MOTT MACDONALD

Central Coast Offshore Wind O&M Infrastructure Study

Final Report - Morro Bay

April 2026

This page left intentionally blank for pagination.

Mott MacDonald
1601 5th Avenue
Suite 800
Seattle
WA 98101
United States of America

T +1 (206) 838 2886
mottmac.com

Central Coast Offshore Wind O&M Infrastructure Study

Final Report - Morro Bay

April 2026

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	12/05/25	SC, BF	CP	KP	Draft Submission
1	04/16/26	SC, BF, EM	CP	AP	Final Submission

Document reference:

Contents

Executive summary 1

1 Introduction 6

2 Abbreviations and acronyms 8

3 Basis of assessment 9

3.1 Site conditions 9
3.1.1 Site location 9
3.1.2 Existing marine infrastructure 9
3.1.3 Environmental conditions 14
3.1.4 Bathymetry 15
3.1.5 Other site constraints 16
3.2 O&M facility infrastructure minimum functional requirements 17
3.2.1 Design vessels 17
3.2.2 Berthing and navigation 18
3.2.3 Marine facility 19
3.3 Study assumptions & exclusions 20
3.3.1 Guidelines 21

4 O&M facility infrastructure concept design 22

4.1 Gap assessment 22
4.2 Concept design for a facility shared by three developers 23
4.2.1 List of concept designs 23
4.2.2 Least constrained concept design 27
4.2.3 Strategic development scenarios 27
4.2.4 Concept design development 27
4.3 Navigation and dredging assessment 32
4.3.1 Background 32
4.3.2 Maintenance dredging history and methodology 32
4.3.3 Preliminary dredging assessment 34
4.4 Cost estimate 38
4.5 Concept design for a facility operated by one developer (Split-Location) 42
4.5.1 Split-location introduction 42
4.5.2 Modified basis of assessment for a single OSW developer 42
4.5.3 Least constrained site layout 42
4.5.4 Split-location cost 47
4.5.5 Split-location conceptual design summary 51

5 Environmental and permitting assessment 52
5.1 Summary 52

6 Summary 54
6.1 Conclusions 54
6.2 Next steps 55

7 References 57

Appendices 58

A. Basis of design 59

B. Environmental constraints and feasibility analysis report (Rincon, 2026) 60

C. Preliminary geotechnical desk study 61

Tables

Table 3.1 Typical vessel mix at the North T-Pier for Harbor Department, USCG and U.S. Fish & Wildlife Service 11
Table 3.2: Tidal datums at the project location 14
Table 3-3 – Topographic and bathymetric data sources 16
Table 3-4 – Morro Bay FNC authorized channel geometries 17
Table 3-5 – Design vessels 18
Table 3-6 – Berthing and navigation requirements 18
Table 3-7 – Operation zones definitions 19
Table 3-8 – Moorage requirements and waterfront facilities 20
Table 3-9 – Upland facilities 20
Table 4-1 – Functional requirements and upgrades to support an O&M facility 22
Table 4.4: List of concept designs 24
Table 4.6: Morro Bay site alternative options cost estimate 39
Table 4.7: Morro Bay Option 4A cost estimate 40
Table 4.8: Morro Bay Option 4B cost estimate 41
Table 4-9: Updated functional requirements for a single developer at Morro Bay 42
Table 4-10 Morro Bay site alternative variant options cost estimate 47
Table 4-11 Split-Location Option Variant A detailed cost estimate 48
Table 4-12 Split-Location Option Variant B detailed cost estimate 49
Table 4-13 Split-Location Option Variant C detailed cost estimate 50

