeae* (e.g., *Chrysaora, Aurelia, Phacellophora, and Cyanea*), in sufficient size and abundance to support individual as well as population growth, reproduction, and development (77 FR 4170-4201). Jellyfish are largest and most abundant in coastal waters of California, Oregon, and Washington during late summer-early fall months.

4.7.4. Recovery Plan

The leatherback sea turtle recovery plan (NMFS and USFWS 1998a) identifies five major actions to recover the species:

- Elimination of incidental take of leatherbacks in U.S. and international commercial fisheries.
- Support the efforts of Mexico and the countries of Central America to census and protect nesting leatherbacks, their eggs, and nesting beaches.

- Identification of movement patterns, habitat needs and primary foraging areas for the species throughout its range.
- Determination of population size and status in U.S. waters through regular aerial or on-water surveys.
- Identify stock home ranges using DNA analysis.

4.7.5. Leatherback Sea Turtle in the Project Area

While there are no known records of leatherback turtle sightings at the DCPP site, telemetry studies (Benson et al. 2011) indicate potential feeding areas several miles offshore of the DCPP site. Due to their offshore distribution, leatherback turtles are highly unlikely to occur within the Action Area during Project activities; however, they may encounter vessels used for project-related activities.

4.8. Green Sea Turtle

4.8.1. Status and Distribution

Green sea turtles are listed as threatened under the ESA and are also divided into DPS management units. The East Pacific DPS extends from the Oregon/California border to central Chile (NOAA 2022c). No nesting beaches for green sea turtle occur in California, and green sea turtles are not resident in any parts of California north of a persistent population established in San Diego Bay (NOAA 2022c). Their primary food source is marine algae and seagrass. Eastern Pacific green sea turtles are known to forage on a greater proportion of invertebrates than other green sea turtles (Seminoff et al. 2015).

4.8.2. Threats and Reasons for Decline

The primary threats to green sea turtles include bycatch in fishing gear, harvest of turtle eggs, vessel strikes, marine debris, climate change and fibropapillomatosis disease (which causes tumors) (NOAA Fisheries 2022c).

4.8.3. Critical Habitat

Critical habitat was designated for green sea turtle in 1998 (63 FR 46693-46701). The critical habitat designation consists of waters surrounding the island of Culebra, Puerto Rico from the mean high-water line seaward to 3 nautical miles. These waters include Culebra's outlying Keys including Cayo Norte, Cayo Ballena, Cayos Geniguí, Isla Culebrita, Arrecife Culebrita, Cayo de Luis Peña, Las Hermanas, El Mano, Cayo Lobo, Cayo Lobito, Cayo Botijuela, Alcarraza, Los Gemelos, and Piedra Steven.

Designated critical habitat for green sea turtle does not occur within the Action Area.

4.8.4. Recovery Plan

The green sea turtle recovery plan (NMFS and USFWS 1998b) identifies six major actions to recover the species:

- Minimize boat collision mortalities, particularly within San Diego County, California.
- Minimize incidental mortalities of turtles by commercial fishing operations.
- Support the efforts of Mexico and the countries of Central America to census and protect nesting East Pacific green turtles, their eggs and nesting beaches.
- Determine population size and status in U.S. waters through regular surveys.
- Identify stock home range(s) using DNA analysis.
- Identify and protect primary foraging areas in the U.S. jurisdiction.

4.8.5. Green Sea Turtle in the Project Area

Rare occurrences of green turtles have been reported within the vicinity of the Action Area. Green turtles were observed on two occasions at the DCPP in 1977, prior to plant commercial operation (PG&E 2020b). Since operation of the facility, green turtles have been observed at the Intake Structure on 13 occasions, with the most recent observation on July 26, 2019 (PG&E 2020b). Therefore, they may occur at the Project site; however, they are typically uncommon and have a low likelihood of occurring during Project activities.

4.9. Western Snowy Plover

4.9.1. Status and Distribution

Western snowy plover was listed as threatened under the ESA in 1993 (58 FR 12864). Western snowy plover is a year-round resident in coastal areas throughout California (USFWS 2007). Inland snowy plovers may migrate to locations along the coastline but are distinct from the western plover population. Preferred habitat includes sandy or gravely beaches along the coast. Nesting locations typically occur within 330 FT (100 meters) of the high tide line in flat, open areas with sandy or saline substrates and sparse to absent vegetation (USFWS 2007). The breeding period occurs from early March through late September, with a peak from mid-April to mid-June. This species forages on small invertebrates along the open beach in low foredune habitat. The historic range spans from coastal Washington to Baja California. Western snowy plovers use the beaches in the Morro Bay area for nesting and wintering and therefore are present year-round (Miller *et al*. 1999).

4.9.2. Threats and Reasons for Decline

Habitat disturbance from development and recreational activities has attributed to population declines and loss of suitable breeding locations.

4.9.3. Critical Habitat

The USFWS revised their designation of Critical Habitat for western snowy plover on June 19, 2012, for the Pacific Coast Population (77 FR 36728). The PBF's identified by USFWS that are specific to western snowy plover include sandy beaches, dune systems immediately inland of an active beach face, salt flats, mud flats, seasonally exposed gravel bars, artificial salt ponds and adjoining levees, and dredge spoil sites with:

- areas that are below heavily vegetated areas or developed areas and above the daily high tides
- shoreline habitat areas for feeding, with no or very sparse vegetation, that are between the annual low tide or low water flow and annual high tide or high-water flow, subject to inundation but not constantly under water, that support small invertebrates, such as crabs, worms, flies, beetles, spiders, sand hoppers, clams, and ostracods, that are essential food sources
- surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates described in PBF (2) for food, and provides cover or shelter from predators and weather, and assists in avoidance of detection (crypsis) for nests, chicks, and incubating adults
- minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators, which provide relatively undisturbed areas for individual and population growth and for normal behavior.

Western snowy plover Critical Habitat Unit CA-30 is located on Montaña de Oro State Park's sand spit adjacent to the offshore dredge placement site.

4.9.4. Recovery Plan

The Recovery Plan for western snowy plover was published by USFWS on September 17, 2007 (72 FR 54279-54280). The recovery strategy for western snowy plover consists of six parts:

- protection of breeding and wintering habitat
- monitoring and managing breeding and winter habitat
- monitoring and managing wintering and migration areas
- undertaking scientific research that facilitates recovery efforts
- public participation, outreach, and education
- establishing an international conservation program with the Mexican government to protect snowy plovers and their breeding and wintering locations in Mexico

4.9.5. Western Snowy Plover in the Project Area

Western snowy plovers are known to nest yearly on the Montaña de Oro State Park sand spit between March and September, with nesting typically peaking between mid-April and mid-June. Wintering plovers are also known to utilize this area, so the species has potential to occur on the beach adjacent to the offshore dredge placement site year-round.

4.10. California Red-legged Frog

4.10.1. Status and Distribution

CRLF was listed as threatened under the ESA in 1996 (61 FR 25813 – 25833). CRLF is known to occur from Mendocino County to Northern Baja California and eastward through the Northern Sacramento Valley and Sierra Nevada foothills at elevations below 1,525 meters (5,000 FT). They require permanent or semi-permanent bodies of water such as lakes, streams, and ponds with plant cover for foraging and breeding. Reproduction occurs in aquatic habitats from late November to early April. Egg masses are laid in the water following breeding, often on emergent vegetation. Following metamorphosis, juvenile frogs may remain in the breeding ponds or disperse into uplands regardless of topography. CRLF have been documented dispersing over two miles from aquatic habitat. Dispersing frogs may seek refuge in small mammal burrows or soil fractures (Zeiner et al. 1988-1990).

4.10.2. Threats and Reasons for Decline

CRLF is threatened by habitat loss and degradation caused by agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, water diversions, degraded water quality, use of pesticides, and the spread of introduced predators (e.g., bullfrog, African clawed-frog [*Xenopus laevis*], red swamp crayfish [*Procambarus clarkii*], signal crayfish [*Pacifastacus leniusculus*], and various species of fishes, especially bass, catfish [*Ictalarus sp.*], sunfish, and mosquitofish [*Gambusia affinis*]) (USFWS 2002; Thomson et al. 2016). Bullfrog is a strong competitor and predator on multiple life stages of CRLF (Thomson et al. 2016; Doubledee et al. 2003). With the development of watersheds and increase in impervious surfaces from urbanization, water contamination from pesticides, fertilizers, heavy metals such as hydrocarbons, and other debris also increases. Water diversion and impoundment for irrigation also may reduce flows necessary to support adequate aquatic habitat for frogs. Routine flood control maintenance including vegetation removal, herbicide spraying, shaping and riprapping of banks to control erosion, dredging of creeks and rivers also degrade CRLF habitat and result in the proliferation of non-native aquatic species or expose and desiccate egg masses (USFWS 2002). Warmer average temperatures and reduced levels of precipitation due to climate change also threaten the permanence and reliability of breeding sites for CRLF (Thomson et al. 2016).

4.10.3. Critical Habitat

Final critical habitat was designated for CRLF on April 13, 2006 (71 FR 19244-19346). Due to concern about litigation and scientific integrity regarding the 2006 designation of critical habitat (Center for Biological Diversity v. Kempthorne et al.), USFWS proposed revised critical habitat for CRLF on September 16, 2008 (73 FR 53492-53679), and published its final revised critical habitat for the species on March 17, 2010 (75 FR 12816-12959). The final revised critical habitat rule designated 1,636,609 acres of critical habitat for 53 critical habitat units within 27 California counties. USFWS stated that the proposed four-fold expansion of critical habitat over the 2006 designation better reflects areas that contain the PBFs of CRLF habitat, including aquatic habitat for breeding activities; aquatic habitat for non-breeding activities; and upland habitat for shelter, foraging, predator avoidance, and dispersal (75 FR 12816-12959). In addition, 34 core areas that were described in the Recovery Plan were used to focus on critical habitat areas, and areas within the 2006 designation were expanded to include habitat that is adjacent to areas with documented occurrences of CRLF (USFWS 2002).

No critical habitat has been designated for this species within the Action Area. The closest designated critical habitat area to the Action Area is SLO-3, located approximately 8.25 miles north of the Action Area.

4.10.4. Recovery Plan

The Recovery Plan for the CRLF was published by USFWS on May 28, 2002 (USFWS 2002). The recovery strategy for CRLF consists of four parts:

- Protect existing populations by reducing threats.
- Restore and create habitat that will be protected and managed in perpetuity.
- Survey and monitor populations and conduct research on the biology of and threats to the subspecies.
- Reestablish populations of the subspecies within its historical range.

The Action Area overlaps with the Central Coast Recovery Unit and is not located within any designated Core Areas, which are identified as areas where recovery actions shall be focused. The Central Coast Recovery Unit has a Recovery Status of "High," meaning that the unit has many existing populations and many areas of high habitat suitability.

4.10.5. California Red-legged Frog in the Project Area

CRLF has been documented within the lower reaches of Diablo Creek and within Tom's Pond (outside of the Action Area), northwest of the onshore dredge placement site considered for Alternative 3 (Terra Verde 2022). Tom's Pond provides high quality habitat for CRLF and the presence of subadults indicates successful breeding has likely occurred in recent years. Individuals dispersing from Tom's Pond may be present within the onshore dredge placement site during

Project activities for Alternative 3. However, CRLF have not be documented adjacent to the Intake Cove and the species is unlikely to occur within the Action Area of Alternatives 1 and 2.

5. Effects of the Action and Determination of Effects

5.1. Summary of Effects

This section includes an analysis of the potential direct and indirect effects of the Proposed Action on black abalone, southern sea otter, humpback whale, blue whale, fin whale, gray whale, leatherback sea turtle, green sea turtle, western snowy plover, and CRLF. The following are definitions of "effects language" used throughout this section:

- **Direct effects** are those caused by the Proposed Action and occur at both the same time and place as the action.
- **Indirect effects** are those that are caused by or will result from the Proposed Action and are later in time but are still reasonably certain to occur.

Even though direct and indirect effects are displayed separately, all effects are to be considered holistically as "effects."

Upon evaluation of potential direct and indirect effects, one of three determinations were made for the species addressed in this BA and any designated critical habitat:

- **"No effect"** means there are no effects from the Proposed action either positive or negative on the listed species or Critical Habitat. If effects are insignificant or discountable, a "may affect, but not likely to adversely affect" determination is appropriate. A "no effect" determination does not require Section 7 consultation with NOAA Fisheries and/or USFWS.
- **"May affect, but not likely to adversely affect"** refers to effects which are either beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated, and shall never reach the scale where "take" occurs. Discountable effects are those extremely unlikely to occur. Based on the best scientific and commercial information available, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects or expect discountable effects to occur. This determination requires only informal consultation with and written concurrence from NOAA Fisheries and/or USFWS.
- **"May affect and is likely to adversely affect"** is assigned when listed resources are likely to be exposed to the proposed action and will respond in a negative manner. This determination means that (1) effects to species and habitat are not insignificant in size and avoidance of "take" cannot be guaranteed, and (2) effects are not extremely unlikely to occur. Adverse effects do not qualify as discountable simply because of lack of certainty that they will occur. The probability of occurrence must be extremely small to achieve discountability (extremely unlikely to occur). A combination of beneficial and adverse effects is still "likely to adversely affect," even if the net effect is neutral or positive. This determination triggers formal consultation with NOAA Fisheries and/or USFWS.

5.2. Black Abalone and Critical Habitat

No direct effects to black abalone or its Critical Habitat are expected as a result of project activities because there are no anticipated impacts to rocky intertidal habitats known to be occupied by the species. This species was not detected within or immediately adjacent to the dredging footprint during focused diver surveys conducted on September 7, 2023. Rocky intertidal habitat would be avoided during dredging activities within the Intake Cove. Indirect effects may occur to black abalone and its Critical Habitat due to temporary increased turbidity created during dredging and vessel anchoring to the seabed. However, the turbidity plume is expected to be localized, with heightened levels of suspended sediment occurring only immediately adjacent to the dredge. In addition, turbidity levels are expected to subside to ambient levels almost immediately after completion of the proposed dredging operation. Furthermore, potential temporary increases in turbidity would be minimized to the extent feasible with implementation of Conservation Measure BIO-3 (Turbidity Management Plan), as defined below in Section 6. No direct or adverse modifications to black abalone habitat would result from Project activities. As such, ***no effect*** to black abalone and its Critical Habitat is expected due to the Project.

5.3. Southern Sea Otter

Southern sea otters are frequently observed within the Intake Cove. Direct effects to southern sea otter due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines if present in the vicinity of project activities. However, southern sea otters are fast and agile swimmers and are typically accustomed to vessel activity. Most sea otters occurring in the Action Area and general vicinity are accustomed to regular vessel traffic/anchoring lines associated with Morro Bay and Port San Luis and would be expected to temporarily avoid areas occupied by the barge/scow for the dredging project. In addition, DCPP scientific divers regularly operate small boats in the Intake Cove. Further, direct effects to southern sea otter would be avoided through implementation of the Conservation Measures defined in Section 6 which includes employing Marine Wildlife Observers (MWO) to actively monitor the Intake Cove and project activities and have the authority to execute a stop work if southern sea otters are within the project area. Indirect effects may include temporary displacement/habitat avoidance due to the movement of dredging and support vessels. Such indirect effects would not be expected to result in adverse effects to southern sea otter given the presence of additional habitat in the general vicinity and short duration of Proposed Project activities. As discussed above, temporarily increased turbidity within the Action Area would be minimized and not likely to have any lasting effects on habitat quality within the Action Area. Areas supporting concentrations of kelp and eelgrass within the Intake Cove would be avoided during proposed dredging activities, and no permanent or adverse effects to southern sea otter habitat would result from the Proposed Project. With the implementation of the Conservation Measures in Section 6, the Proposed Project ***may affect, but is not likely to adversely affect***, southern sea otter.

5.4. Humpback Whale and Critical Habitat

Direct effects to humpback whale due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines. Indirect effects may include temporary habitat avoidance due to dredging and support vessels. However, humpback whales in the Action Area are accustomed to regular vessel traffic and the project would not present an increased risk of vessel collisions relative to the variable daily baseline traffic throughout the area. Therefore, it is unlikely that the limited and short-term vessel traffic associated with the dredging would result in any direct or indirect impacts. Further, with the implementation of the Conservation Measures in Section 6, which includes employing MWOs to actively monitor project activities and direct actions to avoid effects on marine wildlife, it is expected that the Proposed Project will have ***no effect*** to humpback whale.

Critical habitat for humpback whale begins approximately 0.6 mile from the DCPP site and project related dredging and dredge placement are occurring immediately offshore. As such, ***no effect*** to humpback whale Critical Habitat is expected due to the Proposed Project.

5.5. Blue Whale

Direct effects to blue whale due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines. Indirect effects may include temporary habitat avoidance due to dredging and support vessels. However, blue whales in the Action Area are accustomed to regular vessel traffic and the project would not present an increased risk of vessel collisions relative to the variable daily baseline traffic throughout the area. Therefore, it is unlikely that the limited and short-term vessel traffic associated with the dredging would result in any direct or indirect impacts. Furthermore, with the implementation of the Conservation Measures in Section 6, which includes employing MWOs to actively monitor project activities and direct actions to avoid effects on marine wildlife, it is expected that the Proposed Project will have ***no effect*** to blue whale.

5.6. Fin Whale

Direct effects to fin whale due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines. Indirect effects may include temporary habitat avoidance due to dredging and support vessels. However, fin whales in the Action Area are accustomed to regular vessel traffic and the project would not present an increased risk of vessel collisions relative to the variable daily baseline traffic throughout the area. Therefore, it is unlikely that the limited and short-term vessel traffic associated with the dredging would result in any direct or indirect impacts. Further, with the implementation of the Conservation Measures in Section 6, which includes employing MWOs to actively monitor project activities and direct actions to avoid effects on marine wildlife, it is expected that the Proposed Project will have ***no effect*** to fin whale.

5.7. Gray Whale

Direct effects to gray whale due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines. Indirect effects may include temporary habitat avoidance due to dredging and support vessels. However, gray whales in the Action Area are accustomed to regular vessel traffic and the project would not present an increased risk of vessel collisions relative to the variable daily baseline traffic throughout the area. Therefore, it is unlikely that the limited and short-term vessel traffic associated with the dredging would result in any direct or indirect impacts. Further, with the implementation of the Conservation Measures in Section 6, which includes employing MWOs to actively monitor project activities and direct actions to avoid effects on marine wildlife, it is expected that the Proposed Project will have ***no effect*** to gray whale.

5.8. Leatherback Sea Turtle and Critical Habitat

Leatherback sea turtle have never been observed within the Action Area and are not likely to occur during Proposed Activities. The Intake Cove is within designated Critical Habitat for leatherback turtle; however, due to the short duration and limited scope of the dredging impacts, no direct or indirect adverse effects to the Critical Habitat is anticipated. As such, ***no effect*** to leatherback sea turtle or its Critical Habitat is expected due to the Proposed Project.

5.9. Green Sea Turtle

Direct effects to green sea turtle due to project activities may include being struck and killed or seriously injured by dredging and support vessels or becoming entangled in anchoring lines. Indirect effects may include temporary habitat avoidance due to dredging and support vessels. However, green sea turtles very rarely occur within the Action Area. Therefore, it is unlikely that the limited and short-term vessel traffic associated with the dredging would result in any direct or indirect impacts. Further, with the implementation of the Conservation Measures in Section 6, which includes employing MWOs to actively monitor project activities and direct actions to avoid effects on marine wildlife, it is expected that the Proposed Project will have ***no effect*** to green sea turtle.

5.10. Western Snowy Plover

Placement of dredge material offshore of Montaña de Oro State Park's sand spit is not expected to have direct or indirect effects on western snowy plover or its Critical Habitat. No personnel or vehicles will access the sand spit and no dredge material will be placed directly on the beach of the sand spit. As such, ***no effect*** to western snowy plover or its Critical Habitat is expected due to the Proposed Project.

5.11. California Red-legged Frog

No direct effects or indirect effects to CRLF are expected from the implementation of the Proposed Project due to dredging and dredge placement activities occurring entirely offshore. As such, ***no effect*** to CRLF is expected due to the Proposed Project.

6. Conservation Measures

This section presents the minimization and avoidance measures recommended to avoid or minimize Project effects to listed species.

BIO-1 ***Environmental Awareness Training***

An environmental awareness training shall be presented to all Dredging Project personnel by a qualified biologist prior to start of any proposed activities. The training shall include color photographs and a description of the ecology of all special-status species known, or with potential, to occur in the Action Area, as well as other sensitive resources requiring avoidance near the Action Area. The training shall also include a description of protection measures required by discretionary permits, an overview of the Federal Endangered Species Act, and implications of noncompliance with these regulations. This shall include an overview of the required Conservation Measures and Action Area boundaries and avoidance areas. A sign-in sheet with the name and signature of the qualified biologist who presented the training, and the names and signatures of the environmental awareness trainees shall be kept. A fact sheet conveying the information provided in the environmental awareness training would be provided to all Proposed Action personnel and anyone else who may enter the Action Area.

When new personnel join after the initial training period, they shall receive the environmental awareness training from the qualified biologist before beginning work. Visitors to the proposed Action Area, such as company executives, administrative staff, or other guests not directly performing Project activities, are not required to receive the environmental awareness training. Visitors may be independent within the Action Area if they elect to receive the training, but otherwise must be escorted by someone who is trained.

BIO-2 ***General Marine Operations and Listed Marine Wildlife Protection Measures***

The following general measures are recommended to minimize impacts to listed species and habitat during dredging operations. Use of these measures does not give “take” authority under ESA.

- Dredging equipment shall be inspected by the operator daily to ensure that equipment is in good working order and no fuel or lubricant leaks are present.
- Spills shall be cleaned up immediately. Standard dredge specifications include a Spill Prevention Plan, employee training, and the staging of materials on site to clean up accidental spills.
- Vessels shall reduce speeds to be no greater than 5 knots if listed marine wildlife species are visually observed in the vessel’s vicinity.

- Vessels will maintain a minimum distance of 50 yards or 150 FT from listed marine wildlife species.
- Vessels will avoid listed marine mammal species by avoiding work areas if listed marine wildlife species are present within the work area. Vessels will not be used to encourage listed marine wildlife species to move.
- Vessels will avoid disturbing sensitive vegetation by vertically dropping/retrieving anchors, not dragging anchors, and using crown buoys for anchoring.
- Any contractor, employee, or third party responsible for the inadvertent "take" of a federal listed species, or that finds a dead or injured special-status species, will immediately report the incident to the project biologist who will then notify the appropriate agencies within 24 hours by phone and by email. Notification must include date, time, and location of the incident and other pertinent information. Written notification will be provided to the appropriate agency contacts within 3 working days of the incident and will include the same notification information listed above.
- Any contractor, employee, or third party responsible for inadvertently violating the terms or conditions of the project will immediately report the incident to the project biologist who will notify the appropriate agencies within 24 hours by phone and by email. Such violations may include unauthorized habitat disturbance or impacts to wildlife that do not fall into the actions covered by the project permits. All non-emergency actions will cease immediately until guidance is received from the appropriate agencies. Notification must include the date, time, location, and other pertinent information of the incident.

BIO-3 Turbidity Management Plan

A Turbidity Management Plan (TMP) shall be developed and implemented to provide protection of sensitive habitats and protected species from turbidity generated by dredging activities. The TMP should include the following:

- Measures intended to reduce prolonged and large sediment releases during dredging.
- Visual monitoring and potential instrumentation monitoring during dredging activities.
- Thresholds for turbidity exceedance in accordance with the California Ocean Plan and Construction Environmental Monitors who have the authority to impose STOP WORK orders on contractors should thresholds be reached.

BIO-4 Marine Wildlife Continency Plan

A Marine Wildlife Contingency Plan (MWCP) shall be developed and implemented to provide protection of sensitive habitats and protected species from vessel traffic and dredging activities. The MWCP should include the following:

- MWOs shall complete pre-construction surveys and monitoring daily during dredging operations to ensure marine wildlife are being avoided and allowed to leave the work area on their own volition.

MWOs shall have the authority to issue a STOP WORK order at any time that work activities could result in harm to a marine mammal or sea turtle or if a marine mammal or sea turtle appears to be moving toward the active work area.

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Attachment 1 – Figures

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Figure 1. Site Location Map

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Figure 2. Intake Cove and Proposed Dredge Area

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Figure 3. Nearshore Dredge Material Placement Location

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Figure 4. Onshore Dredge Material Placement Location

Diablo Canyon Intake Cove Dredging

Essential Fish Habitat Assessment

Prepared for PG&E

By

Stantec Consulting Inc.
Contract Number:3501324439

Laura Casali	7/27/2023
Prepared by	Date
Kelly Swindle	7/27/2023
Checked by	Date
Eric Snelling	7/27/2023
Approved by	Date

Change History Log

Revision	Author(s)	Date	Description of Change
Rev0	Laura Casali, Stantec	8/1/23	Review and revise Client edits
Rev0	Bo Gould (PG&E)	9/19/23	Included references to pre-dredging surveys conducted September 6-7, 2023.
Rev1	Bo Gould (PG&E)	9/21/23	Section 1.4 edits
Rev2	Bo Gould (PG&E)	2/7/24	Revised Section 1.4 to more fully describe contingent clamshell dredging method

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List of Acronyms and Abbreviations

Name	Description
CESA	California Endangered Species Act
Councils	Eight Regional Fishery Management Councils
CPS	Coastal Pelagic Species
CY	Cubic Yards
DCPP	Diablo Canyon Power Plant
DPS	Distinct Population Segment
EC	Ecosystem Component
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FESA	Federal Endangered Species Act
FMP	Fishery Management Plan
FR	Federal Register
FT	Feet
GIS	Geographic Information Systems
HAPC	Habitat Areas of Particular Concern
HMS	Highly Migratory Species
MHHW	Mean Higher High-Water
MLLW	Mean Lower Low Water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NOAA Fisheries	National Marine Fisheries Service
PCG	Pacific Coast Groundfish
PCS	Pacific Coast Salmon
PFMC	Pacific Fishery Management Council
PG&E	Pacific Gas and Electric Company
Ppt	Parts Per Thousand
U.S.	United States
USACE	United States Army Corps of Engineers

1. Essential Fish Habitat Assessment

1.1. Magnuson-Stevens Act Introduction

This assessment of Essential Fish Habitat (EFH) for the Diablo Canyon Power Plant (DCPP) Intake Cove Dredging Project (Project) is being provided in conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSA) (see Federal Register [FR] 62, 244, December 19, 1997). The 1996 amendments to the Magnuson-Stevens Act set forth a number of new mandates for the National Marine Fisheries Service (NOAA Fisheries), eight regional fishery management councils (Councils), and other federal agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NOAA Fisheries, are required to delineate EFH for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NOAA Fisheries regarding the potential effects of their actions on EFH and respond in writing to the NOAA Fisheries' recommendations. The proposed Project is located within an area designated as EFH for the Pacific Fishery Management Council's (PFMC) Coastal Pelagic Species (CPS), including all finfish and krill, Highly Migratory Species (HMS), Pacific Coast Salmon (PCS), Pacific Coast Groundfish (PCG) Management Plans, as well as two habitat areas of particular concern (HAPC) for canopy kelp and seagrass/eelgrass.

NOAA Fisheries oversees national marine resources and currently manages over 165 endangered and threatened species under the Endangered Species Act (ESA), as well as EFH required for fish to spawn, breed, feed, or grow (MMPA 1972; NOAA 2007; NOAA 2020). EFH is identified by the MSA as waters and substrate which is necessary for breeding, growth, feeding, or spawning. In 2002, NOAA Fisheries further clarified EFH (67 FR 2343) with the following definitions:

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities.
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a fishery management plan (FMP). The MSA requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, which may adversely affect EFH. "Adverse" effect means any impact which reduces quality and/or quantity of EFH, and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Effects of the action consist of interactions between the effects of the Proposed Action and the biological resources which have been identified. If the effects are identified as "substantial", there is a requirement that Avoidance and Minimization Measures be integrated to reduce the harmful impact to less than substantial.

1.2. Fishery Management Plan

There are four FMPs on the Pacific Coast of North America. All four have managed species with designated habitat areas that occur at the DCPP site (Table 1). The FMPs include the CPS FMP, the PCG FMP, the PCS FMP, and the HMS FMP (PFMC 2022a). Each FMP has both defined EFH (textual) in parallel with designated EFH areas (mapped) and lists either specific managed species, or taxonomic groups except for PCS. The PCS FMP describes their respective EFH textually only that includes coastal waters from high tide line and out to 200 nautical miles from Point Conception, California northward through Oregon and Washington.

Table 1. Fishery Management Plans within the Diablo Canyon Power Plant Intake Cove (Source NOAA Fisheries EFH Mapper (noaa.gov) 2023).

Species	Lifestage(s) Found at Location	Management Council	FMP
Finfish	All	Pacific	Coastal Pelagic Species
Krill – *Thysanoessa Spinifera*	All	Pacific	Coastal Pelagic Species
Krill – *Euphausia Pacifica*	All	Pacific	Coastal Pelagic Species
Other Krill Species	All	Pacific	Coastal Pelagic Species
common thresher shark (Alopias vulpinus)	Pre-adult	Pacific	Highly migratory species
Groundfish	All	Pacific	Pacific Coast Groundfish
Canopy kelp	All	Pacific	Pacific Coast Groundfish HAPC
Seagrasses/Eelgrass	All	Pacific	Pacific Coast Groundfish HAPC
Chinook salmon (*Oncorhynchus tshawytscha*)	Not known	Pacific	Pacific Coast Salmon

Fishery Management Plan Species

A list of species managed as part of one of the four FMPs that are likely to occur offshore of the DCPP site is provided below (Table 2). Species that have been observed as part of the ongoing sampling program maintained by Tenera are listed as having a HIGH likelihood of occurrence at the site (Pacific Gas and Electric Company [PG&E 2020]). Species that have not been observed but have the possibility to occur at the site based on their known distribution are included as having a LOW likelihood of occurrence (PG&E 2020). This likelihood of occurrence assessment includes adult, juvenile, and larval distribution patterns.