Figures

Figure 1.1: Map of California Wind Lease Areas (BOEM, 2025) 7
Figure 3.1: Morro Bay project vicinity map 9
Figure 3.2: Existing conditions and land use at Morro Bay Waterfront 10
Figure 3.3: Photos of the fueling facility at Morro Bay 11
Figure 3.4: Photo of the shoreline protection adjacent to USCG and Harbor Dept. 12
Figure 3.5: Photo of the rock revetment protecting Coleman Park 12
Figure 3.6: Public beach at Morro Bay 12
Figure 3.7: City of Morro Bay Harbor Dept. 13
Figure 3.8: USCG Surf Station 13
Figure 3.9: Vistra Pump Intake Waterfront Property 13
Figure 3.10: Power station pump intake 13
Figure 3.11 Current velocity measurement locations. (1 – Between Morro Rock and Sand Spit, 2 – North T-Pier, 3 – South T-Pier) 15
Figure 3.12: Morro Bay basemap. Numbers denote elevation in feet relative to the mean lower-low water (MLLW) tidal datum 16
Figure 3.13 Summary of site constraints in Morro Bay, to be read in conjunction with Table 3-4. 17
Figure 4.1: Morro Bay Option 4A Conceptual Plan 30
Figure 4.2: Morro Bay Option 4B Conceptual Plan 31
Figure 4.3: Schematic a Trailing Hopper Suction Dredger (USAV Yaquina) 33
Figure 4.4: Example of a Cutter Section Dredger 33
Figure 4.5: Dredge material placement sites (USACE, 2013). Orange boxes indicate dredge placement pipes. Red line indicates temporary dredge pipeline. 34
Figure 4.6: Dredging depths in feet for a representative navigation channel layout at Morro Bay 35
Figure 4.7: Turning basin design for high current configuration (USACE, 2006) 37
Figure 4.10: Split-Location Conceptual Design, Variant A – Vistra property not acquired 44
Figure 4.11: Split-Location Conceptual Design, Variant B – Vistra waterfront property leased or acquired 45
Figure 4.12: Split-Location Conceptual Design, Variant C – Vistra waterfront and powerplant property leased or acquired 46

Executive summary

As part of the 2022 State budget, San Luis Obispo County was awarded $1 million for a “Deep-Water Port Feasibility Study for Offshore Wind Procurement.” The funds were used for the development of two studies, one for Morro Bay and one for San Luis Obispo Bay, which evaluate the technical suitability of the two locations for potential offshore wind (OSW) operations and maintenance (O&M) facilities to serve projects in the Morro Bay Wind Energy Area (MBWEA). In an earlier study, the AB 525 Port Readiness Plan by Lim and Trowbridge (2023) prepared for the California State Lands Commission, Morro Bay and San Luis Obispo Bay were identified as appropriate candidates.

This study furthers the evaluation of Morro Bay (the San Luis Obispo Bay study is under separate cover) as a potential O&M facility location. It performs site specific comparisons of the likely requirements an OSW O&M facility with the conditions and constraints within the Bay. Examples of potential modifications or additions to waterfront infrastructure that may be required to meet OSW facility requirements have also been included. The study was developed in coordination with a Study Team consisting of representatives from the County of San Luis Obispo and the City of Morro Bay Community Development and Harbor Department.

It is important to note that the Study Team evaluation of OSW O&M facility concept designs included in the study does not signify a Study Team representative’s personal or organizational support or objection for the conceptual design or the development of an OSW O&M facility, nor does the report intend to promote or support offshore wind development or related facilities. Instead, the study presents conceptual information about the specific functional requirements for a potential OSW O&M facility, what could be accommodated within Morro Bay, and what modifications would likely be necessary in the design and agency review of an application to develop an O&M facility at Morro Bay. Currently, no land use applications have been submitted for the development of an OSW O&M facility in Morro Bay. If an O&M facility is proposed in the future, it would be subject to detailed project-level analysis and public review. This study, however, provides useful information should such an application ever be submitted.

Offshore Wind O&M Base description

Unlike a Staging and Integration (S&I) facility, an OSW O&M facility is typically limited to a dock and loading space for support vessels as well as nearby offices and warehousing for maintenance activities and storage of weather sensitive components. Based on similar facilities and initial conversations with the Morro Bay Wind Energy Area (MBWEA) offshore wind developers, an OSW O&M fleet for a single lease area in the MBWEA would be anticipated to include one (1) large offshore Service Operations Vessel (SOV) and optionally one (1) small Crew Transfer Vessel (CTV).

As an O&M facility in this region could service any or all the three (3) lease areas, this study first considered a concept design suitable for a maximum of three (3) SOVs and three (3) CTVs.

The study later considered a Split-Location approach, whereby the Morro Bay site would only be expected to service one (1) developer with one (1) SOV, and one (1) CTV. Under this scenario, Morro Bay would accommodate a second OSW developer’s SOV and CTV, and it is assumed the third developer would be located out of the area.

CTVs are assumed to be up to 90ft in length and are typically used for shuttling personnel and minor supplies on a daily basis from the O&M facility to the lease area.

SOVs are assumed to be up to 300ft in length and typically remain offshore for extended periods of time (assumed 1 - 2 weeks) performing inspections and maintenance, activities before returning to the O&M facility for a short turnaround (assumed 24hrs). Exact schedules would be subject to the OSW developers' O&M model. Whilst the berths are vacant, developers would be expected to utilize the wharf to stage equipment for the next scheduled vessel call.

Study Approach

This study consists of a desktop assessment of the likely minimum functional requirements for a successful O&M facility, a site visit to assess the condition of the existing infrastructure as well as discussion with the City of Morro Bay and the Harbor Department to understand how an O&M facility may affect their activities and existing public uses. This study methodology included:

1. Identification of minimum functional requirements for an O&M facility and development of Basis of Assessment criteria.
2. Development of conceptual designs which satisfy the Basis of Assessment.
3. Collaborative multi-criteria assessment of concept design alternatives to assess concept options by:
    a. Functional performance including mooring loading and weather downtime options
    b. Environmental and permitting constraints
    c. Potential effects to the community
    d. Likely capital cost

Basis of Assessment

The Basis of Assessment for this study identified existing site conditions of the bay such as bathymetry, wind, and wave data, and considered information and data from relevant previous studies. Informal interviews with likely stakeholders, such as an O&M facility developer and OSW developers, were conducted to refine assumptions related to operating details of an O&M facility. Minimum functional requirements were identified for berthing and navigation of design vessels, quayside operations, and upland support facilities.

The following key conditions were refined throughout the process and collectively agreed upon by all parties present:

- Development should be focused on the North T-Pier, rather than both T-Piers.
- Development should take the form of a T-pier to respect the local fabric of the waterfront.
- The T-Pier should be at least partially publicly accessible.
- T-Pier development should be respectful to neighboring lease sites, recreational areas, local businesses, and restaurants by keeping O&M activities to the north side of the North T-Pier.
- Layouts should avoid partitioning sections of the promenade and harbor-walk for secure access.
- U.S. Coast Guard (USCG) and Morro Bay Harbor Department to be kept at or near the North T-Pier. Secured access would be preferred by USCG.
- Development should be respectful to the Commercial Fishing intent of the Measure D area and minimize impacts on the industry's operations.
- Development should be respectful to Measure A-24. Under this measure, any future changes to the land use designations in the affected area require approval by a majority vote of city residents (Morro Bay 2024).

- The Study Team agreed on these conditions for the purposes of this concept level review. If a project is proposed in the future, these conditions could be re-evaluated based on project-specific information and public input.

Environmental and Permitting Constraints

Rincon Consultants, Inc. (Rincon) provided input on the development of the various design concepts and shared environmental planning, resource, land use and permitting constraints for the Study. Rincon's Environmental Constraints and Feasibility Analysis Report (report) analyzed the least constrained alternatives and locations for an OSW O&M facility located in Morro Bay (Appendix B). The report identifies, evaluates, and provides a technical analysis of the environmental planning, resource, and permitting constraints related to the least constrained concept designs and includes details on responsible parties, permit requirements, approval processes, timelines, and estimated costs.

Any new development on the waterfront would need to be consistent with the City's General Plan and Zoning Code. A primary constraint of an O&M facility from a permitting standpoint is the potential for such a project to be inconsistent with the City's General Plan and Zoning Code. The City's recently updated 2021 General Plan envisions a sustainable, vibrant. and accessible waterfront. The City is updating its 1996 Waterfront Master Plan to create a roadmap to implement this vision. In 2024, the City rezoned key waterfront properties (e.g., the power plant property) from 'industrial' to 'visitor-serving commercial.'

A project would not be able to proceed with the processing of a Coastal Development Permit, until it can be found consistent with the General Plan or until the General Plan is amended to allow for the proposed development. A change to the General Plan for this portion of the waterfront would require voter approval, per a 2024 ballot initiative (A-24).

Potential Effects on the Community

The North and South T-Piers at Morro Bay are currently used by the Harbor Department, U.S. Coast Guard (USCG), U.S. Fish & Wildlife Service, the fishing industry, and for boat moorage, and storage. Adjacent to the North T-Pier is a fishing wharf, used for offloading catch and equipment, and businesses on City lease sites.

The impact that an O&M facility could have can be separated into short term and long-term benefits, changes in use, and localized resource impact. Short-term benefits may include local job opportunities and investment due to construction-related activities. Short-term negative impacts may include public inconveniences and environmental impacts due to construction, such as local noise, traffic management, dredging, and temporary increases in construction traffic.

Long-term benefits of a successful project may include:

- Investment to repair and maintain T-pier(s).
- Reduced maintenance costs for City of Morro Bay, due to cost sharing with OSW tenants.
- Potentially safer navigation for vessels due to dredging of the navigation channel resulting in less shoaling and potentially reduced wave heights propagating through the harbor breakwater.
- Additional beach nourishment from dredging operations, protecting bird habitats at Morro Rock Beach.
- Potential investment for coastal protection upgrades within the bay.