Table 2. Taxonomic groups managed under highly migratory species, Pacific Coast groundfish, coastal pelagic species, and Pacific Coast salmon fishery management plans likely to occur at the Diablo Canyon Power Plant Site (DCPP EFHA 2023).

Taxa	Fishery Management Plan				Likelihood of Occurrence
	HMS	PCG	CPS	PCS	
Nearshore benthic – hard substrate					
Cabezon (*Scorpaenichthys marmoratus*)		X			HIGH
Rockfishes (*Sebastes* spp.)		X			HIGH
Lingcod (*Ophiodon elongates*)		X			HIGH
Kelp greenling (*Hexagrammos decagrammus*)		X			HIGH
Nearshore benthic – soft substrate					
English sole (*Parophrys vetulus*)		X			HIGH
Starry flounder (*Platichthys stellatus*)		X			HIGH
Big skate (*Raja binoculata*)		X			HIGH
California skate (*Raja inornata*)		X			HIGH
Curlfin sole (*Pleuronichthys decurrens*)		X			LOW
Pacific sanddab (*Citharichthys sordidus*)		X			LOW
Sand sole (*Psettichthys melanostictus*)		X			LOW
All other skates (endemic Arhynchobatidae)		X			LOW
Dover sole (*Microstomus pacificus*)		X			LOW
Petrale sole (*Eopsetta jordani*)		X			LOW
Nearshore pelagic/water column					
Leopard shark (*Triakis semifasciata*)		X			HIGH
Pacific sardine (*Sardinops sagax*)			X		HIGH
Pacific (chub) mackerel (*Scomber japonicas*)			X		HIGH
Northern anchovy (*Engraulis mordax*)			X		HIGH
Jack mackerel (*Trachurus symmetricus*)			X		HIGH
Jacksmelt (*Atherinopsis californiensis*)			X		HIGH
Market squid (*Doryteuthis opalescens*)			X		HIGH
Silversides (Atherinopsidae)		X	X		HIGH
Great white shark (*Carcharodon carcharias*)	X				HIGH
Chinook salmon (*Oncorhynchus tshawytscha*)	X			X	HIGH
Pacific whiting (hake) (*Merluccius productus*)		X			LOW
Sablefish (*Anoplopoma fimbria*)		X			LOW
Round herring (*Etrumeus teres*)	X	X	X	X	LOW
Common thresher shark (*Alopias vulpinus*)	X				LOW

Taxa	Fishery Management Plan				Likelihood of Occurrence
	HMS	PCG	CPS	PCS	
Pacific herring (*Clupea pallasii*)			X		LOW
Pacific saury (*Cololabis saira*)	X	X	X	X	LOW
Krill or euphausiids			X		LOW

Source: PG&E 2020.

Notes: Organized by broad adult habitat type.
CPS = Coastal Pelagic Species
HMS = Highly Migratory Species
PCG = Pacific Coast Groundfish
PCS = Pacific Coast Salmon

Ecosystem Component (EC) species are also identified within the Action Area. ECs are identified as "1) *Be a non-target stock/species; 2) Not be subject to overfishing, approaching overfished, or overfished and not likely to become subject to overfishing or overfished in the absence of conservation and management measures; and, 3) Not generally retained for sale or personal use, although "occasional" retention is not by itself a reason for excluding a species from the EC category"* (PFMC, 2021). Two species are occasionally unintentionally caught as bycatch species within this region and thus are included as EC species to accurately monitor by catch in the CPS fishery. The two managed EC species in the Action Area include Pacific herring (*Clupea pallasii pallasii*) and Jacksmelt (*Atherinopsis californiensis*) (PFMC, 2021).

1.2.1. Pacific Coast Groundfish Species

The PCG FMP manages over 90 species; these species span across a large region with high biodiversity (PFMC 2020a). The PCG FMP identifies groundfish EFH as all waters and substrate within the following areas (PFMC 2022a):

- Depths less than or equal to 11,483 feet (FT) to mean higher high-water (MHHW) level or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand (ppt) during the period of average annual low flow;
- seamounts in depths greater than 11,483 FT as mapped in the EFH assessment geographic information system (GIS); and
- areas designated as HAPCs not already identified by the above criteria.

According to the PCG FMP definition, the Proposed Action involving marine work occurs within the groundfish EFH.

1.2.1.1. Canopy Kelp Habitat Area of Particular Concern

Kelp forests serve as important habitat for the groundfish species by providing nurseries, feeding grounds, and shelter. They are highly productive communities in that they provide food from their plant tissue as attached, plants or pieces adrift, and including the dissolved organic matter that these plants exude (Foster and Schiel 1985).

According to the canopy kelp HAPC definition, the Proposed Action involving marine work occurs within the canopy kelp HAPC due to the presence of the species listed in the Action Area (Table 3). The dredging footprint has been sited away from known giant kelp (*Macrocystis pyrifera*) concentrations within the Intake Cove. PG&E holds a Special Use Permit issued by the California Department of Fish and Game, now the California Department of Fish and Wildlife (CDFW), to remove kelp from areas inside of the Intake Cove (to protect the DCPP Intake Structure from occlusion). Dredging would not directly impact any concentrations of kelp on rocky substrates on the edges of the Intake Cove, and the project will be completed within maintained areas covered by the Special Use Permit.

Table 3. Algae species found in rocky intertidal zone whose presence indicates a habitat area of particular concern for canopy kelp or eelgrass (Tenera June 22, 2020).

Common Name	Scientific Name	HAPC
Giant kelp	*Macrocystis* spp.	canopy kelp
Bull kelp	*Nererocystis luetkaeana*	canopy kelp
Eelgrass	*Zostera spp.*	Eelgrass/seagrass

1.2.1.2. Eelgrass Habitat Area of Particular Concern

Eelgrass (*Zostera marina*) is a seagrass, not a seaweed, and categorized as a HAPC which is a subset of Pacific coast groundfish EFH. Eelgrass is found in the intertidal and shallow subtidal estuaries, in soft bottom substrates and within the nearshore areas. HAPCs are afforded a level of protection to ensure these habitats, which are integral to the breeding, feeding, and survival of managed stocks, remain. The PFMC can address non-fishing impacts to these areas by providing additional attention, primarily through their identification, of the ecological services that these areas provide to the groundfish fishery via this habitat designation.

Observed eelgrass beds in the vicinity of the project's Action Area primarily exist in the eastern half of the Intake Cove (Figure 1). Dredging is proposed in the western half of the Cove, away from mapped eelgrass beds (Figure 3). Table 4 approximates the area of the mapped eelgrass beds observed by diver survey within the Intake Cove Project Area (Tenera Environmental Inc. 2020).

Pre-dredging surveys for eelgrass were conducted within the Intake Cove on September 6-7, 2023. Survey results were sent via email to State and Federal regulatory agencies (including the US Army Corps of Engineers, California Coastal Commission, Central Coast Regional Water Quality Control Board, and California State Lands Commission) on September 11, 2023. The closest patch of eelgrass is over 100 meters from the dredge footprint.

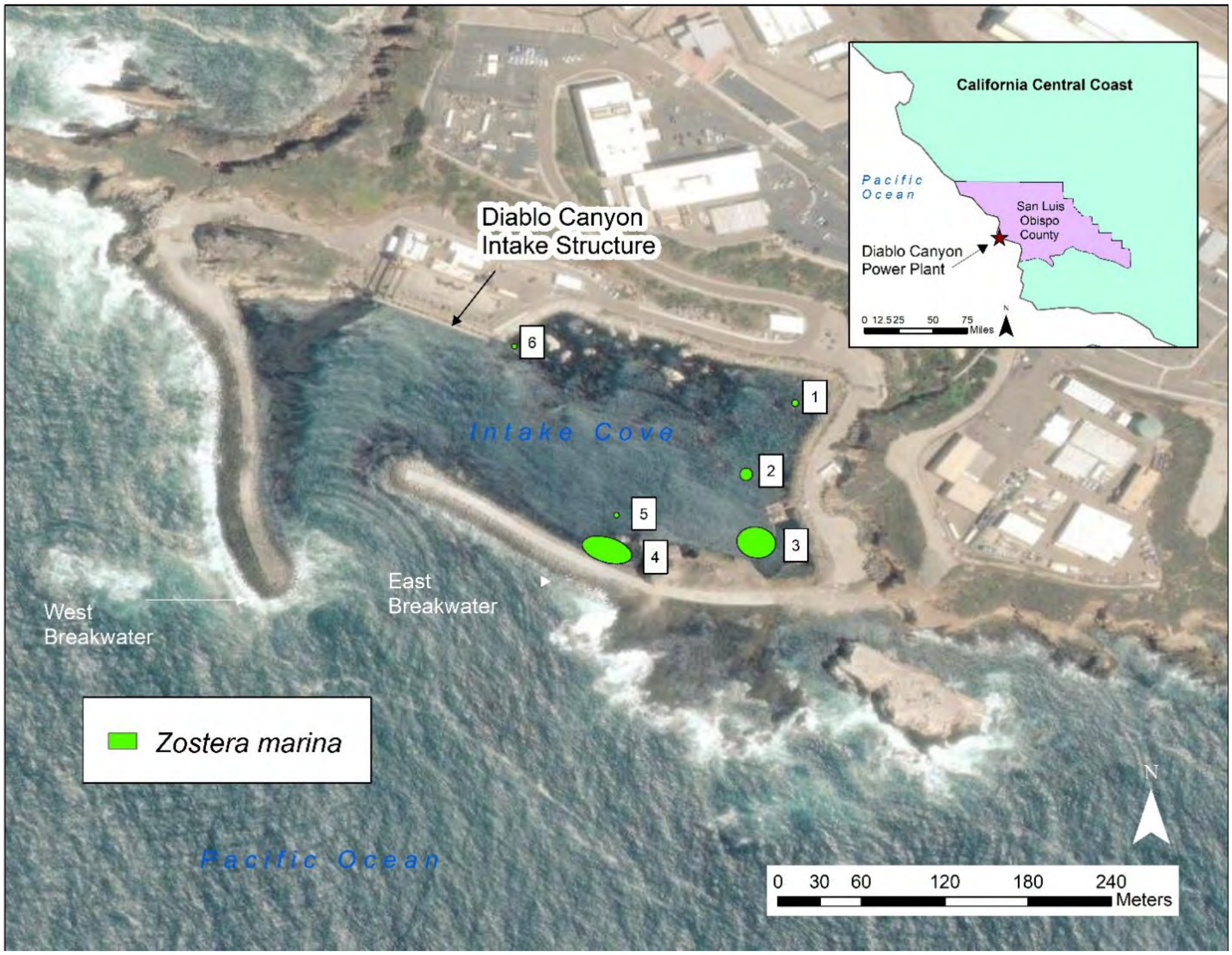

Figure 1. Eelgrass beds mapped are shown as green circle or ovals identified in the Diablo Canyon Power Plant Intake Cove survey in 2020 (Tenera Environmental Inc. 2020). Note that eelgrass bed #6 was not detected during September 2023 eelgrass surveys (Tenera 2023).

Table 4. Approximate location and sizes of eelgrass beds in Intake Cove surveyed by divers in 2020 and illustrated in Figure 1 (Tenera Environmental Inc. 2020).

Eelgrass bed	Areal extent: sq. meters	Areal extent: sq. feet	Location description
1	16.53	177.94	NE corner
2	52.9	569.42	NE
3	401.41	4320.68	SE corner
4	425.46	4579.61	Southeast Inshore of East Breakwater
5	<1	<10	Inshore of East Breakwater
6 *	<1	<10	East Intake Structure

***** Not detected during focused eelgrass surveys conducted September 6-7, 2023.

1.2.1.3. Rocky Reefs Habitat Area of Particular Concern

Rocky reefs are categorized by their proximity to the coastline as near or offshore. This habitat is one of the most important groundfish habitats composed by rock ranging in sizes from bedrock, boulders, and smaller rocks (cobble and gravel). Characteristics can initially be defined by the EFH assessment in GIS. This habitat is further defined as the waters, substrate and biogenic features that are associated with hard rock out to the MHHW. Further distinction can be obtained by observation and distinction between hard and soft substrate. Areas containing rocky substrates within and around the Intake Cove would not be subjected to direct impacts as part of the Project.

1.2.2. Coastal Pelagic Species

The CPS FMP designates all marine and estuarine waters from the shoreline along the California coast to the limits of the United States (U.S.). Exclusive Economic Zone (200 nautical miles [nm]) and above the thermocline where sea surface temperatures range between 50° and 79° Fahrenheit (PFMC 2020). The EFH designated for krill extends to the 1,000 fathoms depth contour and extends from the surface to a depth of 1,300 FT (PFMC 2021). Based on this designation, all submerged portions of the DCPP site are within the CPS EFH.

1.2.3. Highly Migratory Species

The FMP for U.S. West Coast Fisheries for Highly Migratory Species are species dependent and largely occur over water depths deeper than what occur at the DCPP site. Only pre-adult common thresher shark (*Alopias vulpinus*) has designated EFH that may overlap the DCPP site (PG&E 2020). EFH for neonate and juvenile common thresher sharks (less than 40 inches fork length) and for late juveniles and subadult common thresher sharks (less than 66 inches from snout tip to tip of the longest caudal fin) includes waters off beaches and open coast bays and offshore, in near-surface waters from the U.S.-Mexico border to Pigeon Point (37° 10' N. latitude) over bottom depths as shallow as 6 fathoms (PFMC 2007).

1.2.4. Pacific Coastal Salmon

Appendix A of the PCS FMP (PFMC 2022b) designates estuarine and marine waters extending from the extreme high tide line to the U.S. Exclusive Economic Zone (200 nm) offshore of California north of Point Conception as EFH for PCS (PFMC 2022b). The main focus is on salmonid conservation management, including the designation and maintenance of EFH, which is concentrated on the freshwater stream and river habitats that act as spawning and juvenile habitat and are typically subject to considerable anthropogenic pressure from agricultural practices, dams, bycatch, and pollution (PFMC 2022b).

1.2.5. Federally Listed Fish Species

Multiple federally listed finfish could potentially occur within the Action Area as their oceanic distribution overlaps; however, they have not been observed in the Intake Cove during the many diver surveys completed for PG&E (PG&E 2022). Two salmonid species that may occur are chinook salmon, (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss irideus*), with the latter having been observed in lower Diablo Creek (PG&E 2020). Chinook salmon is an anadromous salmonid fish that spawns in freshwater streams and spends part of its life in the ocean (PFMC 2022b). Steelhead trout is an anadromous salmonid fish that spawns in freshwater streams and spends part of its life in the ocean (CDFW 2022). The NOAA EFH Mapper does not identify Pacific Salmon EFH within the Action Area which supports the finding that no suitable habitat for either species was within the U.S. Army Corps of Engineers (USACE) jurisdictional areas and noted in the Marine Biological Resources Assessment (PG&E 2020). Table 5 includes the listed species under the Federal Endangered Species Act (FESA) and/or the California Endangered Species Act (CESA) which may occur at the DCPP Site; however, this is not associated with EFH and included here to establish this distinction. Also included in Table 5 are the distinctions of Evolutionary Significant Unit (ESU) and Distinct Population Segment (DPS). Both are used to describe areal boundaries of specific populations that help to determine ESA designations.

Table 5. Species Listed under the Federal Endangered Species Act or the California Endangered Species Act that May Occur at the Diablo Canyon Power Plant Site.

Species and Management Unit (ESU, DPS, or stock)	Scientific name	FESA†	Likelihood of Occurrence
Chinook salmon - Upper Klamath and Trinity rivers ESU - California coastal ESU - Sacramento River winter-run ESU	*Oncorhynchus tshawytscha*	C FT FE	Low
Chinook salmon - Central Valley spring-run ESU - Central Valley spring-run in the San Joaquin River XN	*Oncorhynchus tshawytscha*	FT e	Low
Steelhead trout - Southern California DPS - California Central Valley DPS - Northern California DPS - Summer run - Central California coast DPS - South-central California coast DPS	*Oncorhynchus mykiss irideus*	 FE FT FT NL FT FT	Low

Notes:
* Likelihood refers to encountering adult tidewater goby in the marine environment, not an assessment of their presence in brackish streams at the DCPP site.
† NOAA Fisheries 2020 unless otherwise indicated.

1.3. Project Location

DCPP is situated on a coastal terrace in central California, midway between the coastal communities of Los Osos and Avila Beach. The DCPP Site is within a 750-acre Nuclear Regulatory Commission licensed boundary located nine miles northwest of Avila Beach. It is accessible via a security entrance at the end of Avila Drive and then by travelling approximately seven miles on a primary access road to the DCPP Site. The DCPP Site is surrounded by the owner-controlled area which consists of lands between the Port San Luis gate and Security Gate A, bounded by the eastern hills directly adjacent to the site access road and the northern evacuation route, and bounded to the west by the Pacific Ocean.

The Intake Cove is approximately 10 acres in size and is formed by two breakwaters that protect the Intake Structure for the DCPP. The shoreline perimeter of the Intake Cove consists of a combination of granite boulder riprap, concrete tribars that form the breakwaters, natural bedrock, and the concrete sea wall of the Intake Structure. The seabed of the Intake Cove consists of sand and soft sediments, boulder fields, low rock ridges, and emergent rocks during low tides. While large areas of the seabed in the back portions of the cove to the east furthest away from the entrance consist of soft, unconsolidated sediments, the seabed between the entrance to the Intake Cove and the Intake Structure largely consists of sand and is influenced by onshore currents generated by operation of the DCPP cooling water intake. The depth of the center portions of the Intake Cove varies from -16 FT mean lower low water (MLLW) in the back (eastern) part of the cove to -33 FT MLLW in front of the Intake Structure.

1.4. Project Description

The Project consists of a singular dredging event within the Intake Cove of the DCPP, as well as placement of suitable dredge material within the USACE nearshore area offshore of Morro Bay State Park, near Morro Bay, California (Figure 2). Dredging needs to occur in the Fall of 2023 (October-November).

The maximum total amount of sediment that is expected to be dredged is a maximum of 70,000 cubic yards (CY). It is anticipated that total mobilization, dredging, and demobilization would take approximately one to three months to complete. The precise schedule is contingent upon a variety of factors, including weather, wave action, wildlife stoppages, and equipment availability.

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Figure 2. Diablo Canyon Power Plant project location including dredged material placement location (Stantec 2023, Revised: 2023-06-16 By: stroedson).

1.4.1. Dredging

A maximum of 70,000 CY of sand and sediment would be dredged in the Intake Cove of the DCPP, covering an area of approximately 125,000 square FT at the north end of the Intake Cove (Figure 3). The removal is anticipated to result in approximately 60,175 CY of sand and sediment to a depth of -36 FT MLLW, with up to 2 FT of over-dredge to a maximum depth of -38 FT MLLW, resulting in an additional 9,089 CY.

The following is a list of the anticipated equipment for the Proposed Project:

- barge equipped with a hydraulic suction dredge and/or environmental clamshell bucket (as a contingent approach)
- scow barges and tugs (to transport material)
- support vessel(s) for crew

1.4.1. Placement of Suitable Dredged Material Area(s)

The Project would include placement of the dredge material at the USACE Nearshore Placement Area located south of the entrance to Morro Bay and west of Morro Bay State Park. The geographic location of the approximate center of the Placement Site is 35°20’33.1” N and -120°52’8.7” W (NAD 83). The Placement Site is the location found in the USACE Draft Environmental Assessment Morro Bay Six Year Federal Maintenance Dredging Program San Luis Obispo County, CA (USACE, 2013). The Placement Site is directly south of the Morro Bay harbor entrance and just offshore in approximately -20 to -40 FT MLLW depth (Figure 4). The Placement Site footprint is approximately 1,115 FT in width perpendicular to the beach, and 4,430 FT in length, running parallel to the beach.

1.4.2. Staging Area(s)

The primary staging area would be located at the Morro Bay Harbor, within the City of Morro Bay, with secondary staging areas within the parking area near the Intake Structure and possibly Port San Luis.

1.4.3. Equipment Mooring

The small dock within the Intake Cove is available for the dredging contractor as a light-duty marine access area for transfer of personnel, if needed. The dredge barge and scow are anticipated to be secured overnight within the Intake Cove, pursuant to the Anchoring Plan which is being developed and will be submitted to permitting agencies prior to start of dredging activities.

1.4.4. Dredging Crew Parking

The dredging crew would park vehicles at the Intake Cove parking area and transfer to the dredging barge via a tender.

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Figure 3. Diablo Canyon Power Plant Intake Cove proposed dredging area. (Stantec 2023, Revised: 2023-06-16 By: stroedson).

Figure 4. Diablo Canyon Power Plant proposed nearshore dredging material placement area (Stantec 2023, Revised: 2023-06-16 By: stroedson).

1.4.5. Dredging Methodology

To minimize turbidity impacts in the immediate vicinity of the Intake Structure, a suction dredge barge would work within the dredging footprint and convey the sediment via a pipe/hose to the scow barge and tug. This would allow for the dredged sand and sediment to be discharged into the scow barge away from the Intake Structure, as shown approximately in Figure 5, below.

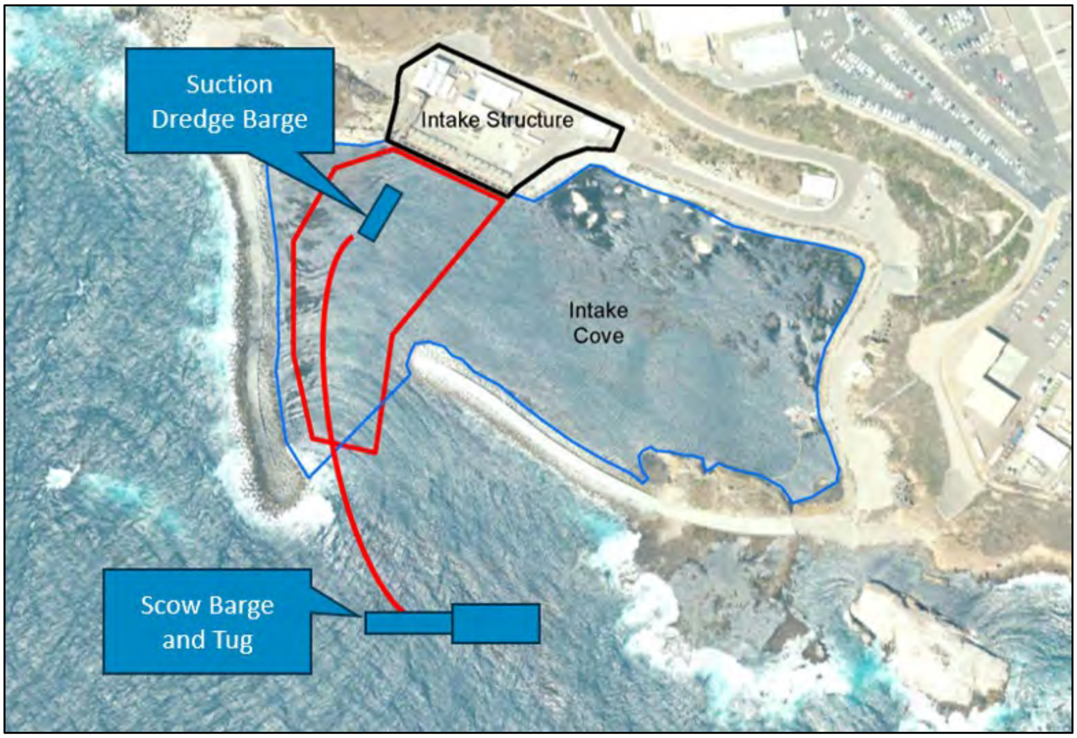

Figure 5. Conceptual Suction Dredge Layout

As part of Alternative 1, PG&E proposes to have environmental clamshell dredging equipment available as a contingent method, to be used (1) if sediments are encountered that would warrant usage of clamshell bucket dredging for increased efficiency or less disturbance to the surrounding environment and/or DCPP infrastructure or (2) if there are operational issues with the hydraulic suction dredge equipment and the environmental clamshell bucket would have similar effectiveness and no greater environmental impacts. The environmental clamshell bucket allows for a much more controlled dredging operation than standard mechanical dredging, and fully encloses sediments within the bucket to minimize turbidity that could result from using standard mechanical dredging equipment. Downward pressure ensures that each bucket is full of material and not water, resulting in a reduction of the turbidity at the dredge site, and the volume of water in the dump scows; eliminating, or at a minimum drastically reducing, the need to decant large amounts of water prior to transferring the scows to the disposal site. To prevent material from being spilled, the sides of the environmental clamshell bucket have strong rubber seals. These seals form a tight bond, so when the clamshell is raised, material cannot escape, and turbidity is minimized.

If environmental clamshell dredging is utilized within the Intake Cove, a scow would be secured to the dredge barge and the clamshell bucket would place material into the scow until full, at which time it would be transported via tug to the disposal site. See Figure 6, below, for a conceptual layout. Because the environmental clamshell bucket fully encloses the dredged sediment and minimizes captured water, there would be no need to decant large amounts of water within the Intake Cove, so there would be no decanting-associated turbidity effects.

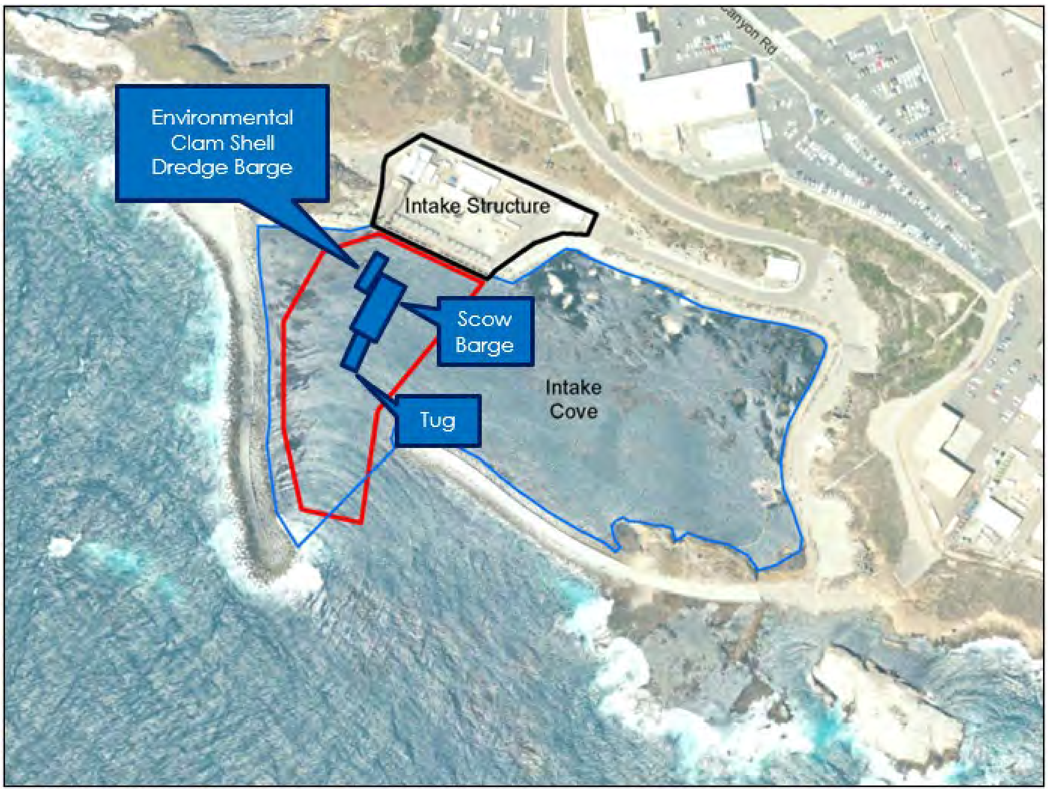

Figure 6. Conceptual Clamshell Dredge Layout (Contingent Approach)

Note the precise layout and equipment/positions will be determined in coordination with the retained Dredging Contractor.

2. Project Objectives

The purpose of the Proposed Action is to remove the accumulated sediment from the Intake Cove at the entrance of the Intake Structure of the DCPP (Table 6). As the seawater enters the Intake Structure, it passes through a series of bar racks and screens and enters the DCPP where it is used to condense steam for the reactors. Over the last decade, shoaling has occurred directly offshore of the base of the Intake Structure's bar racks; recently the rate of accumulation has increased. If the accumulated sediment is not removed, the Intake Structure could become inundated with sediment. Differential pressure across seawater components can result in unexpected derating of the power plant or shutdown. Rising steam plant water temperature parameters can affect generator cooling and condenser performance, posing a risk to the overall cooling system. Unprecedented sand and sediment buildup has been observed in seawater equipment, resulting in equipment challenges and increased risk of shutdown. Shallow Intake Channel depths are promoting additional kelp and algal growth, thereby raising the risk of seawater system fouling and inadvertent plant shutdown. As such, sand and sediment buildup in the Intake Channel is a direct, immediate threat to the reliable and safe operations of DCPP, which is a critical California power resource for stability of the State of California's electrical grid system.

The Proposed Action satisfies the purpose and would serve the following functions:

1. Maintain safe functioning of the Intake Structure, thereby enabling safe operation of the DCPP, which is a critical component of the State electrical grid system;
2. provide for increased worker safety during diver surveys and Intake Cove kelp and debris management by reducing flow velocities immediately offshore of the Intake Structure; and
3. placement of suitable dredged material nearshore to Montaña de Oro State Beach (at an existing dredged material placement site) to help replenish beaches and use dredged materials in an environmentally and economically beneficial manner.

Table 6. Intake Cove Proposed Action components with their size and scope that includes the approximate sediment quantities proposed for dredging and subsequent dredging material placement.

Proposed Action Components	Size/scope
Dredged area	124,961.57 sq FT
Dredging material	A maximum of approximately 70,000 CY
Dredge material placement (nearshore location)	1,115 FT width by 4,430 FT length

2.1. Effects of the Proposed Action on EFH

2.1.1. Action Area

The Intake Cove contains the DCPP Intake Structure within the Cove's 10-acre surface area. The depth of the center portions of the Intake Cove varies from -16 FT MLLW in the back (eastern) part of the Cove to -33 FT MLLW in front of the Intake Structure. The Intake Structure's concrete seawall, rip rap, natural bedrock, and concrete tribars make up the perimeter of the Cove. The seafloor within the Cove is a mixture of sand, soft bottom sediment, boulder fields, rock ridges and rocks exposed at low tides. Large areas in the eastern part of the Cove are primarily comprised of soft and unconsolidated sediments. The seafloor between the Cove's entrance and the Intake Structure are largely sand, as it is influenced by the onshore currents generated by operation of the DCPP cooling water intake.

California rocky nearshore intertidal and subtidal areas are characterized by diverse assemblages of algae, invertebrates, and fishes (Ricketts et al. 1985, Foster et al. 1988, Foster and Schiel 2015). The algae are of particular ecological importance, serving as food and shelter for associated animals (Lubchenco 1978, Kitting 1980, Cubit 1984, Geller 1991, Foster and Schiel 2015). The high diversity of plants and animals, and their abundance and distributions within the different nearshore zones, results from variations in physical factors (temperature, elevation, wave exposure, open space, substrate type) and biological factors (grazing, predation, space competition, and recruitment episodes) (Dayton 1971, Connell 1972, Lubchenco and Menge 1978, McGuinness 1987, Menge et al. 1994).

The Proposed Action is within the following FMPs essential fish habitat including PCG, CPS, HMS, and the potential for PCS. The Intake Cove includes two marine habitat areas: intertidal marine habitat and subtidal marine habitat. Three HAPCs reside within these two broader marine habitats of the Action Area: canopy kelp, eelgrass, and rocky reef are habitats inside the breakwaters of Intake Cove. Areas within the Intake Cove are not affected by the DCPP discharge into Diablo Cove (adjacent and northwest of the project site) per its design within two breakwaters and its utility to avoid DCPPs warm discharge water. As a result, the Intake Cove has no Receiving Water Monitoring Program nor monitoring stations.

Additional fish surveys were completed and described by Tenera Environmental 2020 within the subtidal survey of breakwater with 28 fish taxon observed (Appendix 1.7.1). Non-fishing effects on west coast groundfish EFH are generally categorized by PFMC (2019). Dredging and its disposal are known to have the following potential effects on EFH: loss and alteration of habitat; altered hydrology and geomorphology; sedimentation, siltation, and turbidity; release of contaminants; direct impacts to organisms; and noise.

2.1.2. Effects on EFH of FMPs Identified

Per 50 CFR 600.810, an adverse effect is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Potential for multiple effects to EFH of FMPs identified above from the Proposed Action of dredging and dredging material placement include the following (Table 7): habitat alteration, behavioral disturbance, turbidity, direct burial, and entrainment or impingement of fish. While there is the potential for some level of the effects listed, it is likely that most direct effects would be limited and temporary in nature, with habitat alteration being the primary effect that may last longer than others. The purpose of this activity is to maintain safe and reliable use of the Intake Structure by dredging accumulated material to achieve operational depth, so change of habitat within the dredging footprint is inherent in the action.

Dredging operations are categorized as mechanical disturbances to the seafloor often resulting with alteration of the habitat and turbidity. Habitat alteration of areas around the Intake Structure would be from sandy substrate removal and would not result in permanent elimination or conversion of habitat types; reducing the depth of accumulated sand is needed for existing DCPP Intake infrastructure to remain operational. Nearshore processes, including along-shore and cross-shore currents that drive both the down and upwelling events, will gradually deposit sand back into this area. The area identified to be dredged is located in the northwestern portion of the Intake Cove and consists primarily of sand and not soft sediments like those that occur in the eastern part of the Cove. As a result, the dredging of sandy sediment will result in less time with turbid conditions and less effects from turbidity within the Project Site.

Turbidity can produce negative effects on EFH and HAPCs from plume production from volumes of sediment suspended temporarily, which can result in smothering in some extreme cases as those particles settle. However, the dredging material within the Action Area is largely comprised of sand which results in the least amount of turbidity from dredging operations when compared with other sediment types and its duration is expected to be temporary.

Mechanical disturbance and noise from the Proposed Action will likely result in general behavioral disturbance potentially for all fish of the FMPs identified using the Action Area that may be present during dredging operations. Fish species are likely to initially respond by vacating the area as heavy equipment work commences in the Intake Cove.

Entrainment or impingement of fish from some types of suction dredge mechanisms would pose a negative effect and a potential risk. However, the limited duration of dredging activities and implementation of appropriate measures, such as fish screens during suction hose priming, would lessen these risks to fish in the Project Area.

Effects on EFH identified above from the proposed action of dredging material placement in the nearshore area previously identified may result in the direct burial of benthic communities as well as temporary turbidity in this area. While some benthos will be lost to direct burial, it is likely that these communities will recolonize the area as placement operations cease. Dredging material is primarily made of sand, and not soft sediments, so the length that turbid conditions may be present would be minimal and temporary. While there is the potential for altered hydrology and geomorphology at the nearshore placement site, it is not likely due to the depth range of the site that was previously deemed suitable and approved for such actions.

Table 7. Potential effects to Essential Fish Habitat from proposed activities on Fishery Management Plan species.

Effect from Project Activity	Impact Assessment
Mechanical disturbance	Temporary heavy equipment dredging operations within the intertidal and subtidal areas result in general behavioral disturbance.
Turbidity	Temporary adverse impact on FMP species resulting in avoidance of immediate dredging area (mostly near the scow barge) by adults and some loss of larval over the equipment operation and dredging material placement in the designated nearshore location.
Benthic community direct burial and displacement effects	Some benthos will be lost to direct burial, while other motile species may be displaced, as they may be able to move to adjacent areas. However, these organisms may repopulate the area after Proposed Action is completed.
Entrainment or impingement	Entrainment or impingement of fish from some types of suction dredge mechanisms would pose a negative effect and a potential risk for fish that remain in the dredge area during project activities.

2.1.3. Recommended Avoidance and Minimization Measures

There will be temporary impacts to EFH during the dredging project. Impacts to marine areas would likely come from the dredging and associated temporary turbidity impacts, and vessel traffic and anchoring activities. An anchor pre-plot would be developed for any of the anchoring activities associated with the Proposed Action. The dredging barge will utilize spud anchors, which are vertically dropped and lifted to secure the barge at each dredging position. To ensure anchors avoid hard-bottom habitat and associated kelp beds or algae covered rocks, anchors shall be lowered in a controlled manner and shall be recovered vertically through the water column.

Temporary impacts to EFH may occur due to potential water quality changes during the active dredging activities; however, changes will be localized and temporary. A Turbidity Management Plan will be implemented to minimize the effects of turbidity on sensitive resources.

When a suction dredge is utilized, impingement of marine life will be avoided to the extent practicable by using the smallest suction head possible for the work and limiting the rotation speed to as slow as is feasible for the conditions at the time of dredging. The suction pipe/hose has to be primed by filling it with water before dredging commences. Once primed, the suction head can be placed directly in the sand before turning it on to minimize impingement. During suction hose priming, other controls include utilizing screens with large surface areas and very fine openings to reduce priming velocities and impingement impacts. Priming impacts would be minimized by filling the hose (with screens installed), distant from areas supporting concentrations of fish.

Regardless of the dredging method employed (Section 1.4.5.), operational controls to reduce impacts on marine species include pre-construction diver surveys, clearing the dredging footprint of crabs and other slower invertebrates (non-special-status species) through relocation, and surveying for fish present within or near the dredging footprint, with the goal of ensuring that the dredging footprint is devoid of animals when dredging commences.

Lastly, marine surveys have been conducted prior to dredging and marine monitoring shall occur during construction to help minimize impact to EFH. Additional biological pre-construction survey efforts described in the Biological Monitoring Plan and additional conservation and mitigation measures described in the accompanying Biological Assessment (SWCA 2023) will be implemented. Section 6 of the Biological Assessment includes the following Minimization and Monitoring Measures that may apply to EFH: BIO-1 Environmental Awareness training, BIO-2 General Marine Operations and Listed Marine Wildlife Protection Measures, BIO-4 Turbidity Monitoring Plan.

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Appendix A – Subtidal Surveys of Breakwaters

Subtidal surveys of the DCPP Intake Cove Breakwaters (completed over multiple days in June 2020, Tenera Environmental Inc.) observed a total of 48 algal and 98 invertebrate taxa, along with a total of 29 fish taxa observed in the project area (Table 6). Many taxon observed in the subtidal zone are within the PCG FMP. No project surveys have occurred in water deeper than 4.5 meters, and as a result CPS FMP in the intertidal nor subtidal habitats were not observed in via surveys. However, we can assume that species listed in the FMPs may use this habitat at various life stages. Both canopy kelp species *Macrocystis spp.* and *Nereocystis luetkeana* were observed on the two breakwaters.

Table 6. Subtidal fish survey of breakwaters east and west and including both the inshore and offshore of each infrastructure where these species were observed (Table 3.1-1 – Diablo Canyon Power Plant Intake Cove Subtidal Breakwater Taxa Percent Frequency by Transect, Tenera Environmental Inc. 2020).

Taxon	Common name	FMP
Aulorhynchus flavidus	tubesnout	
Sebastes rastrelliger	grass rockfish	groundfish
Sebastes serranoides	olive rockfish	groundfish
Sebastes mystinus	blue rockfish	groundfish
Sebastes mystinus (juv.)	blue rockfish (juvenile)	groundfish
Sebastes atrovirens	kelp rockfish	groundfish
Sebastes caurinus	copper rockfish	groundfish
Sebastes miniatus	vermilion rockfish	groundfish
Sebastes mystinus (yoy)	blue rockfish (yoy)	groundfish
Sebastes serranoides/S. flavidus (yoy)	rockfish (yoy)	groundfish
Sebastes melanops (yoy)	black rockfish (yoy)	groundfish
Oxylebius pictus	painted greenling	
Orthonopias triacis	snubnose sculpin	
Scorpaenichthys marmoratus	Cabezon	
Artedius spp.	Sculpins	
Paralabrax clathratus	kelp bass	
Girella nigricans	Opaleye	
Hypsurus caryi	rainbow surfperch	
Rhacochilus vacca	pile surfperch	
Brachyistius frenatus	kelp surfperch	
Embiotoca jacksoni	black surfperch	
Embiotoca lateralis	striped surfperch	
Embiotoca lateralis (juv.)	striped surfperch	
Oxyjulis californica	Senorita	
Semicossyphus pulcher	California sheephead	
Gibbonsia spp.	Kelpfishes	
Cebidichthys violaceus	monkeyface prickleback	
Rhinogobiops nicholsii	blackeye goby	

Appendix B – Fish included in the federal fishery management plans for coastal pelagic species and pacific groundfish species (PFMC 2023 & 2022a)

Common Name	Scientific Name
Pacific sardine	*Sardinops sagax*
Pacific (chub) mackerel	*Scomber japonicus*
Northern anchovy Central and northern subpopulations	*Engraulis mordax*
Market squid	*Doryteuthis opalescens*
Jack mackerel	*Trachurus symmetricus*
Krill or Euphausiids Including these eight dominant species.	All Species in West Coast EEZ
First two species are common and are most likely to be targeted by fishing.	*Euphausia pacifica*
	Thysanoessa spinifera
	Nyctiphanes simplex
	Nematocelis difficilis
	T. gregaria
	E. recurva
	E. gibboides
	E. eximia
ELASMOBRANCHS	
Big skate	*Raja binoculata*
Leopard shark	*Triakis semifasciata*
Longnose skate	*Raja rhina*
Spiny dogfish	*Squalus suckleyi*
Cabezon	*Cabezon*
Scorpaenichthys marmoratus	*Scorpaenichthys marmoratus*
Kelp greenling	*Kelp greenling*
Hexagrammos decagrammus	*Hexagrammos decagrammus*
Pacific whiting (hake)	*Merluccius productus*
Sablefish	*Anoplopoma fimbria*
Aurora rockfish	*Sebastes aurora*
Bank rockfish	*S. rufus*
Black rockfish	*S. melanops*

Common Name	Scientific Name
Black and yellow rockfish	*S. chrysomelas*
Blackgill rockfish Blackspotted rockfish	*S. melanostomus* *S. melanostictus*
Blue rockfish	*S. mystinus*
Bocaccio	*S. paucispinis*
Bronzespotted rockfish	*S. gilli*
Brown rockfish	*S. auriculatus*
Calico rockfish	*S. dallii*
California scorpionfish	*Scorpaena gutatta*
Canary rockfish	*Sebastes pinniger*
Chameleon rockfish	*S. phillipsi*
Chilipepper rockfish	*S. goodei*
China rockfish	*S. nebulosus*
Copper rockfish	*S. caurinus*
Cowcod	*S. levis*
Darkblotched rockfish	*S. crameri*
Deacon rockfish	*S. diaconus*
Dusky rockfish	*S. ciliatus*
Dwarf-red rockfish	*S. rufinanus*
Flag rockfish	*S. rubrivinctus*
Freckled rockfish	*S lentiginosus*
Gopher rockfish	*S. carnatus*
Grass rockfish	*S. rastrelliger*
Greenblotched rockfish	*S. rosenblatti*
Greenspotted rockfish	*S. chlorostictus*
Greenstriped rockfish	*S. elongatus*
Halfbanded rockfish	*S. semicinctus*
Harlequin rockfish	*S. variegatus*
Honeycomb rockfish	*S. umbrosus*
Kelp rockfish	*S. atrovirens*
Longspine thornyhead	*Sebastolobus altivelis*
Mexican rockfish	*Sebastes macdonaldi*
Olive rockfish	*S. serranoides*
Pink rockfish	*S. eos*
Pinkrose rockfish	*S. simulator*
Pygmy rockfish	*S. wilsoni*
Pacific ocean perch	*S. alutus*
Quillback rockfish	*S. maliger*
Redbanded rockfish	*S. babcocki*
Redstripe rockfish	*S. proriger*
Rosethorn rockfish	*S. helvomaculatus*
Rosy rockfish	*S. rosaceus*
Rougheye rockfish	*S. aleutianus*

Common Name	Scientific Name
Sharpchin rockfish	*S. zacentrus*
Shortraker rockfish	*S. borealis*
Shortspine thornyhead	*Sebastolobus alascanus*
Silvergray rockfish	*Sebastes brevispinis*
Speckled rockfish	*S. ovalis*
Splitnose rockfish	*S. diploproa*
Squarespot rockfish	*S. hopkinsi*
Sunset rockfish Starry rockfish	*S. crocotulus* *S. constellatus*
Stripetail rockfish	*S. saxicola*
Swordspine rockfish	*S. ensifer*
Tiger rockfish	*S. nigrocinctus*
Treefish	*S. serriceps*
Vermilion rockfish	*S. miniatus*
Widow rockfish	*S. entomelas*
Yelloweye rockfish	*S. ruberrimus*
Yellowmouth rockfish	*S. reedi*
Yellowtail rockfish	*S. flavidus*
Arrowtooth flounder (turbot)	*Atheresthes stomias*
Butter sole	*Isopsetta isolepis*
Curlfin sole	*Pleuronichthys decurrens*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
Flathead sole	*Hippoglossoides elassodon*
Pacific sanddab	*Citharichthys sordidus*
Petrale sole	*Eopsetta jordani*
Rex sole	*Glyptocephalus zachirus*
Rock sole	*Lepidopsetta bilineata*
Sand sole	*Psettichthys melanostictus*
Starry flounder	*Platichthys stellatus*

Appendix C – Groundfish species designated as Ecosystem Component Species

Common Name	**Scientific Name**
Shortbelly rockfish	*Sebastes jordani*
Aleutian skate	*Bathyraja aleutica*
Bering/sandpaper skate	*B. interrupta*
California skate	*R. inornata*
Roughtail/black skate	*Bathyraja trachura*
All other skates	Endemic species in the family *Arhynchobatidae*
Pacific grenadier	*Coryphaenoides acrolepis*
Giant grenadier	*Albatrossia pectoralis*
All other grenadiers	Endemic species in the family *Macrouridae*
Finescale codling (aka Pacific flatnose)	*Antimora microlepis*
Ratfish	*Hydrolagus colliei*
Soupfin shark	*Galeorhinus zyopterus*

Appendix D – Stocks managed under the Fishery Management Plans that may be affected by the Project

Common Name	Scientific Name
Pacific sardine	*Sardinops sagax*
Pacific (chub) mackerel	*Scomber japonicus*
Northern anchovy Central and northern subpopulations	*Engraulis mordax*
Market squid	*Doryteuthis opalescens*
Jack mackerel	*Trachurus symmetricus*
Krill or Euphausiids Including these eight dominant species. First two species are common and are most likely to be targeted by fishing.	All Species in West Coast EEZ
	Euphausia pacifica
	Thysanoessa spinifera
	Nyctiphanes simplex
	Nematocelis difficilis
	T. gregaria
	E. recurva
	E. gibboides
	E. eximia

Appendix E Diablo Canyon Power Plant Intake Structure Caulerpa Report 2020 and 2023

Caulerpa Survey Reporting Form (version 1.2, 10/31/04)

Report Date:	July 5, 2020 (Survey conducted on June 22 and June 23, 2020).	
Name of bay, estuary, lagoon, or harbor	Pacific Gas and Electric Company Diablo Canyon Power Plant (DCPP) Intake Cove	
Specific location name: (address or common reference)	DCPP Intake Structure	
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of map must be included)	See Figure A3-1. The survey area is described as a rectangle extending offshore from the DCPP Intake Structure measuring approximately 72 by 25 meters.	
Survey Contact: (name, phone, e-mail)	Gery Cox (Tenera Environmental): (805) 541-0310, gcox@tenera.com	
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	n/a. This survey was for informational and planning purposes only in support of the planned DCPP decommissioning project. The intake structure will be removed under this project, but another *Caulerpa* survey will be performed according to NOAA/ CDFW timelines prior to any project impact activities.	
Is this the first or second survey for this project?	n/a. This survey was for informational and planning purposes only. No project has been initiated by DCPP.	
Was *Caulerpa* Detected: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	No *Caulerpa* was found at this site during the survey.	
Description of Permitted Work: (describe briefly the work to be conducted at the site under the permits identified above)	n/a. This survey was for informational and planning purposes only in support of the planned DCPP decommissioning project. The intake structure will be removed under this project, but another *Caulerpa* survey will be performed according to NOAA/ CDFW timelines prior to any project impact activities.	
Description of Site: (describe the physical and biological conditions within the survey area at the time of the survey and provide insight into	*Depth range:*	19 to 30 feet mean lower low water
	Substrate type:	Sandy seabed and concrete footing of intake structure.
	Temperature:	54° F on June 22 57° F on June 23

variability, if known. Please provide units for all numerical information).	*Salinity:*	34 parts per thousand
	Dominant flora:	<u>Sandy seabed</u>: *Desmerestia* sp. (acid kelp), *Sarcodiothaeca gaudichaudii, Pleurophycus gardneri* (broad-ribbed kelp). <u>Intake structure</u>: *Nereocystis luetkeana* (juvenile stage), *Cryptopleura ruprechtiana*, *Rhodymenia* spp., Laminariales.
	Dominant fauna:	<u>Sandy seabed</u>: *Pachycerianthus fimbriatus* (tube anemone), *Diopatra ornata* (tube worm), *Cryptochiton stelleri* (gumboot chiton). <u>Intake structure</u>: *Metridium senile* (anemone), *Watersipora subtorquata* (bryozoan), *Corynactis californica* (strawberry anemones), *Balanophyllia elegans* (cup corals), barnacles, tunicates, others.
	Exotic species encountered:	*Watersipora subtorquata* was present on the intake structure walls.
	Other site description notes:	
Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts.	*Survey date and time period:*	This *Caulerpa* survey was performed on June 22 from approximately 11:45 to 12:30, and June 23, 2020 from approximately 13:30 to 14:15
	Horizontal visibility in water:	Underwater horizontal visibility was approximately 12 feet (4 meters).
	Survey type and methods:	The area was visually searched by divers using SCUBA. Meter tapes were used underwater to help ensure the area was searched in a systematic fashion. Approximately 75 percent of the area was searched.
	Survey personnel:	Andrew Harmer and Kim Whiteside (Tenera Environmental)
	Survey density:	Approximately 75percent of the area was systematically searched, a larger percentage of area than 'surveillance level'.
	Survey limitations:	There were no survey limitations.
Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.)	See Figure A3-1 below.	

Caulerpa Survey Reporting Form

Surveys shall only be completed by certified *Caulerpa* surveyors. A current list of certified surveyors is available online (https://www.fisheries.noaa.gov/west-coast/habitat-conservation/certified-caulerpa-surveyors). This form is required to be submitted for any surveys conducted for *Caulerpa* species that are required under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers, California Coastal Commission, or Regional Water Quality Control Boards. The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Bryant Chesney, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4037, or Christopher Potter, California Department of Fish and Wildlife, (415) 740-9869.

Report Date:	September 6, 2023
Name of bay, estuary, lagoon, or harbor:	Diablo Canyon Power Plant (DCPP) Intake Cove.
Specific Location Name: (address or common reference)	Proposed DCPP Intake Cove dredge footprint (see Figure 1)
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map must be included)	35.207207°N, 120.856415°W See Figure 1.
Survey Contact: (name, phone, e-mail)	Gery Cox (Tenera Environmental): (805) 541-0310, gcox@tenera.com
Personnel Conducting Survey (if other than above): (name, phone, e-mail)	Andrew Harmer (Tenera Environmental) (805) 541-0310 aharmer@tenera.com Parker Kalan (Tenera Environmental) (805) 541-0310 pkalan@tenera.com Hailey Whitehead (Tenera Environmental) (805) 541-0310 hwhitehead@tenera.com
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	Permits have yet to be acquired for this project.
Which survey is this for this project (e.g., first, second, etc.)?	This was the first survey for this proposed dredging project, but the same area was searched for Caulerpa (and eelgrass) in 2020 for the proposed decommissioning of the DCPP. No Caulerpa was found in the prior survey.
Was *Caulerpa* Detected?: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFW personnel identified above)	☐ **Yes, *Caulerpa* was found at this site and has been contacted on _________ date.** ☑ **No, *Caulerpa* was not found at this site.**

Description of Authorized Work: (describe briefly the work to be conducted at the site under the permits identified above)	Area in the red polygon of Attachment 1 will be dredged (where possible) to a depth of -36' MLLW, with an overdredge allowance -38' MLLW.	
Description of Site: (describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).	*Depth range:*	-12 ft to -36 ft MLLW
	Substrate type:	sand
	Temperature:	56 F
	Salinity:	34 ppt
	Dominant flora:	Desmarestia tabacoides, Alaria marginata (see Figure 2)
	Dominant fauna:	Diopatra ornata, Pachycerianthis fimbriatus, Panopea generosa, Anthopleura artemisia.
	Exotic species encountered (including all Caulerpa species):	none
	Other site description notes:	
Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts).	*Survey date and time period:*	September 6, 2023 09:00-12:00
	Horizontal visibility in water:	15-20 ft
	Survey type and methods:	Divers swam along seven transect lines within the proposed dredge footprint. Divers visually searched using SCUBA.
	Survey personnel:	Andrew Harmer Parker Kalan Hailey Whitehead
	Survey density:	Conservatively estimating, 75% of the area was searched.
	Survey limitations:	none
Other Information: (use this space to provide additional information or references to attached maps, reports, etc.)		

Caulerpa Survey Reporting Form (version 5.1, 10/20/21)

SAMPLING AND ANALYSIS PLAN RESULTS REPORT

Morro Bay Harbor 2023 Environmental and Geotechnical Investigation

Delivery Order No. W912PL22F0037
USACE Contract No. W912PL20D0003

January 2023

Prepared for:

U.S. Army Corps of Engineers, Los Angeles District
Los Angeles, California

Prepared by:

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GeoPentech Geotechnical & Geoscience Consultants
KINNETIC

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BMP	best management practice
CAL/EPA	California Environmental Protection Agency
CDFW	California Department of Fish and Wildlife
CESPD	Corps of Engineers, South Pacific Division
CESPL	Corps of Engineers, Los Angeles District
CHHSL	California Human Health Screening Level
COC	chain of custody
CSLC	California State Lands Commission
CWA	Clean Water Act
CY	cubic yards
DDD	dichloro-diphenyl-dichloroethane
DDE	dichloro-diphenyl-dichloroethylene
DDT	dichloro-diphenyl-trichloroethane
DGPS	differential global positioning satellite
ERL	effects range low
ERM	effects range medium
ERMq	effects range medium quotient
ITM	Inland Testing Manual
LCS	laboratory control spike
MDL	method detection limit
MLLW	mean lower low water
MS	matrix spike
MSD	matrix spike duplicate
NAD	North American Datum
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
OEHHA	Office of Environmental Hazard Assessment
PAH	polycyclic aromatic hydrocarbon
PDS	post-digestion spike
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
RPD	relative percent difference
RSL	regional screening level
RWQCB	Regional Water Quality Control Board
SAP	sampling and analysis plan
SAPRG	sampling and analysis plan/results guidelines
SC-DMMT	Southern California Dredge Material Mgmt. Team
SOP	standard operating procedure
TMDL	total maximum daily load
TOC	total organic carbon
TRPH	total recoverable petroleum hydrocarbons
TTLC	total threshold limit concentration
TVS	total volatile solids
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USNMFS	U.S. National Marine Fisheries Service

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) conducts annual maintenance dredging of the federal channels of Morro Bay Harbor, Morro Bay, California (Figure 1) to remove accumulated sediment above design depths. This sediment evaluation project was conducted in support of a new six-year Environmental Assessment for the Morro Bay Harbor Federal Maintenance Dredging Program.

There are six channel areas in Morro Bay that USACE maintains. These areas are the Entrance Channel (Area A), Sand Trap (Area B), Transition Channel (Area C), Main Channel (Area D), Navy Channel (Area E), and Morro Channel (Area F). Historically, Areas C and D have been combined into one area for testing purposes. Authorized depths for these channels range from -12 feet mean lower low water (MLLW) for the Morro Channel to -40 feet MLLW for the Entrance Channel. The Entrance Channel and Sand Trap are areas of advanced maintenance dredging to ward off significant shoaling that could endanger vessels entering and leaving the Harbor. Since 2010, between 100,000 and 300,000 cubic yards (cy) of sediment has been dredged annually from the Entrance Channel, Transition Channel, Main Channel, and portions of the Navy Channel (to STA 57+00). The Morro Channel, Sand Trap, and the remaining portion of the Navy Channel are dredged less frequently. Sediments in the Morro Bay Harbor channels were evaluated last in 2013 and 2017/2018. All of Morro Bay Harbor federal channel sediments have been previously beneficially reused for beach replenishment by primarily placing the sediments in the nearshore immediately off Montana de Oro State Beach located south of Morro Bay Harbor. An alternative area for dredged material placement is in the surf zone of Morro Strand State Beach located north of Morro Rock. This alternative area is mainly used for the Areas E and F sediments.

For this current investigation, vibracore sampling was performed from the 38-foot vessel *Bonnie Marietta* from November 1 to November 4, 2022 to collect subsurface sediment samples at 25 locations throughout the six channel areas (see Figures 2 and 3). Subsamples from each location were combined with like subsamples to form five composite samples that represented the six channel areas. These composite samples were analyzed for total and volatile solids, pH, total organic carbon, oil & grease, petroleum hydrocarbons, ammonia, metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc), butyltins, pyrethroid pesticides, chlorinated pesticides, PCB congeners, phenols, phthalates, and PAH compounds. In addition, samples for grain size analyses and archiving were collected from each individual core prior to compositing. These grain size and archive samples represented the entire core length, from the top of the core to the 2-foot overdepth elevations or depth of advanced maintenance. Additional grain size samples were collected from any distinct physical strata.

USACE Los Angeles District (CESPL) used the geotechnical data gathered from this study to perform physical beach compatibility analyses between the proposed dredged sediments and Montana de Oro State Beach nearshore area and Morro Strand State Beach. These receiver areas were sampled for grain size on November 3 and 4, 2022. Eight random locations were sampled within the Montana de Oro State Beach nearshore area. At Morro Strand State Beach, seven elevations were sampled every 6 feet from +12 to -30 feet MLLW along three transects perpendicular to the beach. The -6-foot MLLW elevation at Morro Strand State Beach, which was called for in the project Sampling and Analysis Plan (SAP), could not be sampled due to high surf and safety concerns. To assist in evaluating beach suitability, nearshore area and receiver beach grain size gradation data were compared with grain size gradation data from the harbor channels to determine if the harbor sediments are physically compatible with the receiving areas. The CESPL Morro Bay Harbor Sediment Physical Compatibility Analysis Report (see Appendix C) concluded that the sediments sampled from within the federal channel dredge areas are geotechnically suitable for placement at the Montana de Oro nearshore area or in the surf zone of

Morro Strand State Beach. This conclusion does not consider the suitability of sediments based on chemistry testing results.

Bulk sediment chemistry results were evaluated against National Oceanic and Atmospheric Administration (NOAA) toxicity effects-based screening levels (effects range-low [ERL] and effects range-medium [ERM] values) and federal and California human health objectives. Most analyte concentrations in the Morro Bay Harbor composite samples were below detection limits or low compared to screening values. The only analyte concentration to exceed a NOAA ERL value was nickel, which did not exceed the ERM value. The only organic contaminants detected in the Morro Bay Harbor sediments were low levels of some PAH compounds in composite samples B, E, and F and a few phthalate compounds in composite samples E and F. As one would expect, mean ERM quotients among all contaminants with ERM values were very low (0.01 to 0.02). With an ERMq of 0.1, there is less than a 12% probability of a toxic response. Arsenic was the only metal to exceed a human health objective but at a level less than typically found on beaches. Chemical concentrations were very similar to those from the 2013 and 2017/2018 sampling episodes. The 2013 and 2017/2018 sediments were deemed suitable for their intended reuse.

1. INTRODUCTION

Maintenance dredging is required annually in the federal channels of Morro Bay Harbor, California (Figure 1) to maintain the channels at their design depths. Sediments to be dredged require a physical and environmental evaluation of sediment quality to support planning and permitting for dredging and reuse. This project is authorized by the 1958 Rivers and Harbors Act (H.R. 356, 90th Cong. §2).

This Sampling and Analysis Plan Results (SAPR) report was prepared on behalf of the U.S. Army Corps of Engineers, Los Angeles District (CESPL) to detail procedures and quality assurance/quality control (QA/QC) requirements for the sampling and testing of sediments from Morro Bay Harbor identified for placement at two potential beach nourishment areas. This investigation was performed under Delivery Order W912PL22F0037, USACE Contract W912PL20D0003. All work described in this report was conducted in accordance with the approved sampling and analysis plan (SAP) (Diaz-Yourman, GeoPentech, and Kinnetic Laboratories Joint Venture 2022) unless otherwise noted.

1.1 Project Summary

The purpose of this project was to sample and test sediments from within the federal channels proposed for maintenance dredging to provide sediment quality data for evaluation of dredging and beach nourishment. This sampling and testing program is to fulfill requirements of the U.S. Army Corps of Engineers (USACE), South Pacific Division (CESPD) Regulation R 1110-1-8 (CESPD, 2000), the Inland Testing Manual (ITM) (USACE and USEPA, 1998), the Clean Water Act (CWA), and the Southern California Dredge Material Management Team (SC-DMMT) SAP/Results (SAPR) Guidelines (SAPRG) (CESPL, 2021). This sediment evaluation project is in support of a new six-year Environmental Assessment for the Morro Bay Harbor Federal Maintenance Dredging Program.

Morro Bay Harbor was divided into six dredge units/channel areas based on location and design depths, as shown on Figures 2 and 3. These areas are the Entrance Channel (Area A), Sand Trap (Area B), Transition Channel (Area C), Main Channel (Area D), Navy Channel (Area E), and Morro Channel (Area F). Historically, Areas C and D were combined into one area for testing purposes. Authorized depths for these channels range from -12 feet mean lower low water (MLLW) for the Morro Channel to -40 feet MLLW for the Entrance Channel. The Entrance Channel and Sand Trap are areas of advanced maintenance dredging to ward off significant shoaling that could endanger vessels entering and leaving the Harbor. Authorized depths for each channel area are shown on Figures 2 and 3.

Since 2010, between 100,000 and 300,000 cubic yards (cy) of sediment has been dredged annually from the Entrance Channel, Transition Channel, Main Channel, and portions of the Navy Channel (to STA 57+00) by the Corps of Engineers hopper dredge *Yaquina*. The Morro Channel, Sand Trap, and the remaining portion of the Navy Channel are dredged less frequently, using a variety of means depending on the dredge contractor. In the past, these remaining areas have been dredged using hopper dredges, cutterhead dredges and other hydraulic dredges, and excavator dredges, or a combination of these dredges. Earlier in 2022, approximately 148,000 cy of material was removed from the Entrance Channel, Sand Trap, Transition Channel, and portions of the Navy Channel by the USACE *Yaquina* hopper dredge. The last time the Morro Channel, Sand Trap and remaining portions of the Navy Channel were dredged was in 2017, when approximately 281,000 cy yards of material was removed using a hydraulic cutterhead dredge. The primary area for dredged material placement is the nearshore immediately off Montana de Oro State Beach located south of Morro Bay Harbor. An alternative area for dredged material placement is in the surf zone of Morro Strand State Beach located north of Morro Rock. Approximate locations of both beaches are depicted on Figure 1. Placement of Morro Bay Harbor

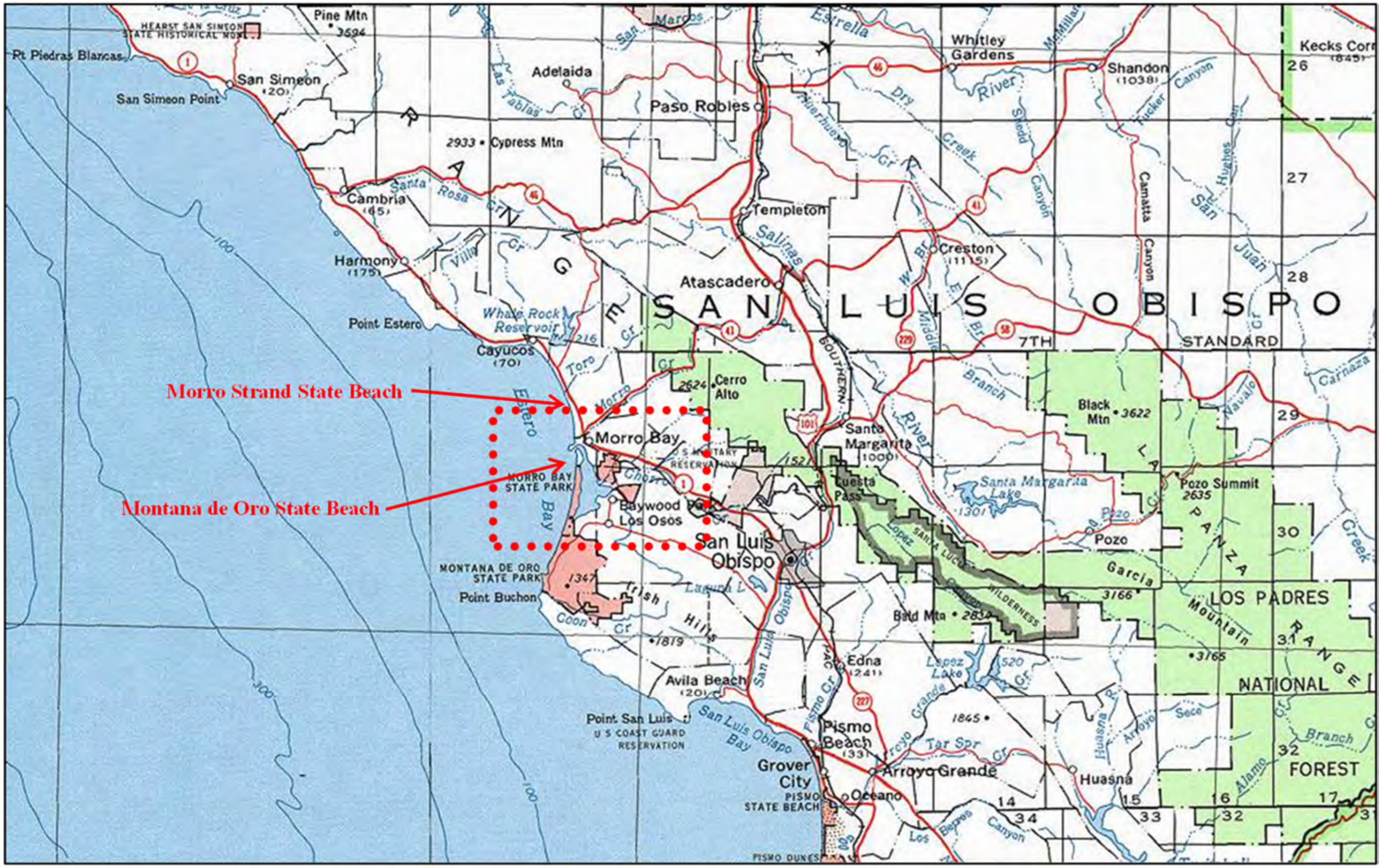

Figure 1. Location of Morro Bay Harbor, Morro Strand State Beach, and Montana de Oro State Beach

TABLE OF COORDINATES ACTUAL LOCATIONS		
Name	Northing	Easting
MB23VC-EC-01	2,329,740	5,706,020
MB23VC-EC-02	2,329,890	5,705,725
MB23VC-EC-03	2,330,220	5,705,795
MB23VC-EC-04	2,330,200	5,706,360
MB23VC-EC-05	2,330,640	5,706,485
MB23VC-ST-01	2,330,480	5,706,850
MB23VC-ST-02	2,330,430	5,707,260
MB23VC-ST-03	2,330,685	5,707,240
MB23VC-ST-04	2,330,980	5,707,130
MB23VC-TC-01	2,330,810	5,706,705
MB23VC-MC-01	2,331,820	5,707,595
MB23VC-MC-02	2,332,030	5,707,715
MB23VC-MC-03	2,332,290	5,707,910
MB23VC-NC-01		
MB23VC-NC-02	2,333,040	5,708,040
MB23VC-NC-03	2,333,080	5,708,890
MB23VC-NC-04	2,332,865	5,709,300
MB23VC-NC-05	2,332,865	5,709,600
MB23VC-NC-06	2,332,575	5,709,950
MB23VC-NC-07	2,332,240	5,710,180
MB23VC-NC-08	2,333,045	5,709,200

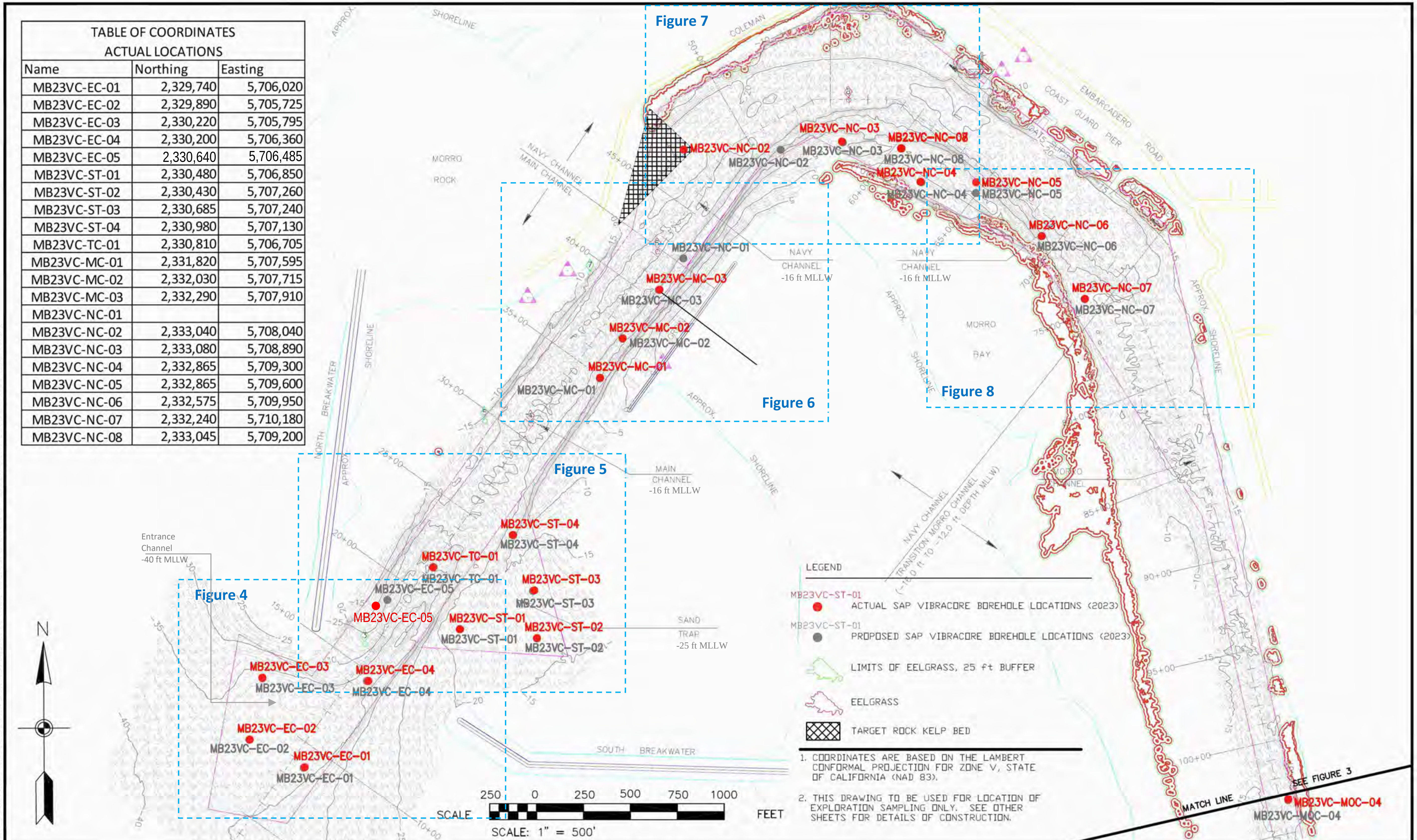

Figure 2. 2022 Bathymetric Data, Final and Target Sampling Locations, and Biological Resources, Morro Bay Harbor Federal Channels (0+00 to 75+00)

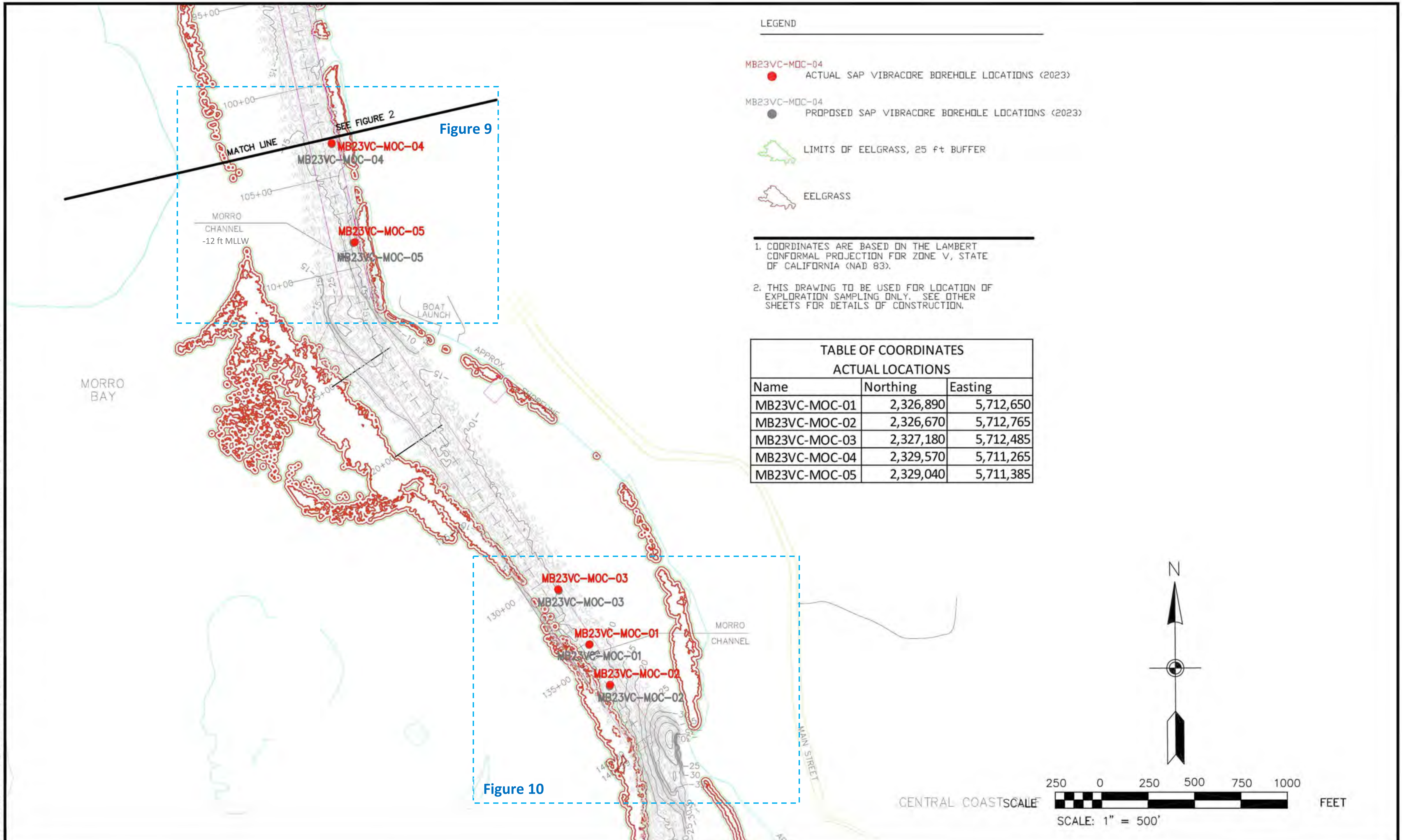

TABLE OF COORDINATES ACTUAL LOCATIONS		
Name	Northing	Easting
MB23VC-MOC-01	2,326,890	5,712,650
MB23VC-MOC-02	2,326,670	5,712,765
MB23VC-MOC-03	2,327,180	5,712,485
MB23VC-MOC-04	2,329,570	5,711,265
MB23VC-MOC-05	2,329,040	5,711,385

Figure 3. 2022 Bathymetric Data, Final and Target Sampling Locations, and Biological Resources, Morro Bay Harbor Federal Channels (75+00 to 140+00)

sediments in the nearshore or on the receiving beaches has historically provided beneficial reuse for beach nourishment purposes and has improved the overall integrity of these beaches.

Portions of Morro Bay Harbor adjacent to the federal channels are inhabited by giant kelp and eelgrass. These important habitats provide food and sanctuary for a variety of marine species and every effort was made to avoid them. These biologically important habitats are shown on Figures 2 and 3. Sea otters also frequent Morro Bay Harbor and were avoided.

1.2 Site Location

Morro Bay Harbor is in San Luis Obispo County, California (see Figure 1). Geographic coordinates (NAD 83) for the Entrance to Morro Bay Harbor are 35° 21' 37" N and 120° 52' 12" W. The approximate center of the Harbor in front of the Coast Guard pier is 35° 22' 10" N and 120° 51' 35" W. Geographic coordinates of the approximate center of the Montana de Oro State Beach nearshore placement area are 35° 20' 47" N and 120° 52' 21" W, and geographic coordinates of the approximate center of the Morro Strand State Beach placement area are 35° 23' 20" N and 120° 51' 59" W.

1.3 Roles and Responsibilities

Project responsibilities and key contacts for this sediment characterization program are listed in Tables 1 and 2. Kinnetic Environmental, Inc. provided sampling and reporting services. Diaz Yourman and Associates was responsible for core logging. Analytical chemical testing of sediments for this project was primarily carried out by Eurofins Calscience (Cal-ELAP No. 2944CA). Geotechnical testing was conducted by the CESPL geotechnical laboratory.

1.3.1 Data Users

The principal users of the data produced by this project are the following SC-DMMT regulating agencies:

- Corps of Engineers, Los Angeles District (CESPL)
- Central Coast Regional Water Quality Control Board (RWQCB) – Region 3
- U.S. Environmental Protection Agency (USEPA) – Region IX
- California Coastal Commission

Other users of the data may include the following agencies:

- California Department of Fish and Wildlife (CDFW)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. National Marine Fisheries Service (USNMFS)
- California State Lands Commission (CSLC)

Table 1. Project Team and Responsibilities

Responsibility	Name	Affiliation
Project planning and coordination	Blake Horita Luis Sepulveda Gabrielle Dodson Natalie Martinez-Takeshita Kirk Brus Christopher Diaz Ken Kronschnabl	CESPL CESPL CESPL CESPL CESPL Diaz-Yourman Kinnetic Environmental
Sampling and Analysis Plan preparation	Ken Kronschnabl Amy Howk Christopher Diaz	Kinnetic Environmental Kinnetic Environmental Diaz-Yourman
Field sample collection and transport	Spencer Johnson Charlie Davidson	Kinnetic Environmental Kinnetic Environmental
Geotechnical investigation	Chris Diaz Ashley Scholder	Diaz-Yourman Diaz-Yourman
Health and safety officer and Site Safety Plan	Tim Fleming	Kinnetic Environmental
Laboratory chemical analyses	Lori Thompson Amy Howk	Eurofins Kinnetic Environmental
QA/QC management Analytical laboratory QA/QC	Amy Howk Lori Thompson	Kinnetic Environmental Eurofins
Technical review	Ken Kronschnabl Luis Sepulveda Gabrielle Dodson Natalie Martinez-Takeshita Kirk Brus Joe Ryan Christopher Diaz	Kinnetic Environmental CESPL CESPL CESPL CESPL CESPL Diaz-Yourman
Final report	Ken Kronschnabl Christopher Diaz	Kinnetic Environmental Diaz-Yourman
Agency coordination	Luis Sepulveda Kirk Brus	CESPL CESPL

Table 2. Key Project Contacts

Key Contacts	
Blake Horita CESPL Project Manager Navigation and Coastal Projects Branch, Navigation Section U.S. Army Corps of Engineers, Los Angeles District 915 Wilshire Boulevard Los Angeles, CA 90017 (213) 452-4026 Blake.M.Horita@usace.army.mil	Luis Sepulveda CESPL Project Technical Manager Geology and Investigations Section U.S. Army Corps of Engineers, Los Angeles District 915 Wilshire Boulevard Los Angeles, CA 90017 (718) 810-6150 Luis.Sepulveda@usace.army.mil
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Natalie Martinez-Takeshita CESPL Project Lead Biologist Environmental Resources Branch, Ecosystem Planning Section U.S. Army Corps of Engineers, Los Angeles District 915 Wilshire Boulevard Los Angeles, CA 90017 Office: (213) 452-3306 Natalie.M.Martinez-Takeshita@usace.army.mil	Ken Kronschnabl Project Manager – Sampling/Testing Kinnetic Environmental, Inc. 9057C Soquel Drive, Suite B Aptos, CA 95003 (831) 457-3950 kkronsch@kinneticenv.com
Chris Diaz Project Manager – Diaz Yourman Associates, Geopentech, and Kinnetic Laboratories Joint Venture Diaz.Yourman & Associates 1616 East 17th Street Santa Ana, CA 92705-8509 (714) 245-2920 chris@diazyourman.com	Amy Howk QA/QC Management Kinnetic Environmental, Inc. 9057C Soquel Drive, Suite B Aptos, CA 95003 (831) 457-3950 ahowk@kinneticenv.com
Spencer Johnson Field Operations Manager Kinnetic Environmental, Inc. 9057C Soquel Drive, Suite B Aptos, CA 95003 (831) 457-3950 sjohnson@kinneticenv.com	Lori Thompson Project Manager Eurofins Calscience, Inc. 7440 Lincoln Way Garden Grove, CA 92841-1427 (949) 870-8766 lori.thompson@eurofinset.com

2. SITE HISTORY AND HISTORICAL DATA REVIEW

This section provides a brief history of Morro Bay Harbor, potential sources of contamination, dredging history, and most recent testing and sampling results.

2.1 Harbor Construction, Site Setting and Potential Sources of Contamination

Morro Bay Harbor is in San Luis Obispo County (see Figure 1) at the mouth of a natural embayment. It was first established as a port in 1870 to export dairy and ranch products. It is now an artificial harbor constructed by USACE. Morro Rock, bordering the northwest corner of the Harbor, was originally an island until USACE constructed a causeway connecting the island to the mainland starting in 1933. Prior to the causeway, the entrance to the Harbor was from the north, east of Morro Rock. Morro Rock was quarried from 1889 to 1969 and some of that material was used to build the causeway. During World War II, USACE built the outer breakwater to protect the new entrance to the Harbor. To improve safety for vessels entering and leaving the Harbor, the Entrance Channel was deepened and extended in 1995.

The Harbor is bounded by a long sand spit with no development to the west and the City of Morro Bay to the east. Most of the surrounding land use to the east of Morro Bay Harbor is residential and commercial. There is a former PG&E 300-megawatt power plant along the northern shore of Morro Bay Harbor east of Morro Rock. There are plans to have this plant, including the stacks, be dismantled sometime in the future. There are no other major industrial facilities in the Morro Bay Harbor watersheds, and it is not known if such facilities existed in the past.

Chorro Creek is Morro Bay's largest tributary. It forms an estuary in the back bay between Morro Bay Harbor and the town of Los Osos. Los Osos Creek, which empties into the far south end of the back bay, is the second largest and only other significant tributary. The Chorro Creek watershed, which is dominated by rangeland with areas of woodland, cropland, and urban land use, has been issued total maximum daily loads (TMDLs) for nutrients and dissolved oxygen. Morro Bay itself, which includes Chorro Creek and Los Osos Creek, also has TMDLs for sediment and pathogens.

There are several marinas in Morro Bay Harbor with the largest operated by the City of Morro Bay. The City manages 50 slips, approximately 125 moorings, a boat launch facility, and a couple of city piers. As many as 50 liveaboards are permitted to stay in Morro Bay Harbor. The Harbor also contains a fuel dock, a couple of boat yards with haul-out facilities, and fish processing facilities.

According to the City of Morro Bay's Storm Water Management Plan (City of Morro Bay, 2011), there are approximately 18 small storm drains (<36 inches in diameter) that discharge into Morro Bay Harbor. These discharges are spread out fairly evenly along the entire waterfront.

Spill reporting for Morro Bay Harbor included records obtained for 2018 through 2022. Fifty-five reports of a sheen were recorded in the Morro Bay Harbor Patrol Logs over that period (City of Morro Bay, 2022). Of those, 15 were reported to the U.S. Coast Guard (USCG) Marine Safety Detachment and the National Response Center (NRC) from unknown sources, and 11 were reported to USCG Marine Safety Detachment and NRC from a specific vessel. No citations were given by Harbor Patrol for pollution during this period. Forty-four cases of pollution prevention of sand dusting or paint chips were recorded by way of loaning vacuum sanders during that same period. No cases were reported for pollution of this type.

Portions of Morro Bay Harbor adjacent to the federal channels are inhabited by giant kelp and eelgrass. These important habitats provide food and sanctuary for a variety of marine species. As such, it is important to avoid damage to these habitats during dredging and sampling activities.

The proposed receiving beaches, Montana de Oro State Beach (primary) and Morro Strand State Beach (alternative), are directly to the south and north of Morro Bay Harbor as shown in Figure 1. Both beaches are west-facing and receive considerable wave energy. Placement of Morro Bay Harbor sediments on or nearshore of the receiving beaches has historically improved the overall integrity of these beaches.

2.2 Previous Morro Bay Harbor Dredging and Testing Episodes

USACE maintains the federal channels of Morro Bay Harbor to their design depths. Portions of the channels have been dredged almost annually for the past 35 years. Table 3 describes the dredging history from 1986 to the present. As mentioned previously, the Entrance Channel, Sand Trap, Transition Channel, Main Channel, and portions of the Navy Channel are dredged most often, while the Morro Channel and the remaining portions of the Navy Channel are dredged only occasionally, with the last harbor-wide dredging occurring in 2017.

Table 3. Morro Bay Maintenance Dredging History

Period	Location	Authorized Depths (ft. MLLW)	Volume Removed (cy)	Placement Location	Dredge Type
May 2022	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	147,821	Montana de Oro SB Nearshore	Hopper
May 2021	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	186,869	Montana de Oro SB Nearshore	Hopper
May 2020	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	160,457	Montana de Oro SB Nearshore	Hopper
May 2019	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	170,187	Montana de Oro SB Nearshore	Hopper
May 2018	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	131,280	Montana de Oro SB Nearshore	Hopper
May 2017	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	198,560	Montana de Oro SB Nearshore	Hopper
Feb-July 2017	ST, Navy, Moro	-25, -16, -12	280,800	Morro Strand (87,100 cy) Montana de Oro (193,700 cy)	Hydraulic Cutterhead
May 2016	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	260,000	Montana de Oro SB Nearshore	Hopper
May-June 2015	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	138,200	Montana de Oro SB Nearshore	Hopper
May 2014	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	173,600	Montana de Oro SB Nearshore	Hopper
May-June 2013	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	122,850	Montana de Oro SB Nearshore	Hopper
May 2012	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	125,000	Montana de Oro SB Nearshore	Hopper
May-June 2011	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	120,920	Montana de Oro SB Nearshore	Hopper
Aug-Sept 2010	EC, ST, Trans, Main	-40, -25, -29, -16	135,170	Montana de Oro SB Nearshore	Hydraulic Cutterhead
May-June 2010	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	249,780	Montana de Oro SB Nearshore	Hopper
2009/2010	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	375,000	Morro Strand SB	Hydraulic Cutterhead
	Morro	-12	199,000	Montana de Oro SB Nearshore	Excavator (Bucket)
June 2009	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	151,070	Montana de Oro SB Nearshore	Hopper

Table 3. Morro Bay Maintenance Dredging History

Period	Location	Authorized Depths (ft. MLLW)	Volume Removed (cy)	Placement Location	Dredge Type
June-July 2008	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	140,800	Montana de Oro SP Nearshore	Hopper
July 2007	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	150,400	Montana de Oro SB Nearshore	Hopper
July 2006	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	196,250	Montana de Oro SP Nearshore	Hopper
July 2005	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	134,000	Montana de Oro SB Nearshore	Hopper
July 2004	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	155,700	Montana de Oro SB Nearshore	Hopper
July 2003	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	170,820	Montana de Oro SB Nearshore	Hopper
2001/2002	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	657,000	Montana de Oro SB Nearshore	Hydraulic
	Morro	-12	211,500	Morro Strand SB	Cutterhead
July 2001	EC, ST, Trans, Main, Navy, Morro	-40, -25, -29, -16, -12	180,470	Montana de Oro SB Nearshore	Hopper
July-Aug 2000	EC, Trans, Main	-40, -29, -16	236,900	Montana de Oro SB Nearshore	Hopper
June-July 1999	EC, Trans, Main	-40, -29, -16	134,230	Montana de Oro SB Nearshore	Hopper
Aug. 1998	EC, Trans, Main	-40, -29, -16	115,390	Montana de Oro SB Nearshore	Hopper
Jan-April 1998	EC, ST, Trans, Main, Navy, Moro	-40, -25, -29, -16, -12	555,900	Montana de Oro SB Nearshore & Morro Strand SB	Hopper
1997	EC	-40	63,000	Montana de Oro SB Nearshore	Hopper
1995-1996	EC, ST, Trans, Main, Navy	-40, -25, -29, -16	1,041,000	Montana de Oro SB Nearshore & Morro Strand SB	Hopper
1994	EC, Trans, Main, Navy	-40, -29, -16	555,900	Montana de Oro SB Nearshore & Morro Strand SB	Hopper/ Cutterhead
1992	EC	-40	120,330	Montana de Oro SB Nearshore & Morro Strand SB	Cutterhead
1990	EC, Trans, Main, Navy, Morro	-40, -29, -16, -12	475,300	Montana de Oro SB Nearshore	Hopper
1986/1987			460,400		

EC Entrance Channel
Main Main Channel
Morro Morro Channel
Navy Navy Channel
ST Sand Trap
Trans Transition Channel

2.2.1 2017 and 2018 Geotechnical and Environmental Investigation Project

The most recent full array of physical and chemical sampling and analyses in the federal channels of Morro Bay occurred in 2017 and 2018. Due to insufficient shoaling in some channel areas in 2017, not all channel areas could be sampled in 2017. Sampling in these less shoaled areas was delayed until 2018 to allow additional shoaling to take place. Twenty-seven cores were collected within five composite/channel areas between both years. Data from these analyses were compared to the grain size distribution of sediments from the primary placement area nearshore of Montana de Oro State Park and along three transects at the alternate placement area at Morro Strand State Beach to determine the physical suitability of Morro Bay Harbor sediments for beach nourishment. In addition, representative portions of the 27 cores were combined into five composite samples for bulk sediment chemical testing to determine if the harbor sediments were environmentally suitable for beach nourishment. Results of this study are summarized in a report by Diaz-Yourman, GeoPentech and Kinnetic laboratories JV (2019). Summary sampling and physical and chemical testing data from this study are provided in Appendix A.

The sediments sampled in 2017/2018 consisted primarily of poorly graded sand (SP) throughout the Harbor. The weighted average sand content for each channel area ranged from 96% to 99%, compared to 98% to 99% in the nearshore area of Montana de Oro State Beach and along the transects at Morro Strand State Beach. As one would expect, the grain size gradation curves for the harbor sediments fit well within the grain size compatibility curves for Montana de Oro State Beach and Morro Strand State Beach.

Overall contaminant concentrations in the 2017/2018 Morro Bay Harbor composite samples were below detection limits or low compared to screening values. The only contaminant detected above a NOAA effects range-low (ERL) value (Long et. al., 1995) was nickel, which was detected in all five composite samples. The mean effects range-medium quotients (ERMq) among all contaminants with effects range-medium (ERM) values were very low (<0.01). The only analyte to exceed a human health objective was arsenic, but the levels of arsenic found in the composite samples were less than the background concentration determined for Morro Strand State Beach in 2014.

The dredged material from 2017/2018 to the present has annually been discharged to the primary dredged material placement site in the nearshore immediately off Montana de Oro State Beach. Some material (87,100 cy) was discharged to the alternate site in the beach surf zone of Morro Strand State Beach during the Harbor-wide maintenance dredging episode in 2017.

2.2.2 2013 Geotechnical and Environmental Investigation Project

A similar sampling and testing program occurred in 2013 with the collection of 27 core samples and the formation of five composite samples. The results are summarized in a report by Diaz Yourman, GeoPentech, and Kinnetic Laboratories JV (2013) and summary sampling and chemical testing data from this study are provided in Appendix B.

As was seen in 2017/2018, the Morro Bay Harbor sediments consisted primarily of poorly graded sand (SP) with low levels of contaminants. The weighted average sand content ranged from 99% to 100%. No organic constituents were detected above reporting limits in any of the samples. Except for nickel, all metal concentrations were below NOAA ERL values. Based on the high sand content and low levels of contaminants found, these sediments were determined to be acceptable for beach replenishment.

2.2.3 2001 and 2008 Sampling and Testing Episodes

Studies conducted in 2001 (Kinnetic Laboratories, 2001) and 2008 (Kinnetic Laboratories and Diaz Yourman, 2008) also showed that the Morro Bay Harbor sediments were coarse grained and generally clean, and these studies also resulted in positive suitability determinations. The 2001 and 2008 sampling and testing results are available upon request.

3. METHODS

This section describes the dredging design, study design and field and analytical methods for this testing program.

3.1 Dredge Design

Bathymetric data from June 2022 in relationship to final and target sampling locations are shown on Figures 2 and 3. Figures 2 and 3 also define the limits of dredging. Figures 4 through 10 are additional close-up maps showing more legible point bathymetric data from the June 2022 survey for each of the channel areas in relationship to sampling locations. Note that the June 2022 survey was conducted after the May 2022 dredging of the Entrance Channel, Transition Channel, Main Channel, and portions of the Navy Channel. As such, the bathymetry shown in these areas does not necessarily reflect the shoaling present at the time of sampling and during future dredging episodes.

The Morro Bay Harbor kelp and eelgrass beds have been mapped over the past several years and these maps can be used to assist contractors in avoiding damage to these areas. Mapping data are included in Figures 2 and 3. The distribution of the main kelp bed, also known as the Target Rock kelp bed, is primarily adjacent to Morro Rock and along the northwest side of the Main Channel, with scatterings of kelp to the north and south of the Target Rock bed. The distribution of the main eelgrass beds extends from Morro Rock to the Morro Channel along the north and south sides of the Navy Channel.

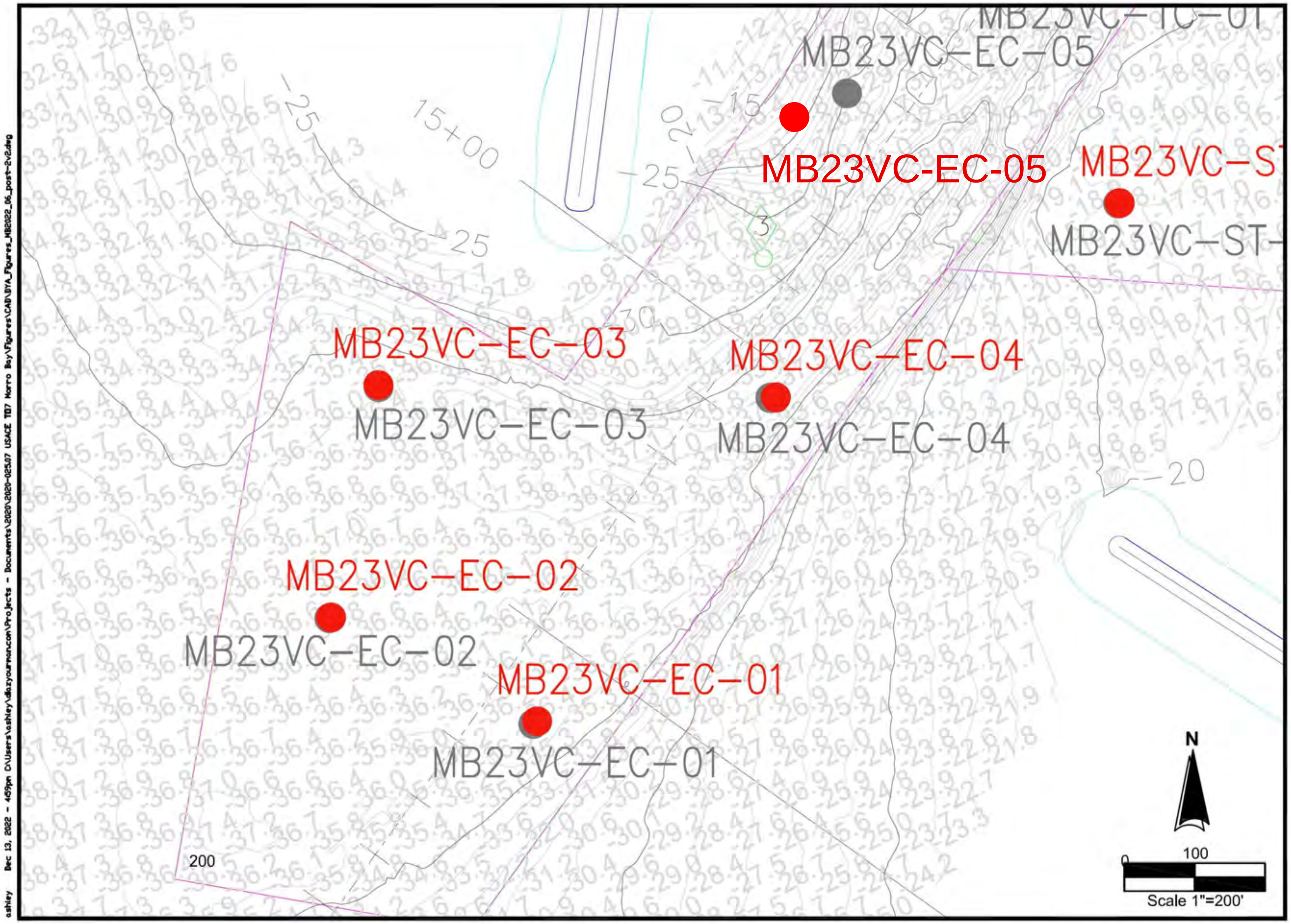
3.2 Sampling and Testing Design

The study design detailed in the project SAP and described below covers data collection tasks performed for Morro Bay Harbor sediment collection and testing and Montana de Oro State Beach nearshore area and Morro Strand State Beach sampling and geotechnical testing.

3.2.1 Sampling and Testing Approach

The main approach was to sample dredge sediments to design depths plus any applicable overdepth, composite the sediments by area, and subject the composite samples to chemical testing to determine if they are suitable for beach nourishment. The main approach was to also determine the physical properties of the sediments at each location at different depths to compare to the physical properties of the receiver sites. Testing followed requirements and procedures detailed in the ITM (USEPA/USACE, 1998) with further guidance from the SC-DMMT SAPRG. Acceptability guidelines published in these documents were used to evaluate the suitability of Morro Bay Harbor maintenance-dredged sediments for beach nourishment.

A total of five area composite samples were created from the six channel areas described above and shown on Figures 2 and 3 and analyzed for bulk sediment chemistry. These composite areas are the same as those for previous investigations including the combination of Areas C and D (Transition Area and Main Channel) into one of the composite samples. The remaining areas had one composite sample each.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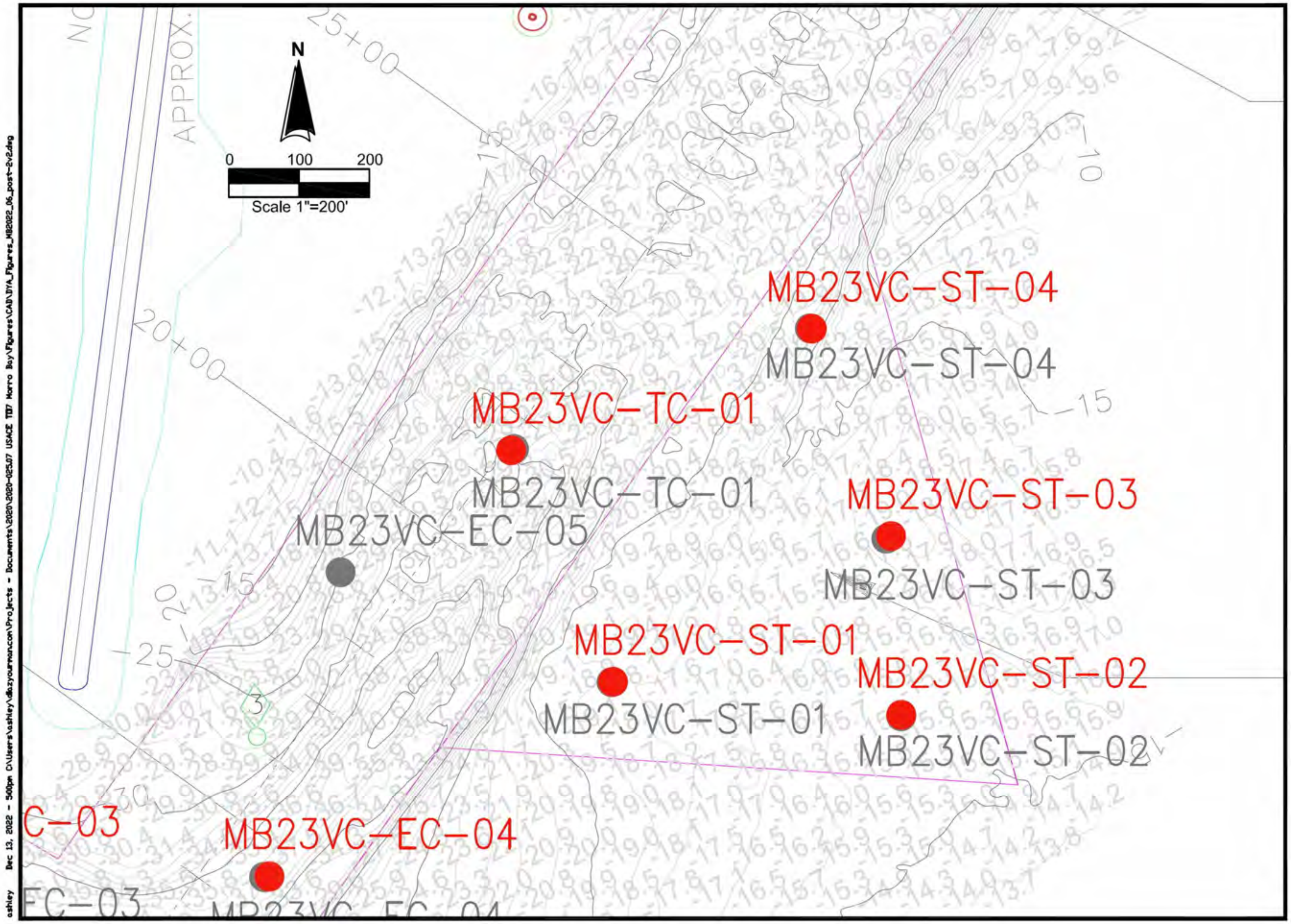

Figure 5. June 2022 Bathymetric Data and Sampling Locations for the Sand Trap and Transition Channel (Red Actual, Grey Proposed)

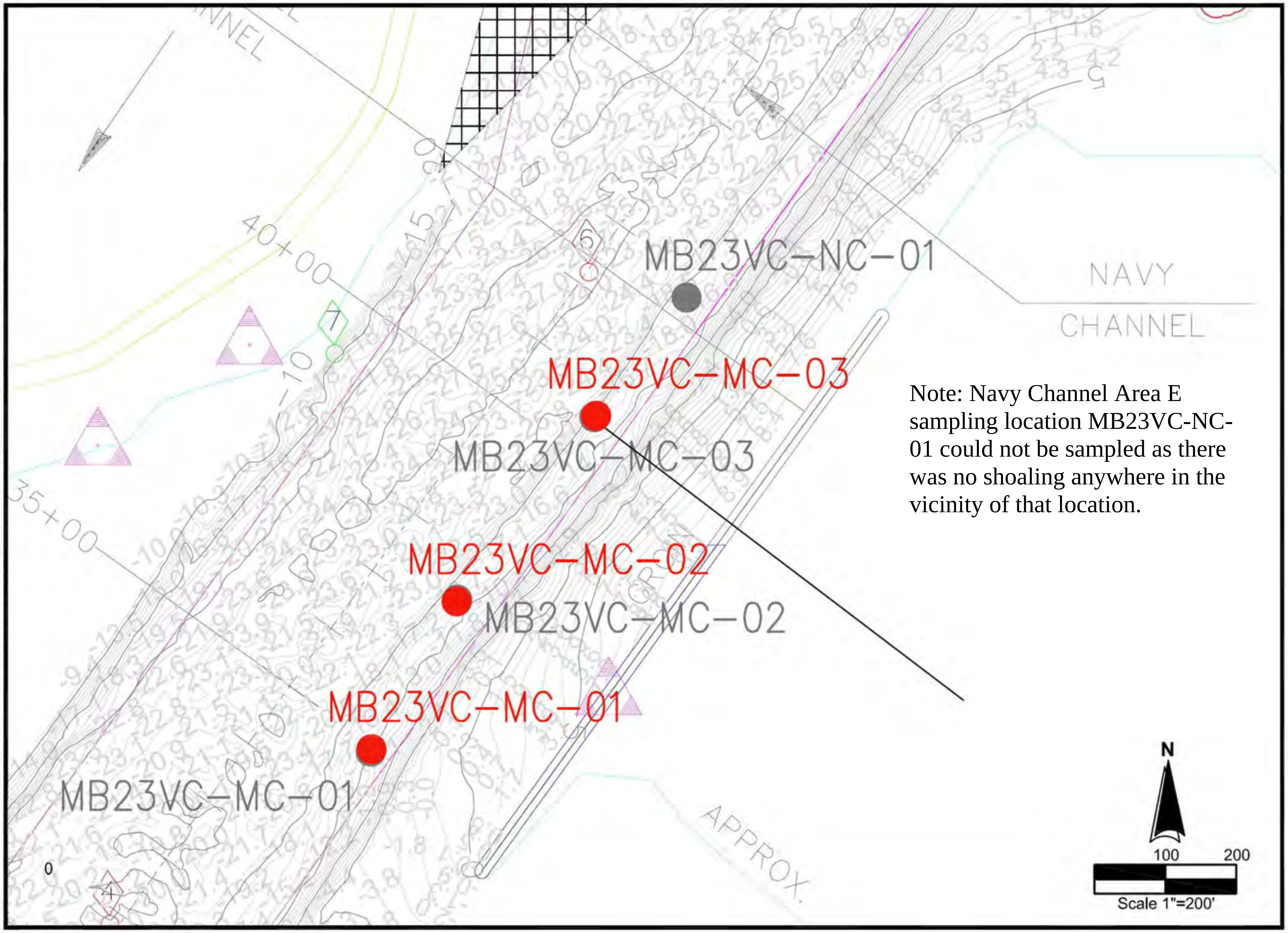

Figure 6. June 2022 Bathymetric Data and Sampling Locations for the Main Channel (Red Actual, Grey Proposed)

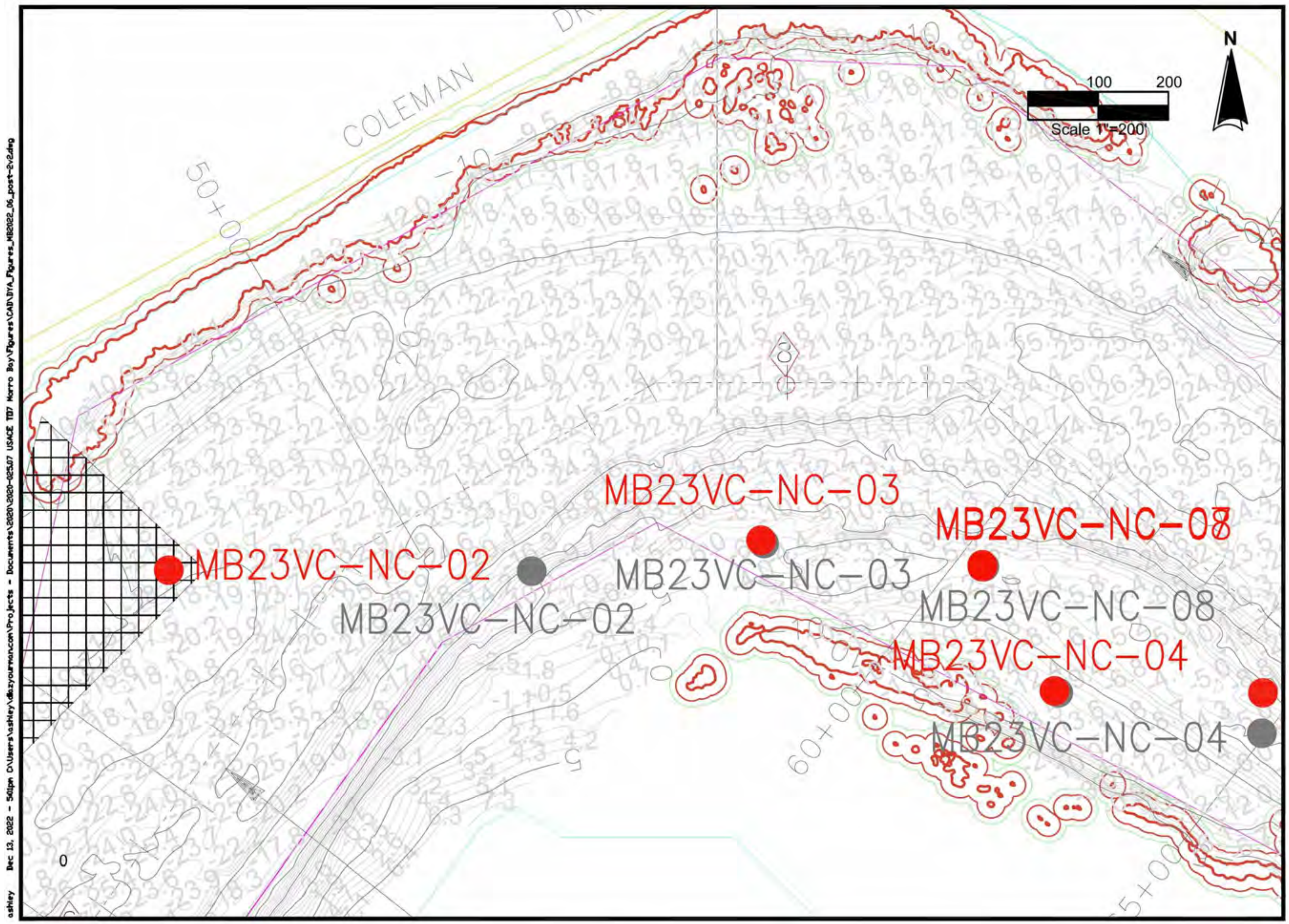

Figure 7. June 2022 Bathymetric Data and Sampling Locations for the Navy Channel (Red Actual, Grey Proposed)

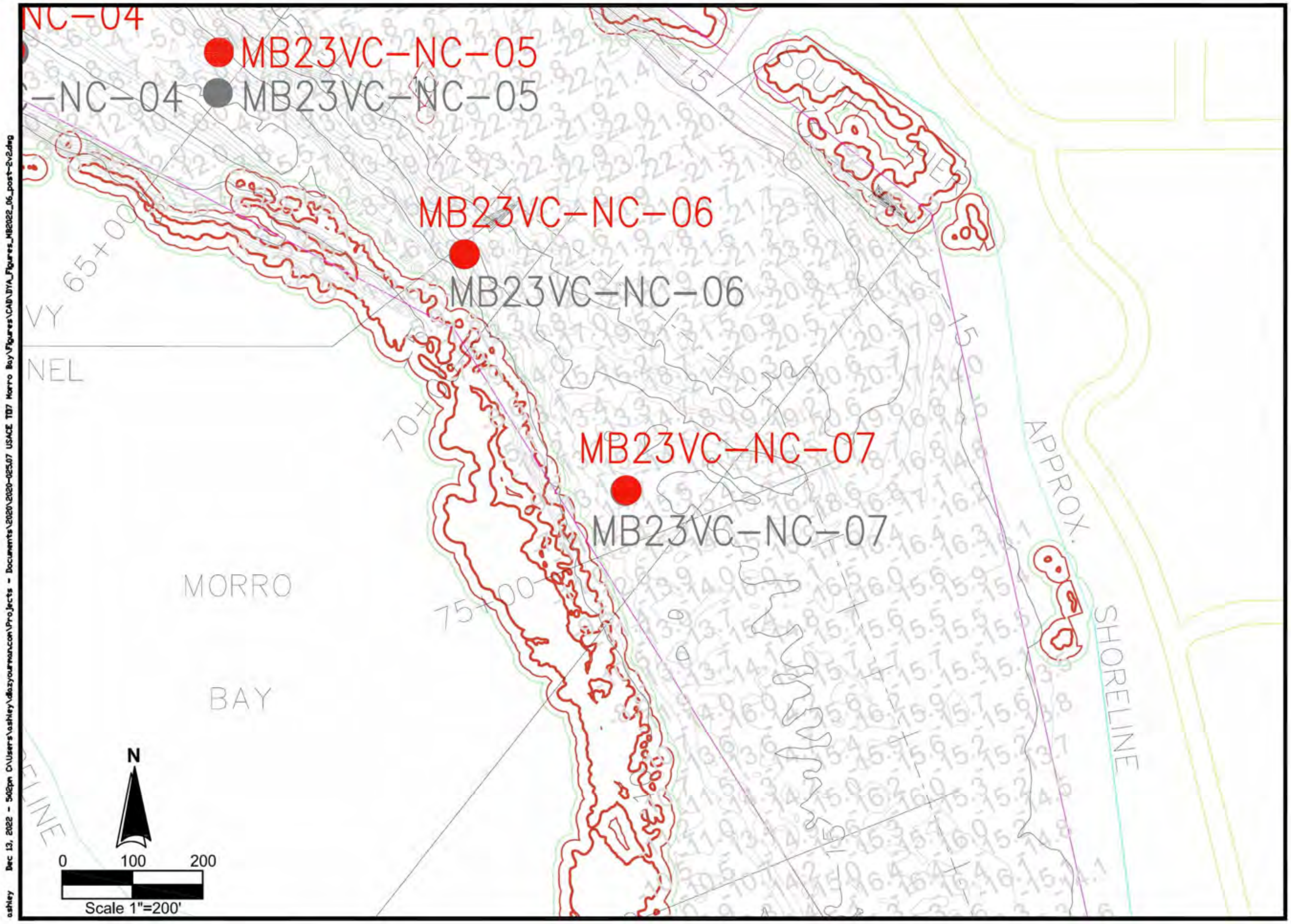

Figure 8. June 2022 Bathymetric Data and Sampling Locations or the Southern Navy Channel (Red Actual, Grey Proposed)

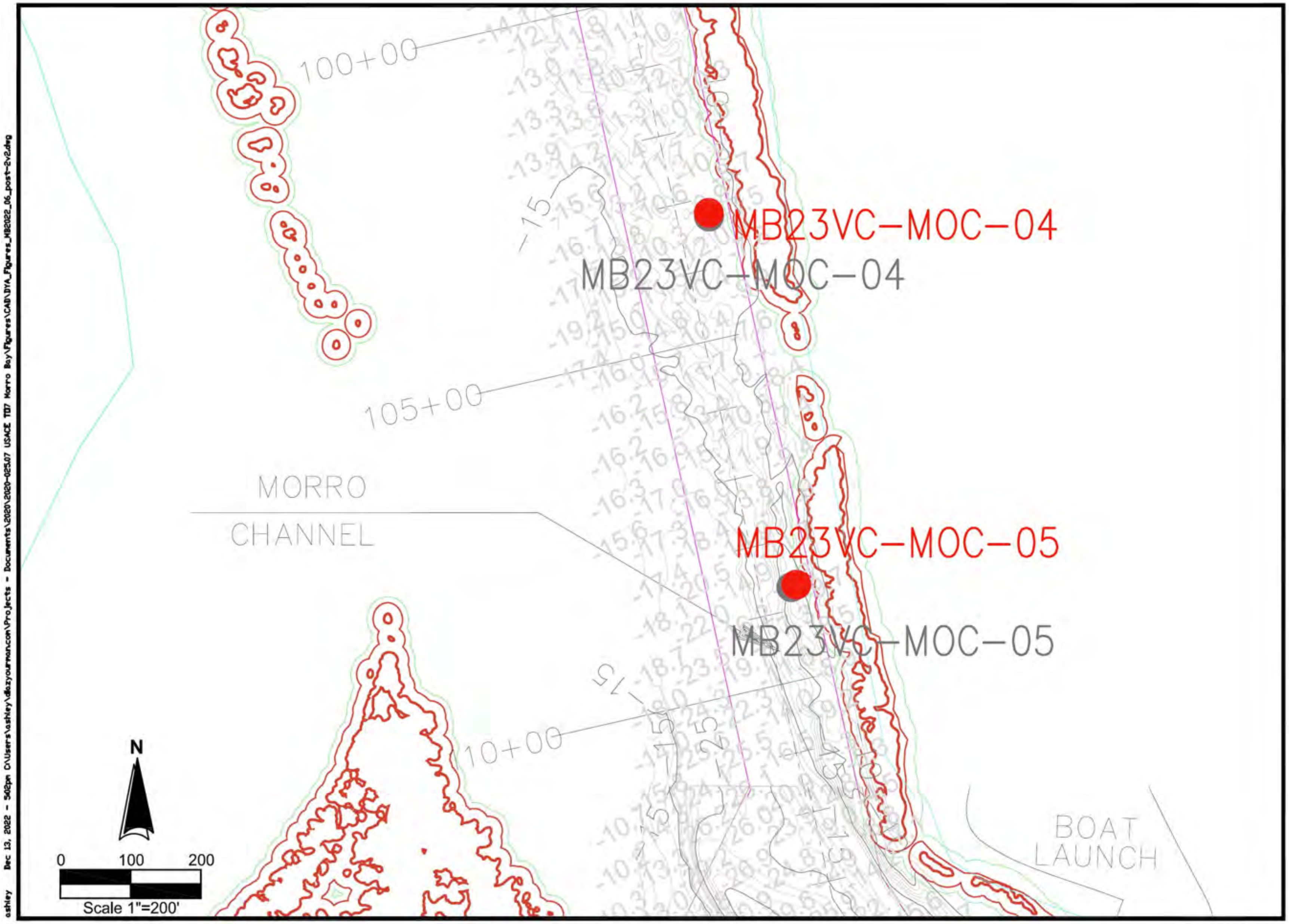

Figure 9. June 2022 Bathymetric Data and Sampling Locations for the Northern Morro Channel (Red Actual, Grey Proposed)

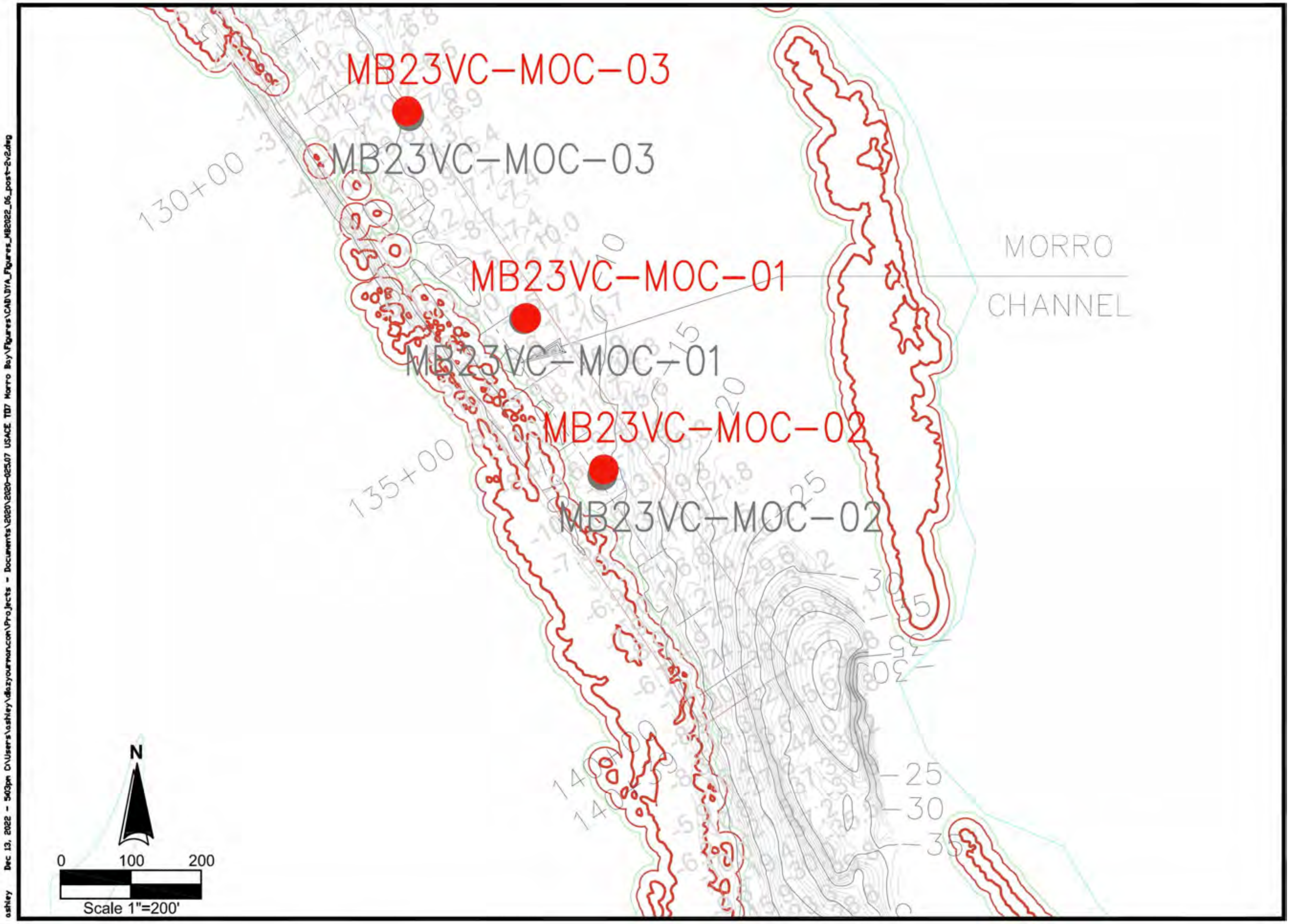

Figure 10. June 2022 Bathymetric Data and Sampling Locations for the Southern Morro Channel (Red Actual, Grey Proposed)

For primary beach placement suitability evaluations, a continuous sample from the mudline to project depths plus 2 feet for overdepth testing was collected from 15 locations within Areas C through F, and a continuous sample from the mudline to project depths only (no overdepth) was collected from nine locations within Areas A and B. There is no overdepth allowance for Areas A and B since these are areas of advanced maintenance dredging. Note that one of the eight sampling locations in the Navy Channel (MB23VC-NC-01) could not be sampled because there was no shoaling anywhere in the vicinity of that location. All primary core intervals were homogenized and then combined with like core intervals in a composite area for bulk sediment chemistry analyses. Sediments below overdepth or advanced maintenance elevations were not included in any sediment composite sample for chemistry. Composite samples and overdepth elevations are summarized in Table 4.

Bulk sediment analyses (methods and quantification limits can be found in Table 8) performed on the Morro Bay Harbor composite samples are as follows:

- Percent solids
- Total ammonia
- Total organic carbon (TOC)
- Total and dissolved sulfides
- Oil & grease
- Total volatile solids (TVS)
- Total recoverable petroleum hydrocarbons (TRPH)
- Metals, including mercury
- Chlorinated pesticides
- Pyrethroid pesticides
- Butyltins
- Polychlorinated biphenyl (PCB) congeners
- Phenols
- Phthalate esters
- Polycyclic aromatic hydrocarbons (PAHs)

In addition to the composite samples, at least one archive bulk sediment chemistry sample was collected from each core location. The archive sample represents the entire primary core interval (mudline to project or overdepth elevations). All archive samples are being stored frozen for at least six months unless directed otherwise by the CESPL Technical Manager.

Core subsamples for geotechnical testing were selected from any geo-physically different layers of material not already being analyzed for grain size distribution as described later in Section 3.2.4.

3.2.2 Montana de Oro State Beach Nearshore Area and Morro Strand State Beach Reference

A series of surface grabs were collected on November 3 and 4, 2022 at eight (8) randomly placed locations in the USACE primary placement area nearshore of Montana de Oro State Beach and along three transects at the USACE alternate placement site at Morro Strand State Beach. These placement areas are shown on Figures 11 through 13. The eight randomly placed locations at the primary placement area occurred between mudline elevations of -20 and -40 MLLW. These locations are shown on a Google Earth™ image represented by Figure 12. The Morro Strand State Beach transect sampling consisted of collecting surface grab samples at seven elevations (+12, +6, 0, -12, -18, -24 and -30 feet MLLW) along three perpendicular transects. The project SAP also called for the collection of a grab sample at the -6 feet MLLW elevation at Morro Strand State Beach. However, due to high surf and safety considerations, these samples at the -6 feet MLLW elevation at Morro Strand State Beach were unable to be collected. The three transects locations and their respective sampling locations are shown on Figure 13. Summaries of sampling dates and times, location coordinates, water depths, and tidal elevations for the beach reference samples are provided in Tables 5 and 6. Geotechnical grain size testing was performed for all grab samples collected from the beach and nearshore nourishment sites.

Table 4. Final Sampling Locations, Core Depths, Mudline Elevations, and Core Intervals Sampled – Morro Bay Harbor Federal Channels

Channel/Composite Area	Core Designation	Date Sampled	Time Sampled	Geographic Coordinates (NAD 83)		Seafloor Elevation (ft MLLW)	Design Depth + Overdepth (ft MLLW)	Core Recovery (ft)	Core Interval Sampled (ft MLLW)
				Latitude North	Longitude West				
Entrance Channel (Area A)	MB23VC-EC-01	11/4/2022	10:35	35.36057	-120.87001	-36.1	-40	5.5	-36.1 to -40
	MB23VC-EC-02	11/4/2022	11:00	35.36094	-120.87102	-36.5	-40	4.5	-36.5 to -40
	MB23VC-EC-03	11/4/2022	11:20	35.36162	-120.87055	-36.4	-40	4.5	-36.4 to -40
	MB23VC-EC-04	11/4/2022	11:41	35.36190	-120.86893	-35.5	-40	4.8	-36.5 to -40
	MB23VC-EC-05	11/4/2022	14:30	35.36302	-120.86852	-27.8	-40	18.0	-27.8 to -40
Sand Trap (Area B)	MB23VC-ST-01	11/3/2022	10:30	35.36301	-120.86691	-17.3	-25	11.5	-17.3 to -25
	MB23VC-ST-02	11/3/2022	10:00	35.36369	-120.8667	-18.2	-25	9	-18.2 to -25
	MB23VC-ST-03	11/3/2022	8:31	35.36323	-120.86597	-18.0	-25	11	-18.0 to -25
	MB23VC-ST-04	11/3/2022	9:30	35.36400	-120.86640	-17.1	-25	10.5	-17.1 to -25
Transition (Area C)/ Main Channel (Area D)	MB23VC-TC-01	11/1/2022	9:30	35.36357	-120.86781	-27.5	-31	5	-27.5 to -31
	MB23VC-MC-01	11/1/2022	13:00	35.36637	-120.86492	-15.3	-18	5	-15.3 to -18
	MB23VC-MC-02	11/1/2022	13:35	35.36697	-120.86437	-14.0	-18	5	-14.0 to -18
	MB23VC-MC-03	11/2/2022	7:50	35.36769	-120.86388	-15.6	-18	4.5	-15.6 to -18
Navy Channel (Area E)*	MB23VC-NC-02	11/2/2022	9:30	35.36983	-120.8618	-15.2	-18	5	-15.2 to -18
	MB23VC-NC-03	11/2/2022	11:05	35.36996	-120.86074	-7.0	-18	11.0	-7.0 to -18
	MB23VC-NC-04	11/2/2022	14:50	35.36937	-120.85932	-11.7	-18	7	-11.7 to -18
	MB23VC-NC-05	11/2/2022	13:10	35.36954	-120.85834	-14.3	-18	7	-14.3 to -18
	MB23VC-NC-06	11/2/2022	13:40	35.36861	-120.85711	-12.0	-18	7	-12.0 to -18
	MB23VC-NC-07	11/1/2022	15:10	35.36768	-120.85626	-13.4	-18	5.5	-13.4 to -18
	MB23VC-NC-08	11/2/2022	12:35	35.37005	-120.85971	-12.3	-18	7	-12.3 to -18
Morro Channel (Area F)	MB23VC-MOC-01	11/2/2022	16:38	35.35321	-120.84752	-8.7	-14	7.5	-8.7 to -14
	MB23VC-MOC-02	11/2/2022	16:10	35.3526	-120.8471	-8.3	-14	7	-8.3 to -14
	MB23VC-MOC-03	11/2/2022	17:05	35.35398	-120.84808	-9.4	-14	7.5	-9.4 to -14
	MB23VC-MOC-04	11/2/2022	6:10	35.36044	-120.85239	-9.6	-14	7	-9.6 to -14
	MB23VC-MOC-05	11/2/2022	17:45	35.35899	-120.85196	-10.8	-14	7	-10.8 to -14

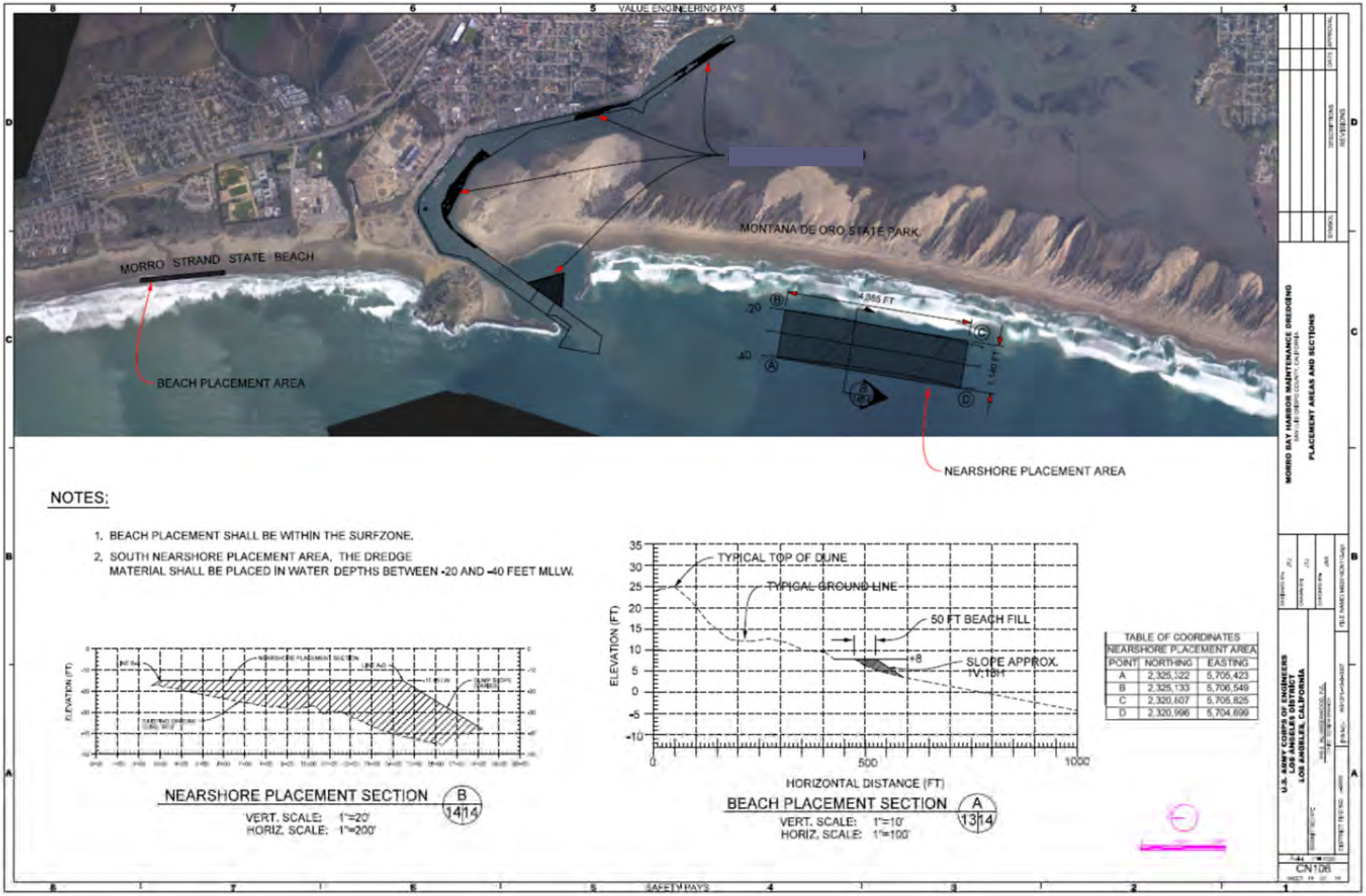

Figure 11. Location of and the Primary Placement Area at Montana de Oro State Beach and the Alternate Placement Area at Morro Strand State Beach

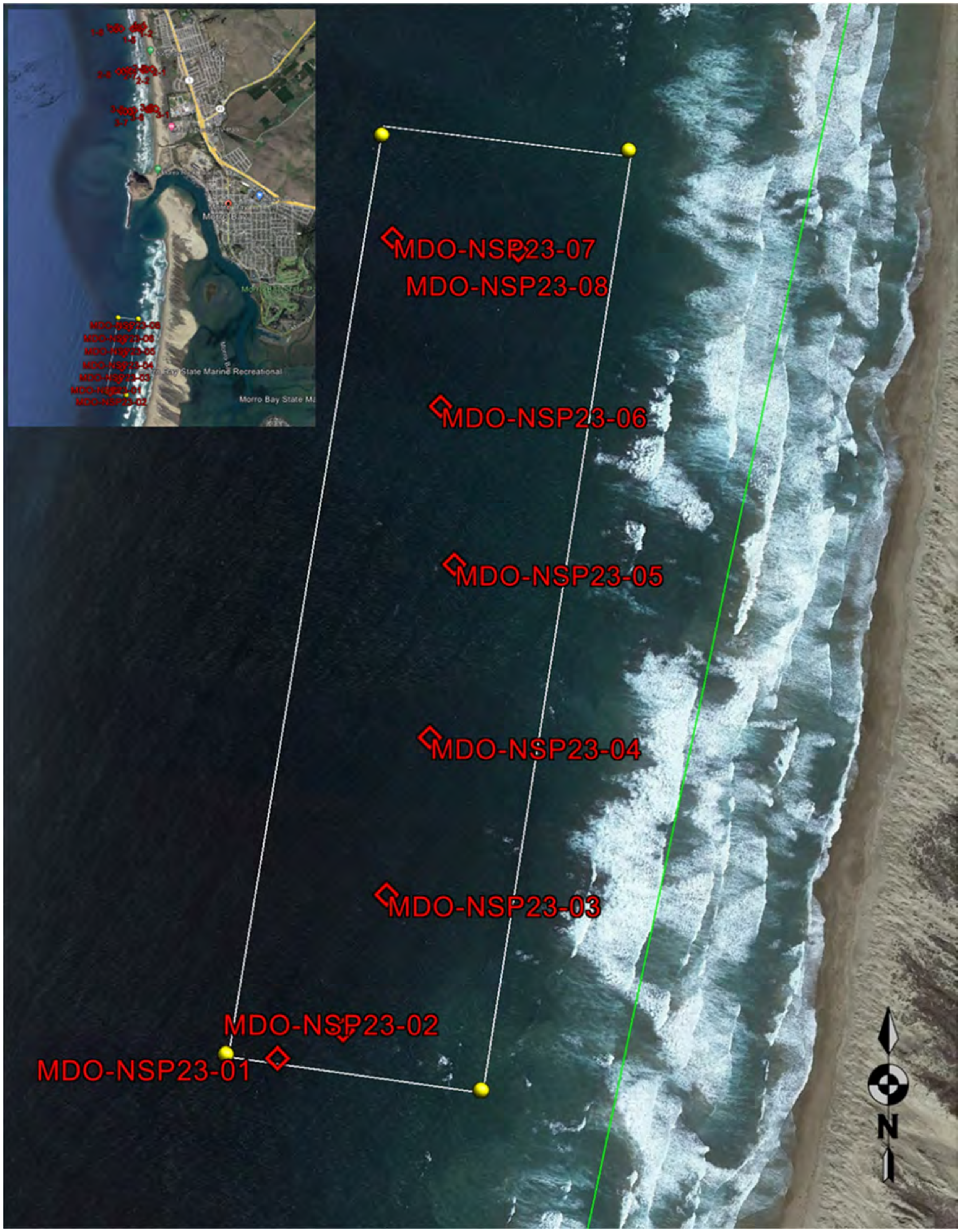

Figure 12. Sampling Locations at the Montana de Oro State Beach Nearshore Placement Site

Figure 13. Approximate Locations of the Beach Sampling Transects at the Alternate Placement Area at Morro Strand State Beach (Note: Due to high surf and safety concerns, grab samples from transects at the -6 feet MLLW elevation were unable to be collected)

Table 5. Dates, Times, Sampling Coordinates, and Water Depths for Samples Collected from the Montana de Oro State Beach Nearshore Primary Dredged Material Placement Area

Area	Site ID	Sample Date	Sample Time	Elevation (ft MLLW)	Latitude North	Longitude West	Water Depth (ft)	Tide (ft)
Montana de Oro State Beach Nearshore Placement Area (MDO-NSP23-)	01	11/03/2022	12:31	-34.0	35.336350	-120.872617	36.3	2.3
	02	11/03/2022	12:35	-30.5	35.336617	-120.871967	32.8	2.3
	03	11/03/2022	12:39	-26.8	35.338350	-120.871250	29.1	2.3
	04	11/03/2022	12:43	-25.4	35.340283	-120.870667	27.6	2.2
	05	11/03/2022	12:47	-26.7	35.342467	-120.870300	28.9	2.2
	06	11/03/2022	12:52	-29.6	35.344467	-120.870550	31.7	2.1
	07	11/03/2022	12:57	-33.4	35.346733	-120.871317	35.5	2.1
	08	11/03/2022	13:02	-25.3	35.346500	-120.869367	27.4	2.1

Table 6. Dates, Times, Sampling Coordinates, and Water Depths for Samples Collected from Morro Strand State Beach Secondary Dredged Material Placement Area

Area	Site ID	Sample Date	Sample Time	Elevation (ft MLLW)	Latitude North	Longitude West	Water Depth (ft)	Tide (ft)
Morro Strand State Beach Transect 1 (MS-TS23-1-)	1-1 (+12)	11/03/2022	14:59	+12	35.396067	-120.867183	--	--
	1-2 (+6)	11/03/2022	14:52	+6	35.395967	-120.868150	--	--
	1-3 (0)	11/03/2022	14:40	0	35.395950	-120.868800	--	--
	1-5 (-12)	11/04/2022	8:05	-12	35.395750	-120.869333	17	5
	1-6 (-18)	11/04/2022	8:03	-18	35.395750	-120.871767	23	5
	1-7 (-24)	11/04/2022	7:59	-24	35.395683	-120.872767	29	5
	1-8 (-30)	11/04/2022	7:54	-30	35.395667	-120.873767	35	5
Morro Strand State Beach Transect 2 (MS-TS23-2-)	2-1 (+12)	11/03/2022	15:41	+12	35.388883	-120.865250	--	--
	2-2 (+6)	11/03/2022	15:38	+6	35.388833	-120.866500	--	--
	2-3 (0)	11/03/2022	15:31	0	35.388767	-120.867183	0	--
	2-5 (-12)	11/04/2022	8:25	-12	35.388583	-120.869700	17	5
	2-6 (-18)	11/04/2022	8:21	-18	35.388633	-120.870383	23	5
	2-7 (-24)	11/04/2022	8:18	-24	35.388517	-120.871183	29	5
	2-8 (-30)	11/04/2022	8:14	-30	35.388483	-120.872100	35	5
Morro Strand State Beach Transect 3 (MS-TS23-3-)	3-1 (+12)	11/03/2022	16:28	+12	35.382183	-120.864567	--	--
	3-2 (+6)	11/03/2022	16:24	+6	35.382050	-120.865550	--	--
	3-3 (0)	11/03/2022	16:20	0	35.382017	-120.866183	--	--
	3-5 (-12)	11/04/2022	8:39	-12	35.381817	-120.868967	17	5
	3-6 (-18)	11/04/2022	8:36	-18	35.381700	-120.869717	23	5
	3-7 (-24)	11/04/2022	8:33	-24	35.381683	-120.870683	29	5
	3-8 (-30)	11/04/2022	8:30	-30	35.381750	-120.871500	35	5

Note: Due to high surf and safety concerns, grab samples at the -6 feet MLLW elevation along all three transects at Morro Strand State Beach were unable to be collected.

3.2.3 Summary of Morro Bay Harbor Testing and Evaluation Sequence

The testing and evaluation sequence performed on the Morro Bay Harbor federal channel sediments is outlined as follows:

- Bulk sediment chemical analyses were performed on each composite sample.
- Grain size physical compatibility analysis of the individual cores with the receiver sites was conducted by the CESPL Geotechnical Branch (Appendix C).
- Analytical results were evaluated using the sediment quality guidelines consisting of ERL and ERM values developed by Long et al. (1995) that correlate concentrations of selected contaminants with likelihood of adverse biological effects.
- As an additional measure of potential toxicity, the mean ERM quotient (ERMq) for the composite samples can be calculated according to Long et al. (1998) and Hyland et al. (1999).
- Analytical results were also evaluated using the USEPA regional screening levels (RSLs) (USEPA Region 9, updated 2022) and the State of California's Human Health Screening Levels (CHHSLs) (Cal/EPA, updated 2010) for potential effects to humans.
- If grain size analyses determine that sediments are physically suitable for nearshore placement (as determined by CESPL), contaminant levels are low enough to be suitable for beach nourishment, and the SC-DMMT concurs, then no further testing will be required.
- All analyses were conducted in a manner consistent with guidelines for dredge material testing methods in the USEPA/USACE ITM.
- The sampling and testing program is to fulfill requirements of the U.S. Army Corps of Engineers (USACE), South Pacific Division (CESPD) Regulation R 1110-1-8 (CESPD, 2000), the ITM (USACE and USEPA, 1998), the Clean Water Act (CWA), and the Southern California Dredge Material SC-DMMT SAPRG(CESPL, 2021).

3.2.4 Geotechnical Samples and Testing

Approximately ½-gallon of sediment was collected from each location within the Morro Bay Harbor federal channels so that a representative amount of sediment was included in each geotechnical sample. At least one primary grain size sample of the material from the mudline to the project overdepth elevation or elevation of advanced maintenance was formed and analyzed from each core. Additional grain size samples representing layers of physically different material greater than 6 inches thick were selected amongst all the cores and tested. Grain size gradations were also determined for each sampling location along the three Morro Strand State Beach transects and from the eight Montana de Oro State Beach nearshore area samples.

In addition to the mechanical grain size samples, three hydrometer tests and three Atterberg Limit tests were run on representative samples with fines (passing #200 sieve).

All geotechnical data gathered were used to conduct physical beach compatibility analyses between the dredged sediments and the receiving beaches. This task was accomplished by CESPL and reported separately as Appendix C.

3.3 Field Sampling Protocols

Vibracore sampling, grab sampling, decontamination, sample processing and documentation procedures performed are discussed in this section.

3.3.1 Positioning and Depth Measurements

Positioning at sampling locations was accomplished using a differential global positioning system (DGPS) referenced to a local geodetic benchmark with positioning accuracies of 3 to 10 feet. The locations were recorded in geographic coordinates (NAD 83) and converted to State Plane Coordinates (CA Zone V, NAD 83). Water depths were measured with a graduated lead line and corrected to MLLW. Beach elevations were determined with a level transit and stadia rod. Tidal stage was determined using NOAA-predicted tide tables checked against a local tide gage on the Morro Bay Coast Guard dock. These tables were used to calculate the seafloor elevation/mudline for each site. The DGPS was checked against a known location at least twice a day: prior to leaving or underway from the dock at the beginning of the day and upon return at the end of the day. DGPS and tidal elevation verification data are provided in daily field activity reports located in Appendix D (Field Documentation).

3.3.2 Vibracore Sampling Methods

As mentioned previously, extensive eelgrass and kelp beds are located within Morro Bay Harbor. All effort was made to avoid traversing, anchoring, and coring within eelgrass and kelp beds. Best Management Practices that were used to avoid damaging biologically sensitive habitat are detailed in the project SAP. In addition, all effort was also made to avoid Sea Otters.

All federal channel sediment samples were collected using an electric vibracore that can penetrate and obtain samples at the project sample elevations. Core refusal was not encountered at any sampling location.

Vibracore sampling was conducted from the 38-foot vessel *Bonnie Marietta*. This vessel was fully equipped with all necessary navigation, safety, and lifesaving devices, per Coast Guard requirements, and was capable of three-point anchoring.

The vibracore used consists of a 4-inch diameter aluminum coring tube, a stainless-steel cutting tip, and a stainless-steel core catcher. Inserted into the core tubes was food-grade clean polyethylene liners. The vibrating unit has two counter-rotating motors encased in waterproof aluminum housing. A three-phase, 240-volt generator powers the motors. The vibracore head and tube were lowered overboard via an A-frame. The unit was then vibrated until it reaches target sampling elevation or until the depth of refusal was reached. When penetration of the vibracore was complete, power was shut off to the vibra-head, and the vibracore was brought aboard the vessel. A check valve located on top of the core tube reduced sediment loss during pull-out. The length of sediment recovered is noted by measuring down the interior of the core tube to the top of the sediment. The core tube was then detached from the vibra-head, and the core cutting tip and catcher were removed. Afterward, the core liners were removed and sealed on both ends until processed.

A stand was used to support the vibracore in waters unprotected from wave action. The vibracore and stand were lowered overboard from the sampling vessel as one unit. Use of a stand allowed the sampling vessel to move off the sampling location while the coring apparatus penetrates the sediment; thus one-point anchoring or no anchoring was utilized. A stand also prevented the coring apparatus from being pulled up from waves during penetration, alleviating multiple penetrations of the same material.

3.3.3 Vibracore Decontamination

All sample contact surfaces were stainless steel or polyethylene. Compositing tools were stainless steel. Except for the core liners, all contact surfaces of the sampling devices and the coring tubes were cleaned between cores. The cleaning protocol consisted of a site water rinse, a Micro-90® soap wash, and then finished with deionized water rinses. The polyethylene core liners used were new and of food grade quality. All rinseate was collected in containers and disposed of properly.

3.3.4 Core Processing

Whole cores were processed on the deck of the vessel. Cores were placed in a PVC core rack that was cleaned between cores. After placement in the core rack, core liners were split lengthwise to expose the recovered sediment. Once exposed, sediment that contacted the core liner was removed by scraping with a pre-cleaned stainless-steel spoon. The cores were measured and any sediment that may have been collected below the sample elevation was separated from the primary core interval and discarded. Each core was then photographed and lithologically logged in accordance with the Unified Soil Classification System (USCS), as outlined in ASTM Standards D-2488 (2018) and D-2487 (2017). A geologist from Diaz Yourman and Associates performed the lithologic logging and collection of sample splits for geotechnical testing.

Photographs of each core covered maximum two-foot intervals. These photographs are provided in Appendix D.

Following logging, vertical composite subsamples were formed from each core along with samples for geotechnical testing. All samples for geotechnical testing were transferred to pre-labeled sample containers (sealed plastic bags) and stored appropriately until they were ultimately transferred to the CESPL geotechnical laboratory. The primary vertical composite subsamples were from the mudline to project depths or to 2 feet below project depths, depending on the area. Primary vertical composite subsamples were used to form area composite samples for chemical testing. An archived sample was also formed from each primary vertical composite subsample. If distinct geologic stratification was observed, then separate vertical composite subsamples of each core stratum were formed for geotechnical testing.

Vertical composite subsamples were formed by combining and homogenizing a representative sample from each sampling interval and from each core stratum, as described in Section 3.2.1 (Sampling and Testing Approach), in pre-cleaned stainless steel trays. A 0.5-liter portion of each primary vertical composite subsample and core stratum was placed in a pre-cleaned and certified glass jar with a Teflon®-lined lid for archived material (sealable plastic bags for geotechnical samples). The representative portion of each primary vertical composite subsample within each sampling interval identified for composite sample formation was placed in a large, pre-cleaned stainless-steel mixing bowl for area compositing with other cores in the same composite area. The composited sediment was placed in a 1-liter pre-cleaned and certified glass jars with a Teflon®-lined lid.

Except for chemistry archival material, containers were completely filled to minimize air trapped inside the sample container. A small amount of headspace was allowed for archived chemistry samples to prevent container breakage during freezing. For the preservation of all chemistry samples, filled containers were placed on ice immediately following sampling and maintained at 2 °C to ±4 °C until analyzed. Archived samples for chemistry were placed on ice initially and then frozen as soon as possible. The sample containers, both jars and bags, were sealed to prevent any moisture loss and possible contamination.

3.3.5 Beach Transect and Nearshore Area Grab Samples

Each beach transect sample and nearshore area sample was individually logged and analyzed for grain size distribution. Positioning at all transect sampling locations was accomplished using DGPS. Water depths at intertidal and subtidal stations were measured with a graduated lead line and corrected to MLLW. The onshore elevations were determined with a level transit and stadia rod.

The top 6 inches of sand or sediment was collected at all beach transect sampling locations. The three highest locations along each beach transect were sampled on land using a handheld scoop. The -6-foot MLLW elevation could not be safely sampled at Morro Strand State Beach because of high surf. All remaining offshore stations were sampled from the *Bonnie Marietta* using 0.1 m^2 modified Van Veen grab. Upon retrieval of the grab sampler, the grab was visually inspected to ensure the sample was acceptable according to the standard operating procedures. A subsample of each grab was collected using a plastic sampling scoop. All geotechnical samples were transferred to pre-labeled sample containers (sealed plastic bags) and stored appropriately until transferred to CESPL for analysis.

3.3.6 Detailed Soils Log

A detailed soils log was prepared for each sampling location, including beach transect and nearshore locations. At a minimum, this log included the project name, hole or transect number or designation, date, time, location, water depth, estimated tide, mudline elevation, type of sampling device used, depth of penetration, length of recovery, name of person(s) taking samples, depths below mudline of samples, and a description and condition of the sediment. The description of the sediment was in accordance with ASTM D 2488 (2018), and included at a minimum: grain size, color, maximum particle size, estimation of density (sand) or consistency (silts and clays), odor (if present), and description of amount and types of organics and trash present. The soils logs for each vibracore location and beach reference sample are included as in Appendix E

3.3.7 Documentation and Sample Custody

All sample containers were physically marked as to sample location, date, and time of collection. All samples were handled under chain of custody (COC) protocols beginning at the time of collection. Redundant sampling data was also recorded on field data log sheets. An inventory was kept of all samples taken and delivered.

Completed COC forms were secured in a sealable plastic bag and then placed in the cooler with the samples. Copies of the COC records are included with the testing laboratory reports in Appendix F.

A daily field activity log was maintained listing the times for each and all phases of operation including a description and length of any delays. This log also includes DGPS and tide calibration/verification notes. The daily field activity logs, along with field logs for each sampling location, are provided in Appendix D.

3.4 Laboratory Testing Methods

Analytical chemical testing of sediments for this project used USEPA and USACE approved methodologies. Laboratory certification and quality assurance manual for the analytical laboratory can be found in Appendix C of the project SAP.

3.4.1 Geotechnical Testing

All mechanical grain size tests were performed according to ASTM D 6913 (2017). In addition to the mechanical grain size testing, three hydrometer tests were run according to ASTM D 7928 (2021) and three Atterberg Limits tests were run according to ASTM D 4318 (2018) on representative samples with fines (passing #200 sieve). Required U.S. standard sieve sizes included Nos. 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230 sieves. All sediment samples were classified in accordance with the Unified Soil Classification System (ASTM D 2487-17 and ASTM D 2488-18).

All geotechnical data gathered was used to perform physical beach compatibility analyses between the dredged sediments and the receiving beach (Appendix C).

3.4.2 Bulk Sediment Chemical Analyses

The five sediment composite samples collected from within Morro Bay Harbor were analyzed for the parameters and quantification limits specified in Table 8. Quantification limits in Table 8 did not meet SAPRG limits in all cases. The laboratory was unable to meet SAPRG target reporting limits for the following analytes:

- TRPH (50 vs 25 mg/kg)
- Selenium (0.5 vs 0.1 mg/kg)
- Silver (0.5 vs 0.2 mg/kg)
- Organotins (3.0 vs 1.0 µg/kg)
- bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and di-n-butyl Phthalate (50 vs 20 µg/kg)
- 2,4-dinitrophenol, 2-methyl-4,6-dinitrophenol, and pentachlorophenol (250 vs 20 µg/kg)

There are various reasons for not meeting SAPRG target reporting limits. The laboratory switched from running method 1664(A) to running 9071(B) for oil and grease, which led to a higher reporting limit. There is no longer an option for certifying 1664(A) for solid matrices. Metals limits were in flux this year due to the merging of two laboratories (Test America Irvine and Calscience Garden Grove). Now that the labs have successfully merged, the limits should be stable going forward but are slightly higher than SC-DMMT limits for selenium, silver, and zinc. The lab is looking into instituting modifications to their current metals procedures to attempt to lower limits to meet SC-DMMT requirements. The laboratory cannot meet the new SAPRG limit of 1.0 µg/kg for organotins using the method by Krone et al. (1989). The reporting limit for organotins was lowered from 6.0 µg/kg in the previous draft guidance document. Certain nitrophenols suffer from signal interference from co-existing isomers leading to higher limits. Phthalate limits are partially driven by the risk of contamination during the analytical procedure due to its ubiquity in the laboratory environment, products, solvent, and reagents.

The results were reported in dry weight unless noted otherwise. All analyses were conducted in a manner consistent with guidelines for dredge material testing methods in the USEPA/USACE ITM. Except for sulfide analyses as discussed in Section 6 (Quality Assurance/Quality Control Evaluation), samples were extracted and analyzed within specified USEPA holding times. All analyses were accomplished with appropriate quality control measures.

Discrete samples from each location are being archived frozen for at least 180 days from collection.

Table 7. Sediment Analytical Methods and Target Quantitation Limits Achieved

Analyte	Method	Method Detection Limits (Wet Weight)	Lab Reporting Limits (Wet Weight)	SAPRG Target Reporting Limits (Dry Weight)
CONVENTIONALS (mg/kg except where noted)				
Percent Solids (%)	SM D2216-19	0.1	0.1	- -
Ammonia	SM 4500-NH3 B/C (M)	0.02	0.03	0.5
Total Organic Carbon (%)	EPA 9060A	0.01	0.2	0.2
Total Volatile Solids (%)	EPA 160.4M	0.1	0.1	- -
Oil & Grease	EPA 1664A (M) HEM	30.2	50	- -
TRPH	EPA 1664A (M) HEM-SGT	13.9	50	25
METALS (mg/kg)				
Arsenic	EPA 6020	0.09	0.5	1.0
Cadmium	EPA 6020	0.084	0.5	0.5
Chromium	EPA 6020	0.102	1.0	2.0
Copper	EPA 6020	0.112	1.0	3.0
Lead	EPA 6020	0.065	1.0	3.0
Mercury	EPA 7471A	0.0135	0.0833	0.5
Nickel	EPA 6020	0.094	1.0	5.0
Selenium	EPA 6020	0.372	1.0	0.1
Silver	EPA 6020	0.313	0.5	0.2
Zinc	EPA 6020	0.546	9.8	3.0
ORGANICS-CHLORINATED PESTICIDES (µg/kg)				
2,4' DDD	EPA 8270C PEST-SIM	0.038	0.2	2.0
2,4' DDE	EPA 8270C PEST-SIM	0.029	0.2	2.0
2,4' DDT	EPA 8270C PEST-SIM	0.037	0.2	2.0
4,4' DDD	EPA 8270C PEST-SIM	0.038	0.2	2.0
4,4' DDE	EPA 8270C PEST-SIM	0.019	0.2	2.0
4,4' DDT	EPA 8270C PEST-SIM	0.20	0.2	2.0
Total DDT	EPA 8270C PEST-SIM	- -	0.2	- -
Aldrin	EPA 8270C PEST-SIM	0.015	0.2	2.0
BHC-alpha	EPA 8270C PEST-SIM	0.015	0.2	2.0
BHC-beta	EPA 8270C PEST-SIM	0.031	0.2	2.0
BHC-delta	EPA 8270C PEST-SIM	0.12	1.0	2.0
BHC-gamma (Lindane)	EPA 8270C PEST-SIM	0.027	0.2	2.0
Chlordane (Technical)	EPA 8081	0.71	5.0	10
Chlordane-alpha	EPA 8270C PEST-SIM	0.023	0.2	2.0
Chlordane-gamma	EPA 8270C PEST-SIM	0.013	0.2	2.0

Table 7. Sediment Analytical Methods and Target Quantitation Limits Achieved

Analyte	Method	Method Detection Limits (Wet Weight)	Lab Reporting Limits (Wet Weight)	SAPRG Target Reporting Limits (Dry Weight)
Cis-Nonachlor	EPA 8270C PEST-SIM	0.039	0.2	2.0
Oxychlordane	EPA 8270C PEST-SIM	0.036	1.0	2.0
Total Chlordane	EPA 8270C PEST-SIM	- -	1.0	- -
Dieldrin	EPA 8270C PEST-SIM	0.14	1.0	2.0
Endosulfan sulfate	EPA 8270C PEST-SIM	0.19	1.0	2.0
Endosulfan I	EPA 8270C PEST-SIM	0.31	1.0	2.0
Endosulfan II	EPA 8270C PEST-SIM	0.20	1.0	2.0
Endrin	EPA 8270C PEST-SIM	0.042	0.2	2.0
Endrin aldehyde	EPA 8270C PEST-SIM	0.45	1.0	2.0
Endrin ketone	EPA 8270C PEST-SIM	0.040	0.2	2.0
Heptachlor	EPA 8270C PEST-SIM	0.011	0.2	2.0
Heptachlor epoxide	EPA 8270C PEST-SIM	0.027	0.2	2.0
Methoxychlor	EPA 8270C PEST-SIM	0.24	1.0	2.0
Mirex	EPA 8270C PEST-SIM	0.036	0.2	- -
Toxaphene	EPA 8081	1.0	5.0	10
trans-Nonachlor	EPA 8270C PEST-SIM	0.034	0.2	2.0
ORGANICS-Pyrethroid Pesticides (µg/kg)				
Allethrin (Bioallethrin)	EPA 8270D (M)/TQ/EI	0.16	1.0	1.0
Bifenthrin	EPA 8270D (M)/TQ/EI	0.079	1.0	1.0
Cyfluthrin-beta (Baythroid)	EPA 8270D (M)/TQ/EI	0.24	1.0	1.0
Cypermethrin	EPA 8270D (M)/TQ/EI	0.22	1.0	1.0
Deltamethrin/Tralomethrin	EPA 8270D (M)/TQ/EI	0.67	1.0	1.0
Fenpropathrin	EPA 8270D (M)/TQ/EI	0.23	1.0	1.0
Fenvalerate /Esfenvalerate	EPA 8270D (M)/TQ/EI	0.29	1.0	1.0
Fluvalinate	EPA 8270D (M)/TQ/EI	0.16	1.0	1.0
Lambda Cyhalothrin	EPA 8270D (M)/TQ/EI	0.28	1.0	1.0
Permethrin (cis and trans)	EPA 8270D (M)/TQ/EI	0.094	1.0	1.0
Phenothrin (Sumithrin)	EPA 8270D (M)/TQ/EI	0.46	1.0	1.0
Resmethrin/Bioresmethrin	EPA 8270D (M)/TQ/EI	0.2	1.0	1.0
Tetramethrin	EPA 8270D (M)/TQ/EI	0.1	1.0	1.0
ORGANICS-BUTYLTINS (µg/kg)				
Monbutyltin	Krone et al., 1989	0.54	3.0	1.0
Dibutyltin	Krone et al., 1989	1.3	3.0	1.0
Tributyltin	Krone et al., 1989	1.4	3.0	1.0
Tetrabutyltin	Krone et al., 1989	1.6	3.0	1.0
ORGANICS-PHTHALATES (µg/kg)				
Bis(2-ethylhexyl) phthalate	EPA 8270C (SIM)	33	50	20
Butyl benzyl phthalate	EPA 8270C (SIM)	22	50	20

Table 7. Sediment Analytical Methods and Target Quantitation Limits Achieved

Analyte	Method	Method Detection Limits (Wet Weight)	Lab Reporting Limits (Wet Weight)	SAPRG Target Reporting Limits (Dry Weight)
Diethyl Phthalate	EPA 8270C (SIM)	4.9	10	20
Dimethyl Phthalate	EPA 8270C (SIM)	2.9	10	20
Di-n-butyl Phthalate	EPA 8270C (SIM)	47	50	20
Di-n-octyl Phthalate	EPA 8270C (SIM)	13	20	20
ORGANICS-PHENOLS (µg/kg)				
2,3,4,6-Tetrachlorophenol	EPA 8270C (SIM)	9.8	10	- -
2,4,5-Trichlorophenol	EPA 8270C (SIM)	7.5	10	20
2,4,6-Trichlorophenol	EPA 8270C (SIM)	4.9	10	20
2,4-Dichlorophenol	EPA 8270C (SIM)	4.1	10	20
2,4-Dimethylphenol	EPA 8270C (SIM)	4.3	10	20
2,4-Dinitrophenol	EPA 8270C (SIM)	200	250	20
2,6-Dichlorophenol	EPA 8270C (SIM)	6.4	10	20
2-Chlorophenol	EPA 8270C (SIM)	2.6	10	20
2-Methyl-4,6-dinitrophenol	EPA 8270C (SIM)	140	250	20
2-Methylphenol	EPA 8270C (SIM)	2.5	10	20
2-Nitrophenol	EPA 8270C (SIM)	3.5	10	20
3+4-Methylphenol	EPA 8270C (SIM)	4.2	20	20
4-Chloro-3-methylphenol	EPA 8270C (SIM)	2.6	10	20
4-Nitrophenol	EPA 8270C (SIM)	100	500	- -
Bisphenol A	EPA 8270C (SIM)	1.9	10	20
Pentachlorophenol	EPA 8270C (SIM)	100	250	20
Total Phenol	EPA 8270C (SIM)	8.6	10	20
ORGANICS-PCBs (µg/kg)				
PCB congeners of 018, 028, 037, 044, 049, 052, 066, 070, 074, 077, 081, 087, 099, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138/158, 149, 151, 153, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206	EPA 8270C (SIM)	0.08 - 0.24	0.2 - 0.4	0.5
ORGANICS-PAHs (µg/kg dry)				
1-Methylnaphthalene	EPA 8270C (SIM)	2.1	10	20
1-Methylphenanthrene	EPA 8270C (SIM)	1.5	10	- -
1,6,7-Trimethylnaphthalene	EPA 8270C (SIM)	1.3	10	20
2,6-Dimethylnaphthalene	EPA 8270C (SIM)	1.4	10	20
2-Methylnaphthalene	EPA 8270C (SIM)	2.4	10	20
Acenaphthene	EPA 8270C (SIM)	3.8	10	20
Acenaphthylene	EPA 8270C (SIM)	1.8	10	20

Table 7. Sediment Analytical Methods and Target Quantitation Limits Achieved

Analyte	Method	Method Detection Limits (Wet Weight)	Lab Reporting Limits (Wet Weight)	SAPRG Target Reporting Limits (Dry Weight)
Anthracene	EPA 8270C (SIM)	2.0	10	20
Benzo[a]anthracene	EPA 8270C (SIM)	3.1	10	20
Benzo[a]pyrene	EPA 8270C (SIM)	4.7	10	20
Benzo[b]fluoranthene	EPA 8270C (SIM)	7.7	10	20
Benzo[e]pyrene	EPA 8270C (SIM)	6.3	10	20
Benzo[g,h,i]perylene	EPA 8270C (SIM)	5.1	10	20
Benzo[k]fluoranthene	EPA 8270C (SIM)	2.7	10	20
Biphenyl	EPA 8270C (SIM)	1.4	10	20
Chrysene	EPA 8270C (SIM)	2.6	10	20
Dibenzo[a,h]anthracene	EPA 8270C (SIM)	7.8	10	20
Dibenzothiophene	EPA 8270C (SIM)	1.2	10	- -
Fluoranthene	EPA 8270C (SIM)	2.5	10	20
Fluorene	EPA 8270C (SIM)	3.7	10	20
Indeno[1,2,3-c,d]pyrene	EPA 8270C (SIM)	6.2	10	20
Naphthalene	EPA 8270C (SIM)	4.3	10	20
Perylene	EPA 8270C (SIM)	1.3	10	- -
Phenanthrene	EPA 8270C (SIM)	3.2	10	20
Pyrene	EPA 8270C (SIM)	2.1	10	20
Total Low Weight PAHs	EPA 8270C (SIM)	- -	10	- -
Total High Weight PAHs	EPA 8270C (SIM)	- -	10	- -
Total Detectable PAHs	EPA 8270C (SIM)	- -	10	- -

4. RESULTS

Physical and chemical testing results for the Morro Bay Harbor sediment samples are summarized in Tables 8 through 11. These tables do not include analytical QA/QC data. Complete analytical results, including all associated QA/QC data, are provided in Appendix F. A complete set of physical results is included in Appendix G. Analytical Laboratory Quality Assurance/Quality Control Evaluation Report is included in Appendix H.

4.1 Sediment Physical Results

Grain size analyses were performed on multiple layers from each of the 25 cores collected. The weighted average grain size distribution for each composite area is provided in Table 8. Data for each core as a whole or each individual layer are provided in Table 9. Sieve analysis data for the three individual Morro Strand State Beach transects and their profile samples and the Montana de Oro State Beach nearshore samples are provided in Table 10. Individual grain size distribution curves for each individual grain size sample, along with plasticity index plots and hydrometer data for three samples, are provided in Appendix G.

4.2 Sediment Chemical Results

A summary of the chemical testing results is provided in Table 11 for the five composite samples. Included in these tables are biological effects screening values consisting of ERLs and ERMs and human health criteria for residential and industrial settings consisting of RSLs and CHHSLs. Red values in Table 11 indicate an ERL exceedance. Green shaded values exceed one or more human health objectives.

Data contained in Table 11 are often coded. Values that were not detected above the method detection limit were assigned a “<” prefix symbol. Values estimated between the method detection limit and reporting limit were tagged with a “J”. A “J” code may also indicate an estimated value due to that value being outside of certain QA/QC objectives. Definitions of all other symbols are described in the QA/QC report in Appendix H and in table footnotes.

Table 8. Morro Bay Harbor Weighted Average Sieve Analysis Grain Size Data for Each Composite Area

Composite Sample SBHVC22-	Gravel			Coarse Sand			Medium Sand				Fine Sand						Silt
	Sieve No./Sieve Size/Weighted Average* of each Composite Area % Passing Through																
	1.0	3/4	3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230
	25.4 mm	19 mm	9.5 mm	4.75 mm	2.8 mm	2.0 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm
A	100	100	100	100	100	100	99	99	98	98	97	94	64	7	1	1	0
B	100	100	100	100	100	100	99	99	99	99	98	96	75	12	2	1	1
C/D	100	100	100	99	97	97	95	94	93	91	88	78	38	3	1	1	1
E	100	100	100	100	100	99	99	99	98	97	96	91	56	7	2	2	2
F	100	100	100	100	100	100	100	100	100	100	100	99	67	8	2	2	2

* Weighted average calculated by factoring in the length of each core interval contributing to the composite sample.

Table 9. Morro Bay Harbor Sieve Analysis Grain Size Data and Atterberg Limits for Individual Cores

Location	Elevation (ft MLLW)		Gravel*			Coarse Sand			Medium Sand				Fine Sand						Silt	Atterberg Limits		Classification
			Sieve No./Sieve Size/% Passing																			
			1.0	3/4	3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230			
	Top	Bottom	25.4 mm	19 mm	9.5 mm	4.75 mm	2.8 mm	2.0 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	LL	PI	
Entrance Channel (Area A)																						
MB23VC-EC-01	-36.1	-40	100	100	100	100	100	100	100	99	99	98	98	96	71	8	1	1	1			POORLY GRADED SAND (SP)
MB23VC-EC-02	-36.5	-40	100	100	100	100	100	100	100	99	99	99	98	97	73	10	1	0	0			POORLY GRADED SAND (SP)
MB23VC-EC-03	-36.4	-40	100	100	100	100	100	99	99	98	98	98	97	95	72	9	1	1	0			POORLY GRADED SAND (SP)
MB23VC-EC-04	-35.5	-40	100	100	100	100	100	100	99	99	99	98	98	96	69	8	1	1	1			POORLY GRADED SAND (SP)
MB23VC-EC-05	-27.8	-40	100	100	100	100	100	100	100	99	98	97	96	92	55	5	1	0	0			POORLY GRADED SAND (SP)
MB23VC-EC-05	-27.9	-37.8	100	100	100	100	99	99	98	98	97	96	96	91	57	6	1	1	1			POORLY GRADED SAND (SP)
MB23VC-EC-05	-37.8	-38.3	100	100	98	77	55	42	31	27	26	25	24	21	12	1	0	0	0			WELL-GRADED SAND WITH GRAVEL (SW)
MB23VC-EC-05	-38.3	--40	100	94	80	55	38	28	20	17	16	15	14	12	6	1	0	0	0			POORLY GRADED SAND WITH GRAVEL (SP)
Sand Trap (Area B)																						
MB23VC-ST-01	-17.3	-25	100	100	100	100	100	100	100	99	99	99	98	96	75	8	0	0	0			POORLY GRADED SAND (SP)
MB23VC-ST-02	-18.2	-25	100	100	100	100	100	100	100	100	100	100	100	98	76	11	3	2	2			POORLY GRADED SAND (SP)
MB23VC-ST-03	-18	-25	100	100	100	100	100	100	100	99	99	98	97	95	85	23	3	2	1			POORLY GRADED SAND (SP)
MB23VC-ST-04	-17.1	-25	100	100	100	100	100	100	99	99	99	98	98	96	67	7	1	1	1			POORLY GRADED SAND (SP)
Transition Channel (Area C)																						
MB23VC-TC-01	-27.5	-31	100	100	100	98	95	94	91	89	88	86	81	63	22	2	1	1	1			POORLY GRADED SAND (SP)
Main Channel (Area D)																						
MB23VC-MC-01	-15.3	-18	100	100	100	98	97	96	93	91	88	85	80	68	30	2	1	1	0			POORLY GRADED SAND (SP)
MB23VC-MC-02	-14	-18	100	100	99	99	99	98	98	98	97	96	95	90	54	4	1	1	1			POORLY GRADED SAND (SP)
MB23VC-MC-03	-15.6	-18	100	100	100	100	100	99	99	98	98	98	96	89	43	3	1	1	0			POORLY GRADED SAND (SP)
Navy Channel (Area E)																						
MB23VC-NC-02	-15.2	-18	100	100	100	100	100	100	100	100	100	99	99	95	50	5	1	1	1			POORLY GRADED SAND (SP)
MB23VC-NC-03	-7	-18	100	100	100	100	100	99	99	98	98	98	98	95	54	4	0	0	0			POORLY GRADED SAND (SP)
MB23VC-NC-04	-11.7	-18	100	100	100	100	100	100	100	99	98	97	97	95	85	22	10	9	8	34	30	POORLY GRADED SAND WITH SILT (SP-SM)
MB23VC-NC-04	-11.8	-13.1	100	100	100	100	100	99	99	99	99	98	98	97	90	28	12	11	10	35	31	POORLY GRADED SAND WITH SILT (SP-SM)
MB23VC-NC-04	-13.1	-18	100	100	100	100	100	100	100	100	99	99	98	97	89	21	7	5	4	NP	NP	POORLY GRADED SAND WITH SILT (SP-SM)
MB23VC-NC-05	-14.3	-18	100	100	100	100	100	100	100	100	100	100	99	97	59	6	1	1	1			POORLY GRADED SAND (SP)
MB23VC-NC-06	-12	-18	100	100	100	100	100	100	100	100	100	100	99	93	45	5	2	1	1			POORLY GRADED SAND (SP)
MB23VC-NC-07	-13.4	-18	100	100	100	100	99	98	96	94	92	89	83	62	27	3	1	1	1			POORLY GRADED SAND (SP)

Table 9. Morro Bay Harbor Sieve Analysis Grain Size Data and Atterberg Limits for Individual Cores

	Elevation (ft MLLW)		Gravel*			Coarse Sand			Medium Sand				Fine Sand						Silt	Atterberg Limits		
			Sieve No./Sieve Size/% Passing																			
			1.0	3/4	3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230			
Location	Top	Bottom	25.4 mm	19 mm	9.5 mm	4.75 mm	2.8 mm	2.0 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	LL	PI	Classification
MB23VC-NC-07	-13.5	-16.5	100	100	100	100	99	98	97	95	94	92	86	64	27	3	1	1	1			POORLY GRADED SAND (SP)
MB23VC-NC-07	-16.5	-18	100	100	100	100	100	100	100	100	100	100	99	92	47	5	1	1	1			POORLY GRADED SAND (SP)
MB23VC-NC-08	-12.3	-18	100	100	100	100	100	100	100	99	99	98	98	97	68	7	1	1	1			POORLY GRADED SAND (SP)
Morro Channel (Area F)																						
MB23VC-MOC-01	-8.7	-14	100	100	100	100	100	100	100	100	100	100	99	99	68	9	3	3	3			POORLY GRADED SAND (SP)
MB23VC-MOC-02	-8.3	-14	100	100	100	100	100	100	100	100	100	100	100	99	71	8	2	2	2			POORLY GRADED SAND (SP)
MB23VC-MOC-03	-9.4	-14	100	100	100	100	100	100	100	100	100	100	100	98	45	5	2	1	1			POORLY GRADED SAND (SP)
MB23VC-MOC-04	-9.6	-14	100	100	100	100	100	100	100	100	100	100	100	99	80	10	3	3	3			POORLY GRADED SAND (SP)
MB23VC-MOC-04	-9.7	-12.7	100	100	100	100	100	100	100	100	100	100	99	75	8	2	2	1	1			POORLY GRADED SAND (SP)
MB23VC-MOC-04	-12.7	-14	100	100	100	100	100	100	100	100	100	100	100	99	80	12	2	2	1			POORLY GRADED SAND (SP)
MB23VC-MOC-05	-10.8	-14	100	100	100	100	100	100	100	100	100	100	99	99	69	8	3	3	3			POORLY GRADED SAND (SP)
MB23VC-MOC-05	-10.9	-12.8	100	100	100	100	100	100	100	99	99	99	99	98	74	10	4	4	3			POORLY GRADED SAND (SP)
MB23VC-MOC-05	-12.8	-14	100	100	100	100	100	100	100	100	100	100	100	99	61	6	2	2	1			POORLY GRADED SAND (SP)

*All material passed through sieve sizes greater than 25.4 mm with one exception – 3% of the material from -12 to -21 feet MLLW was retained on the 1.5-inch (38.1 mm) sieve.

Shaded rows are those samples that represent the entire core interval from the mudline to overdepth elevation or elevation of advanced maintenance. Unshaded cells represent individual layers within the core.

Table 10. Surface Physical Data for Morro Strand State Beach Transects and the Montana de Oro Nearshore Placement Area

Core Designation	Mudline Elevation (ft MLLW)	Gravel			Coarse Sand			Medium Sand				Fine Sand					Silt/Clay		Classification
		Sieve No. / Sieve Size / % Passing																	
		1.0*	3/4	3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		25.4 mm	19.0 mm	9.5 mm	4.75 mm	2.80 mm	2.00 mm	1.40 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.25 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
Morro Strand State Beach – Transect 1																			
MS-TS-1-1	+12	100	100	100	100	100	100	100	100	100	100	100	100	65	6	1	0	0	POORLY GRADED SAND (SP)
MS-TS-1-2	+6	100	100	100	100	100	100	99	99	99	98	98	95	54	6	1	0	0	POORLY GRADED SAND (SP)
MS-TS-1-3	0	100	100	100	100	100	100	100	100	99	99	98	93	62	9	2	1	1	POORLY GRADED SAND (SP)
MS-TS-1-5	-12	100	100	100	99	99	99	99	99	99	99	99	98	85	17	3	2	2	POORLY GRADED SAND (SP)
MS-TS-1-6	-18	100	100	98	98	97	97	97	97	97	96	96	94	76	11	1	1	1	POORLY GRADED SAND (SP)
MS-TS-1-7	-24	100	100	100	100	100	100	100	100	100	100	99	97	45	9	2	2	2	POORLY GRADED SAND (SP)
MS-TS-1-8	-30	100	100	99	99	99	99	98	98	97	97	97	96	84	22	3	2	1	POORLY GRADED SAND (SP)
Morro Strand State Beach – Transect 2																			
MS-TS-2-1	+12	100	100	100	100	100	100	100	100	99	99	98	97	57	4	2	1	0	POORLY GRADED SAND (SP)
MS-TS-2-2	+6	100	100	100	100	100	100	100	100	99	99	99	96	55	5	1	1	1	POORLY GRADED SAND (SP)
MS-TS-2-3	0	100	100	100	100	100	100	99	99	98	98	96	91	59	7	1	1	0	POORLY GRADED SAND (SP)
MS-TS-2-5	-12	100	100	98	98	98	98	98	97	97	97	96	95	70	10	1	1	0	POORLY GRADED SAND (SP)
MS-TS-2-6	-18	100	100	100	100	99	99	99	98	98	97	97	94	58	10	2	1	1	POORLY GRADED SAND (SP)
MS-TS-2-7	-24	100	100	100	100	100	100	100	100	100	100	99	98	81	18	2	1	1	POORLY GRADED SAND (SP)
MS-TS-2-8	-30	100	100	100	100	100	100	100	100	100	100	100	98	80	16	3	2	2	POORLY GRADED SAND (SP)
Morro Strand State Beach – Transect 3																			
MS-TS-3-1	+12	100	100	100	100	100	100	100	100	100	100	99	98	65	5	0	0	0	POORLY GRADED SAND (SP)
MS-TS-3-2	+6	100	100	100	100	100	100	100	99	98	98	98	96	63	5	1	1	1	POORLY GRADED SAND (SP)
MS-TS-3-3	0	100	100	100	100	100	100	99	99	98	98	97	92	65	7	0	0	0	POORLY GRADED SAND (SP)
MS-TS-3-5	-12	100	100	100	100	100	100	100	99	99	98	96	90	56	6	1	1	1	POORLY GRADED SAND (SP)
MS-TS-3-6	-18	100	100	100	100	99	99	99	99	99	99	99	97	83	14	2	1	1	POORLY GRADED SAND (SP)
MS-TS-3-7	-24	100	100	100	100	100	100	100	99	99	99	98	97	87	24	5	3	2	POORLY GRADED SAND (SP)
MS-TS-3-8	-30	100	100	99	98	98	98	97	97	96	96	96	95	85	21	3	1	1	POORLY GRADED SAND (SP)
Montana de Oro State Beach Nearshore Area																			
MDO-NSP-1	-34.0	100	100	96	95	95	95	95	95	95	94	94	92	71	14	4	2	1	POORLY GRADED SAND (SP)
MDO-NSP-2	-30.5	100	100	100	99	99	98	98	97	96	96	95	90	52	8	2	1	1	POORLY GRADED SAND (SP)
MDO-NSP-3	-26.8	100	100	100	99	97	96	94	93	91	90	88	80	43	6	2	1	1	POORLY GRADED SAND (SP)
MDO-NSP-4	-25.4	100	100	100	100	100	100	99	99	98	97	97	92	56	6	1	0	0	POORLY GRADED SAND (SP)
MDO-NSP-5	-26.7	100	100	98	98	98	98	98	97	97	97	95	90	49	6	2	1	1	POORLY GRADED SAND (SP)
MDO-NSP-6	-29.6	100	100	100	100	100	100	99	99	98	97	96	90	54	6	2	2	1	POORLY GRADED SAND (SP)
MDO-NSP-7	-33.4	100	100	100	99	99	99	99	98	98	97	95	85	39	3	1	0	0	POORLY GRADED SAND (SP)
MDO-NSP-8	-25.3	100	100	100	100	99	99	99	98	98	97	96	88	47	5	1	1	1	POORLY GRADED SAND (SP)

*All material passed through sieve sizes greater than 25.4 mm.

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Conventionals												
Percent Solids	%	74.5	77.9	85	79.8	74						
Total Volatile Solids	%	0.804	5.53	1.07	1.06	9.21						
Total Organic Carbon	%	0.0631	0.175	0.255	0.178	0.144						
Oil & Grease	mg/Kg dry	44.5J	68.1	<35.5	50.1J	<40.8						
TRPH	mg/Kg dry	22.3J	34.1J	<16.3	25.1J	<18.8						
Total Ammonia	mg/Kg dry	1.43	5.92	2.59	15.6	1.84						
Water Soluble Sulfides	mg/Kg	0.0151UJ	0.0151UJ	0.0151UJ	0.0152UJ	0.0152UJ						
Total Sulfides	mg/Kg dry	3.31	10.7J	1.21J	17.1J	11.8J						
Metals												
Arsenic	mg/Kg dry	3.75	3.94	4.81	3.45	3.11	8.2	70	0.68	3	0.07	0.24
Cadmium	mg/Kg dry	<0.115	<0.11	<0.101	<0.106	<0.114	1.2	9.6	71	980	1.7	7.5
Chromium	mg/Kg dry	23.7	28	22.8	32.1	28.4	81	370				
Copper	mg/Kg dry	1.8	1.93	2.67	3.55	2.54	34	270	310	4,700	3,000	38,000
Lead	mg/Kg dry	1.23	1.4	1.2	1.68	1.23	46.7	218	400	800	80	320
Mercury	mg/Kg dry	0.0267J	0.028J	0.0188J	0.0185J	0.021J	0.15	0.71	1.1	4.6	18	180
Nickel	mg/Kg dry	23.1	28.3	24.6	35	26.4	20.9	51.6	150	2,200	1,600	16,000
Selenium	mg/Kg dry	<0.506	<0.487	<0.446	<0.466	0.575J			39	580	380	4,800
Silver	mg/Kg dry	<0.426	<0.409	<0.375	<0.392	<0.425	1	3.7	39	580	380	4,800
Zinc	mg/Kg dry	6.01J	7.21J	6.36J	10J	7.72J	150	410	2,300	35,000	23,000	100,000
Organotins												
Monobutyltin	µg/Kg dry	0.71UJ-	0.67UJ-	0.62UJ-	0.67UJ-	0.71UJ-						
Dibutyltin	µg/Kg dry	<1.7	<1.6	<1.5	<1.6	<1.7			1,900	25,000		
Tributyltin	µg/Kg dry	<1.8	<1.7	<1.6	<1.7	<1.8			19,000	25,000		
Tetrabutyltin	µg/Kg dry	<2.1	<2	<1.9	<2	<2.1						
PAHs												

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
1-Methylnaphthalene	µg/Kg dry	<2.8	<2.7	<2.5	<2.7	<2.9			18,000	73,000		
1-Methylphenanthrene	µg/Kg dry	<1.9	<1.9	<1.7	<1.8	<2						
2,3,5-Trimethylnaphthalene	µg/Kg dry	<1.7	<1.7	<1.5	<1.6	<1.7						
2,6-Dimethylnaphthalene	µg/Kg dry	<1.8	<1.8	<1.6	<1.7	<1.9						
2-Methylnaphthalene	µg/Kg dry	<3.2	<3.1	<2.8	<3	<3.3	70	670	24,000	300,000		
Acenaphthene	µg/Kg dry	<5	<4.8	<4.4	<4.7	<5.1	16	500	360,000	4,500,000		
Acenaphthylene	µg/Kg dry	<2.4	<2.3	<2.1	<2.3	<2.4	44	640				
Anthracene	µg/Kg dry	<2.6	<2.5	<2.3	<2.4	<2.6	85.3	1100	1,800,000	23,000,000		
Benzo (a) anthracene	µg/Kg dry	<4.1	<4	<3.6	<3.9	<4.2	261	1600	1,100	21,000		
Benzo (a) pyrene	µg/Kg dry	<6.2	<6	<5.5	<5.8	<6.3	430	1600	110	2,100	38	130
Benzo (b) fluoranthene	µg/Kg dry	<10	<9.9	<9	<9.6	<10			1,100	21,000		
Benzo (e) pyrene	µg/Kg dry	<8.4	<8.1	<7.4	<7.9	<8.5						
Benzo (g,h,i) perylene	µg/Kg dry	<6.7	<6.5	<5.9	<6.3	<6.8						
Benzo (k) fluoranthene	µg/Kg dry	<3.6	<3.5	<3.2	<3.4	<3.6			11,000	210,000		
Biphenyl	µg/Kg dry	<1.8	<1.7	<1.6	<1.7	<1.8			4,700	20,000		
Chrysene	µg/Kg dry	<3.4	<3.3	<3	<3.2	<3.5	384	2800	16,000	290,000		
Dibenz (a,h) anthracene	µg/Kg dry	<10	<10	<9.1	<9.7	<10	63.4	260	110	2,100		
Dibenzothiophene	µg/Kg dry	<1.6	<1.6	<1.4	<1.5	<1.6			78,000	1,200,000		
Fluoranthene	µg/Kg dry	<3.4	<3.3	<3	14	4.6J	600	5100	240,000	3,000,000		
Fluorene	µg/Kg dry	<4.8	<4.7	<4.3	<4.6	<4.9	19	540	240,000	3,000,000		
Indeno (1,2,3-c,d) pyrene	µg/Kg dry	<8.2	<8	<7.3	<7.7	<8.3			1,100	21,000		
Naphthalene	µg/Kg dry	<5.7	<5.6	<5.1	<5.4	<5.8	160	2100	2,000	8,600		
Perylene	µg/Kg dry	<1.7	3.1J	<1.5	<1.6	<1.7						
Phenanthrene	µg/Kg dry	<4.3	<4.1	<3.8	<4	<4.3	240	1500				
Pyrene	µg/Kg dry	<2.7	<2.7	<2.4	<2.6	5J	665	2600	180,000	2,300,000		

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Total Low Weight PAHs	µg/Kg dry	ND	ND	ND	ND	ND	552	3160				
Total High Weight PAHs	µg/Kg dry	ND	3.1J	ND	14	9.6J	1700	9600				
Total PAHs	µg/Kg dry	ND	3.1J	ND	14	9.6J	4022	44792				
Phthalates												
Benzyl butyl phthalate	µg/Kg dry	<28	<28	<25	<27	<29						
Bis(2-Ethylhexyl) phthalate	µg/Kg dry	<43	<42	<38	47J	<44			39,000	160,000		
Diethyl phthalate	µg/Kg dry	<6.4	<6.2	<5.7	<6.1	7.5J			5,100,000	66,000,000		
Dimethyl phthalate	µg/Kg dry	<3.9	<3.8	<3.4	60	<4			780,000	1,200,000		
Di-n-butyl phthalate	µg/Kg dry	<62	<60	<55	110	67			630,000	8,200,000		
Di-n-octyl phthalate	µg/Kg dry	<17	<17	<15	<16	<18			63,000	820,000		
Phenols												
2,3,4,6-Tetrachlorophenol	µg/Kg dry	<13	<13	<11	<12	<13			190,000	2,500,000		
2,4,5-Trichlorophenol	µg/Kg dry	<10	<9.7	<8.8	<9.4	<10			630,000	8,200,000		
2,4,6-Trichlorophenol	µg/Kg dry	<6.4	<6.2	<5.7	<6.1	<6.5			6,300	82,000		
2,4-Dichlorophenol	µg/Kg dry	<5.5	<5.3	<4.8	<5.2	<5.6			19,000	250,000		
2,4-Dimethylphenol	µg/Kg dry	<5.7	<5.6	<5.1	<5.4	<5.8			130,000	1,600,000		
2,4-Dinitrophenol	µg/Kg dry	<270	<260	<240	<250	<270			13,000	160,000		
2,6-Dichlorophenol	µg/Kg dry	<8.4	<8.2	<7.4	<7.9	<8.6						
2-Chlorophenol	µg/Kg dry	<3.5	<3.4	<3.1	<3.3	<3.6			39,000	580,000		
2-Methylphenol	µg/Kg dry	<3.3	<3.2	<2.9	<3.1	<3.4			320,000	4,100,000		
2-Nitrophenol	µg/Kg dry	<4.6	<4.4	<4	<4.3	<4.7						
3/4-Methylphenol	µg/Kg dry	<5.5	<5.4	<4.9	<5.2	<5.6						
4,6-Dinitro-2-methylphenol	µg/Kg dry	<190	<180	<170	<180	<190						
4-Chloro-3-methylphenol	µg/Kg dry	<3.5	<3.4	<3.1	<3.3	<3.5			630,000	8,200,000		
4-Nitrophenol	µg/Kg dry	<130	<130	<120	<120	<130						
Bisphenol A	µg/Kg dry	<2.6	<2.4	<2.2	<2.4	<2.6			320,000	4,100,000		

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Pentachlorophenol	µg/Kg dry	<140	<130	<120	<130	<140			1,000	4,000	4,400	13,000
Phenol	µg/Kg dry	<11	<11	<10	<11	<12			1,900,000	25,000,000		
OC Pesticides												
2,4'-DDD	µg/Kg dry	<0.05	<0.048	<0.044	<0.046	<0.05						
2,4'-DDE	µg/Kg dry	<0.038	<0.037	<0.034	<0.036	<0.038						
2,4'-DDT	µg/Kg dry	<0.049	<0.047	<0.043	<0.045	<0.049						
4,4'-DDD	µg/Kg dry	<0.05	<0.048	<0.044	<0.046	<0.05	2	20	190	2,500	2,300	9,000
4,4'-DDE	µg/Kg dry	<0.025	<0.024	<0.022	<0.023	<0.025	2.2	27	2,000	9,300	1,600	6,300
4,4'-DDT	µg/Kg dry	<0.26	<0.25	<0.23	<0.24	<0.26	1	7	1,900	8,500	1,600	6,300
Total DDT	µg/Kg dry	ND	ND	ND	ND	ND	1.58	46.1				
Aldrin	µg/Kg dry	<0.02	<0.02	<0.018	<0.019	<0.02			39	180	33	130
BHC-alpha	µg/Kg dry	<0.02	<0.019	<0.018	<0.018	<0.02						
BHC-beta	µg/Kg dry	<0.04	<0.039	<0.036	<0.037	<0.04						
BHC-delta	µg/Kg dry	<0.16	<0.16	<0.14	<0.15	<0.16						
BHC-gamma	µg/Kg dry	<0.035	<0.034	<0.032	<0.033	<0.036			500	2,000		
Chlordane (Technical)	µg/Kg dry	<0.96	<0.90	<0.84	<0.89	<0.94			1,700	7,700	430	1,700
Chlordane-alpha	µg/Kg dry	<0.03	<0.029	<0.027	<0.028	<0.03						
Chlordane-gamma	µg/Kg dry	<0.017	<0.016	<0.015	<0.016	<0.017						
cis-Nonachlor	µg/Kg dry	<0.051	<0.05	<0.046	<0.048	<0.052						
trans-Nonachlor	µg/Kg dry	<0.044	<0.043	<0.039	<0.041	<0.044						
Oxychlordane	µg/Kg dry	<0.047	<0.046	<0.042	<0.044	<0.048						
Total Chlordane	µg/Kg dry	ND	ND	ND	ND	ND	0.5	6	1,700	7,700		
Dieldrin	µg/Kg dry	<0.18	<0.18	<0.16	<0.17	<0.18	0.02	8	34	140	35	130
Endosulfan sulfate	µg/Kg dry	<0.25	<0.24	<0.22	<0.23	<0.25						
Endosulfan I	µg/Kg dry	<0.4	<0.39	<0.36	<0.37	<0.4			47,000	700,000		
Endosulfan II	µg/Kg dry	<0.26	<0.25	<0.23	<0.24	<0.26						

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Endrin	µg/Kg dry	<0.055	<0.053	<0.049	<0.052	<0.056			1,900	25,000	21,000	230,000
Endrin aldehyde	µg/Kg dry	<0.59	<0.58	<0.53	<0.56	<0.6						
Endrin ketone	µg/Kg dry	<0.053	<0.051	<0.047	<0.049	<0.053						
Heptachlor	µg/Kg dry	<0.014	<0.014	<0.013	<0.013	<0.014			130	630	130	520
Heptachlor epoxide	µg/Kg dry	<0.036	<0.034	<0.032	<0.033	<0.036			70	330		
Methoxychlor	µg/Kg dry	<0.31	<0.3	<0.28	<0.29	<0.31			32,000	410,000	340,000	3,800,000
Mirex	µg/Kg dry	<0.047	<0.045	<0.042	<0.044	<0.047			36	170	31	120
Toxaphene	µg/Kg dry	<1.3	<1.3	<1.2	<1.2	<1.3			490	2,100	460	1,800
PCB Congeners												
PCB018	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13						
PCB028	µg/Kg dry	<0.13	<0.13	<0.12	<0.12	<0.14						
PCB037	µg/Kg dry	<0.11	<0.1	<0.093	<0.098	<0.11						
PCB044	µg/Kg dry	<0.16	<0.15	<0.14	<0.15	<0.16						
PCB049	µg/Kg dry	<0.15	<0.14	<0.13	<0.13	<0.15						
PCB052	µg/Kg dry	<0.11	<0.1	<0.093	<0.098	<0.11						
PCB066	µg/Kg dry	<0.15	<0.14	<0.13	<0.14	<0.15						
PCB070	µg/Kg dry	<0.12	<0.12	<0.11	<0.11	<0.13						
PCB074	µg/Kg dry	<0.14	<0.13	<0.12	<0.13	<0.14						
PCB077	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13			38	160		
PCB081	µg/Kg dry	<0.12	<0.11	<0.1	<0.11	<0.12			12	49		
PCB087	µg/Kg dry	<0.16	<0.16	<0.14	<0.15	<0.17						
PCB099	µg/Kg dry	<0.11	<0.11	<0.1	<0.11	<0.12						
PCB101	µg/Kg dry	<0.14	<0.14	<0.13	<0.13	<0.15						
PCB105	µg/Kg dry	<0.14	<0.13	<0.12	<0.13	<0.14			120	490		
PCB110	µg/Kg dry	<0.12	<0.11	<0.1	<0.11	<0.12						
PCB114	µg/Kg dry	<0.14	<0.14	<0.13	<0.13	<0.14			120	500		

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

		Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
Analyte Name	Units	A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
PCB118	µg/Kg dry	<0.11	<0.1	<0.093	<0.099	<0.11			120	490		
PCB119	µg/Kg dry	<0.17	<0.16	<0.15	<0.15	<0.17						
PCB123	µg/Kg dry	<0.13	<0.13	<0.12	<0.12	<0.13			120	490		
PCB126	µg/Kg dry	<0.12	<0.12	<0.11	<0.11	<0.12			0.036	0.15		
PCB128	µg/Kg dry	<0.18	<0.18	<0.16	<0.17	<0.19						
PCB132/153	µg/Kg dry	<0.32	<0.31	<0.28	<0.3	<0.32						
PCB138/158	µg/Kg dry	<0.32	<0.31	<0.28	<0.3	<0.33						
PCB149	µg/Kg dry	<0.14	<0.14	<0.13	<0.13	<0.15						
PCB151	µg/Kg dry	<0.12	<0.12	<0.11	<0.11	<0.12						
PCB156	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13			120	500		
PCB157	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13			120	500		
PCB167	µg/Kg dry	<0.15	<0.14	<0.13	<0.14	<0.15			120	510		
PCB168	µg/Kg dry	<0.14	<0.13	<0.12	<0.13	<0.14						
PCB169	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13			0.12	0.51		
PCB170	µg/Kg dry	<0.14	<0.13	<0.12	<0.13	<0.14						
PCB177	µg/Kg dry	<0.13	<0.12	<0.11	<0.12	<0.13						
PCB180	µg/Kg dry	<0.11	<0.11	<0.097	<0.1	<0.11						
PCB183	µg/Kg dry	<0.16	<0.16	<0.14	<0.15	<0.16						
PCB187	µg/Kg dry	<0.12	<0.11	<0.1	<0.11	<0.12						
PCB189	µg/Kg dry	<0.11	<0.1	<0.093	<0.098	<0.11			130	520		
PCB194	µg/Kg dry	<0.15	<0.14	<0.13	<0.14	<0.15						
PCB201	µg/Kg dry	<0.18	<0.18	<0.16	<0.17	<0.19						
PCB206	µg/Kg dry	<0.15	<0.14	<0.13	<0.14	<0.15						
Total PCB Congeners	µg/Kg dry	ND	ND	ND	ND	ND	22.7	180			89	300
Pyrethroid Pesticides												
Allethrin	µg/Kg dry	<0.21	<0.2	<0.18	<0.2	<0.21						

Table 11. Morro Bay Harbor Bulk Sediment Chemistry Results

Analyte Name	Units	Morro Bay Harbor Composite Samples (MB23VC-)					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		A	B	C/D	E	F	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Bifenthrin	µg/Kg dry	<0.1	0.22J	<0.092	0.27J	<0.11			95,000	1,200,000		
cis-/trans-Permethrin	µg/Kg dry	<0.12	<0.12	<0.11	<0.12	<0.13			320,000	4,100,000		
Cyfluthrin	µg/Kg dry	<0.31	<0.3	<0.28	<0.3	<0.32			160,000	2,100,000		
Cypermethrin	µg/Kg dry	<0.28	<0.28	<0.25	<0.27	<0.29			450,000	5,900,000		
Deltamethrin/Tralomethrin	µg/Kg dry	<0.88	<0.86	<0.78	<0.83	<0.9			47,000	620,000		
Esfenvalerate/Fenvalerate	µg/Kg dry	<0.38	<0.37	<0.33	<0.36	<0.38			160,000	2,100,000		
Fenpropathrin	µg/Kg dry	<0.3	<0.29	<0.26	<0.28	<0.3			160,000	2,100,000		
Fluvalinate	µg/Kg dry	<0.21	<0.2	<0.18	<0.19	<0.21			63,000	820,000		
Lambda-cyhalothrin	µg/Kg dry	<0.36	<0.35	<0.32	<0.34	<0.37			6,300	82,000		
Phenothrin	µg/Kg dry	<0.6	<0.59	<0.53	<0.57	<0.61			320,000	4,100,000		
Resmethrin/Bioresmethrin	µg/Kg dry	<0.26	<0.25	<0.23	<0.25	<0.27			190,000	2,500,000		
Tetramethrin	µg/Kg dry	<0.14	<0.13	<0.12	<0.13	<0.14						
ERM Quotient		0.01	0.02	0.01	0.01	0.01						

1 Effects Range Low (ERL) and Effects Range Median (ERM) sediment quality objectives from Long et al. (1995)
2 Regional Screening Levels for Chemical Contaminants at Superfund Sites (USEPA 2020)
3 California Human Health Screening Levels for Soil (Cal/EPA 2005)
< Not detected at the corresponding Method Detection Limit
J Estimated between the Reporting Limit and the Method Detection Limit or outside certain QC objectives
ND Not detected
Red values exceed the ERL
Green shaded values exceed a human health criterion.

5. DISCUSSION

The subsections that follow describe chemical and physical testing results, as summarized in Tables 8 through 11, in terms of sediment screening levels and objectives for beach nourishment.

5.1 Sediment Observations

Observed sediment characteristics were somewhat similar among cores. According to soils logs (Appendix E), sediments from 23 of the 25 cores were described as olive, light brown, and/or black poorly graded sand (SP) of various grain sizes throughout the cores. One core in the Navy Channel (NC-04) was described as non-plastic poorly graded sand with silt (SP-SM), and one core in the Entrance Channel (EC-05) contained poorly graded sand with gravel below 10 feet (SW and SP). In comparison, sediments in all grab samples taken within the Montana de Oro State Beach nearshore area and along the Morro Strand State Beach transects were noted to be poorly graded sand (SP). In addition, sand dollars were observed in most offshore grabs collected (Appendix D) and were released back into the ocean.

Except for core NC-04 and a slight hydrogen sulfide odor in numerous cores, there were no noxious odors, trash, or other non-organic debris observed in any of the cores. There were also no obvious layers of elevated contamination or layers of fine-grained material. Core NC-04 was noted to have a presence of a strong hydrogen sulfide odor. This core was also noted to have aquatic grass in the top six inches despite efforts by the sampling crew to avoid Eelgrass beds.

5.2 Sediment Grain Size

As summarized in Table 9, results indicate that all Morro Bay Harbor primary core intervals (mudline to project depth and associated overdepth) consisted of 89 to 100 percent coarse-grained material. The weighted average sand and gravel content for each channel area was 98 to 99 percent (Table 8). In comparison, sieve analysis data for the individual beach transect and nearshore samples, provided in Table 10, show that sediments collected in 2022 in the nearshore area of Montana de Oro State Beach and along the transects at Morro Strand State Beach were poorly graded sand with very little or no fines (average of 97-100 percent sand), which resulted in fines limits of 1.7 percent for Montana de Oro State beach nearshore and 2.7 percent for Morro Strand State Beach. Therefore, all sediment within all six dredge footprint areas (A, B, C, D, E, and F) is compatible for placement at the two receiver beaches. This is based on the weighted grain size composite curve and analysis of each footprint area, and on the individual grain size curves of each vibracore sample within each footprint. Summaries of the grain size results for each of the Morro Bay Harbor dredge areas sampled as well as the receiving beach samples are also provided in Appendix C along with placement site compatibility (suitability determination) of the Morro Bay Harbor maintenance dredging sediments.

5.3 Bulk Sediment Chemistry

Overall, contaminant concentrations, as summarized in Table 10, for the Morro Bay Harbor composite samples were below detection limits or low compared to effects-based screening values. In fact, the only contaminant detected above a NOAA ERL value, but less than the ERM value, was nickel in all five composite samples. The confidence in NOAA screening values for nickel is low. It was found that the incidence of toxic effects does not increase appreciably with increasing concentrations of nickel (Long et al., 1995). The elevated nickel concentration is probably due to natural sources from serpentine-rich soils common in the Morro Bay watershed (Central California Coast Regional Water Quality Control Board, 2007).

The only organic contaminants detected in the Morro Bay Harbor sediments were low levels of PAH compounds in composite samples B, E, and F and a few phthalate compounds in Composites E and F. All detected organic analyte concentrations were well below the ERL values. As one would expect, mean ERM quotients among all contaminants with ERM values were very low (0.01 to 0.02). With an ERMq of 0.1, there is less than a 12% probability of a toxic response.

Except for arsenic, all contaminants detected in the Morro Bay Harbor sediments were well below RSLs and CHHSLs for residential soils developed for human protection. However, arsenic concentrations in the Morro Bay Harbor composite samples were actually lower than the calculated background arsenic concentration in reference beaches (4.37 mg/kg) to the north of Morro Bay Harbor (Kinnetic Labs/ Diaz Yourman, 2014). Additionally, elevated arsenic concentrations occur commonly from natural as well as from anthropogenic sources in California dredge sediments and soils, and the concentrations of arsenic in three out of the five Morro Bay Harbor composite samples were less than the background concentration (3.5 mg/kg) for soils throughout California (Bradford et al., 1996), and all five were less than the concentration (12 mg/kg) that the DTSC considers dangerous to human health (Dr. William Bosan, Personal Communication). Two composite samples, areas C/D and E, were slightly elevated (4.02 mg/kg and 3.88 mg/kg respectively) above background for CA soils but still below the local beach background value of 4.37 mg/kg.

5.4 Conclusions

According to CESPL's grain size suitability analysis (Appendix C), all sediments within Morro Bay Harbor are compatible for placement at the nearshore area immediately offshore of Montana de Oro State Beach and in the surf zone along Morro Strand State Beach. This is based on the average individual and composite sediment grain size curves of each area. This and the fact that inorganic and organic contaminant concentrations were low compared to screening levels, Morro Bay Harbor sediments are suitable for placement at the receiver beaches.

6. QUALITY ASSURANCE/QUALITY CONTROL EVALUATION

Formal QA/QC procedures were followed for this project. The objectives of the QA/QC program are to fully document the field and laboratory data collected, to maintain data integrity from the time of field collection through storage and archiving, and to produce the highest quality data possible. Quality assurance involves all the planned and systematic actions necessary to provide confidence that work performed by the project team conforms to contract requirements, laboratory methodologies, state and federal regulation requirements, and corporate SOPs. The program is designed to allow the data to be assessed by the following parameters: precision, accuracy, comparability, representativeness, and completeness. These parameters are controlled by adhering to documented methods and procedures (the SOPs), and by the analysis of quality control samples on a routine basis.

6.1 Field Sampling Quality Management

Field quality control procedures are summarized in Table 12 and include adherence to SOPs and formal sample documentation and tracking. There were no QC issues with the field sampling to report.

Table 12. Quality Control Summary for Field Sediment Sampling

Sediment Sampling Field Activity
• Grab and Vibracore sampling SOP
• Protocol cleaning/low detection limits
• Certified clean laboratory containers
• Horizontal and vertical controls
• Sediment logging and subsampling protocols
• Sample control/chain of custody procedures
• Field logs and sediment logs
• Sample preservation and shipping procedures

6.2 Chemical Analysis Quality Management

Analytical chemistry quality control is formalized by USEPA and state certification agencies and involves internal quality control checks for precision and accuracy. Any issues associated with the quality control checks are summarized in Appendix H.

The QA/QC findings presented are based on data validation according to the quality assurance objectives detailed in the project SAP (Diaz-Yourman, GeoPentech, and Kinnetic Laboratories/ Joint Venture 2022), in Appendix H, and using guidance from the USEPA National Functional Guidelines for inorganic and organic data (USEPA 2020a and 2020b).

As the first step in the validation process, all results were carefully reviewed to ensure the laboratories met the project reporting limits. Most reporting limits for this project, as specified in project SAP, were met. Selenium and zinc were the only constituents to exceed both the SAP and SAPRG limits. The SAPRG limit for selenium is 0.1 mg/kg with the laboratory able to only achieve a reporting limit of 1.0 mg/kg. For zinc, the SAPRG limit is 3.0 mg/kg with the laboratory only able to achieve a reporting limit of 10 mg/kg.

QA/QC records (831 total) for the sediment analyses include method blanks, laboratory duplicates, laboratory control spikes and their duplicates (LCS/LCSDs), matrix spikes and matrix spike duplicates (MS/MSDs), and surrogates. Total number of QC records by type are summarized in Table 13. Generally, the QC data were within limits with the exceptions noted in Table 14. Of the 760 sample results, 14 (1.8%) were qualified during the QC review. Sediment qualifications were a result of holding time violations and poor matrix spike recoveries. A complete QA/QC discussion of the data can be found in Appendix H.

As part of the validation process, chemical analyses were checked to see if they were completed within holding times. Total and water-soluble sulfides were run outside the 7-day holding time due to laboratory being overwhelmed with short holding time samples. Total sulfides were run 1 to 15 days out of hold for all but one location, Area A. Sample results for all but Area A have been qualified with a "J" indicating they should be viewed as an estimate. Water soluble sulfides were run 17 to 19 days out of hold time. All results were below the detection limit and were thus qualified with a "UJ", indicating the results should be viewed as a non-detected estimate.

A careful review of the results confirmed that the laboratories met most QA/QC requirements. Nine qualifiers were added to the data due to holding time violations and an additional five qualifiers were added due to matrix spike recoveries that were outside of QC objectives. This resulted in only 1.8% of the sediment data requiring qualification. Since no results were rejected, 100% completeness was achieved for this project. Overall evaluation of the analytical QA/QC data indicates that the chemical data are within established performance criteria and can be used for characterization of sediments in the proposed project area.

Table 13. Counts of QC records per Chemical Category

Analyte Group	BLK	DUP	LCS /LCSD	MS/MSD	SURR	Total
Conventionals						
Percent Solids	1	1				2
Ammonia	1	1	2	2		6
Total Sulfides	2		4	4		10
Dissolved Sulfides	1		2	2		5
Total Organic Carbon	1	1	2	2		6
Total Volatile Solids		1				1
O&G	1		2	2		5
TRPH	1		2	2		5
Total Metals including Hg	11		22	22		55
PAH's, Phthalates & Phenols	49		82	82	60	273
Chlorinated Pesticides	56		84	44	42	226
PCB Congeners	40		36	36	20	132
Butyltins	4		8	8	10	30
Pyrethroids	13		26	26	10	75
Sediment QC Totals	181	4	272	232	142	831

Table 14. Final QC Qualification Applied to Sample Results

Analyte	# Samples Qualified	Final Qualifier	BLK	DUP	LCS	MS	SURR	Other
Conventionals								
Total Sulfides	4	J						J
Dissolved Sulfides	5	UJ						UJ
Organotins								
Monobutyltin	5	UJ				UJ		
Total number of affected samples	14							
Percentage of all samples	1.8%							

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Appendix A

USACE Morro Bay Harbor O&M Dredging Summary Data from 2017/2018

Diaz Yourman, GeoPentech and Kinnetic Laboratories, JV (2019)

Appendix B

USACE Morro Bay Harbor O&M Dredging Summary Data from 2013

Diaz Yourman, GeoPentech and Kinnetic Laboratories, JV (2013)

Appendix C

Morro Bay Harbor Sediment Physical Compatibility Analysis Report

Appendix D

Field Data Logs, Daily Report Logs, and Core Photographs

Appendix E

Soils (Sediment) Logs

Appendix F

Analytical Laboratory Reports

Appendix G

Geotechnical Laboratory Report

Appendix H

Analytical Laboratory Quality Assurance/Quality Control Evaluation Report