- Improvements to public facilities augmented by the new facility, such as the Harbor Department office, a new boat lift (if required for CTVs), and additional fueling or powering facilities.
- Job creation to service the O&M facility and potential supply chain business opportunities to fabricate serviceable offshore wind components.

Pro-active community engagement would be a critical component for a viable project, to maximize the potential community benefits whilst reducing the potential for long-term negative impacts to Morro Bay's character and identity. Identified community considerations included the following:

- Changes to the viewscape and character of the bay due to new marine infrastructure and moorage of large vessels.
- Additional Heavy Goods Vehicle movements expected to transfer service components to and from the OSW O&M facility on the waterfront.
- Additional commercial and industrial operations in the bay may impact the character of the city and waterfront.
- Wave conditions through the inlet may improve due to dredging of the navigation channel. Improvements to navigational safety could speculatively lead to the USCG surf station being converted to a security station or other mission. This change may affect the USCG vessel mix, berthing, and facility requirements. However, without wave modelling and without formal coordination with the USCG, it remains unclear whether these changes in wave conditions and station designation would occur.
- The waterfront area between Beach Street and Coleman Park is heavily used for commercial and recreational fishing, kayaking, boat tours, sporting events, and sightseeing. These uses play a major role in sustaining Morro Bay's economy and help define the community's character. Any O&M facility in this area would need to be designed to maintain coastal access for these activities while preserving Morro Bay's distinctive character.

Cost

Costs were estimated for the waterfront infrastructure only and excluded any potential costs for environmental mitigation, upland development, or costs to relocate or compensate businesses.

Construction cost estimates for the least constrained concept designs were estimated to be approximately $130-140 million, however may be in the range of $90-210 million according to the Advancement of Cost Estimating's Class V cost estimate scheme (-50% to +100%) for concept-level assessments.

Construction cost estimates for the Split-Location concept design (one developer at Morro Bay, one developer at San Luis Obispo Bay, and one developer located out of the area) were estimated to be approximately $114-$122 million, but may be in the range of $80-183 million according to the Advancement of Cost Estimating's Class V cost estimate scheme (-50% to +100%) for concept-level assessments.

Study Recommendations

An O&M facility located on the Morro Bay waterfront would present several inconsistencies with the City's General Plan and Zoning Code. Despite this, the existing waterfront infrastructure at Morro Bay has the physical characteristics needed to support the development of an O&M facility to service the OSW industry. This is due to key factors such as the presence of an existing channel and the availability of industrial land parcels with waterfront access that make development a viable option.

The existing infrastructure was assessed for reuse viability for an OSW O&M facility. Due to the expected size of vessels and loading required for O&M activities, the existing T-Piers at Morro Bay were found to be likely unsuitable for reuse or modification for O&M requirements. As such, an O&M facility would likely require a new marine structure, sized to support the required number of SOV(s) and CTVs.

Several concept designs which met the minimal functional requirements of an offshore wind O&M facility are included within this report. The concepts aimed to reduce environmental and permitting challenges and attempted to minimize the impact to existing infrastructure and community activities.

The study found that the reconstruction of the North T-Pier, as a purpose-built OSW O&M facility, would be technically viable from a construction perspective; however, such a development would face multiple challenges that would need to be resolved in the pursuit of sustainable development. The outstanding issues include the following:

- Potential inconsistency with the General Plan's vision for visitor-serving and commercial fishing waterfront.
- Environmental concerns due to the extent of dredging required, and the increase in maritime and road traffic.
- Potential local objection due to changes to the waterfront viewscape and local character. The loss of the historic wooden T-Pier and its appearance.
- Fueling arrangements (excluded from this study due to uncertainty on vessel fueling methods and potential for electrification).
- Onerous permitting process due to environmental impacts, impacts to a federal facility and the FNC channel, potential changes in zoning and Measure D, which aims to preserve the waterfront for 'commercial fishing uses' and 'visitor serving uses'.
- Relatively high capital investment costs due to the necessity to construct a new T-Pier to accommodate the expected vessel and equipment loads.
- The waterfront area between Beach Street and Coleman Park is heavily used for commercial and recreational fishing, kayaking, boat tours, sporting events, and sightseeing. These uses play a key role in sustaining Morro Bay's economy and help define the community's character. Any O&M facility in this area would need to be designed to maintain coastal access for these activities while preserving Morro Bay's distinctive character.

The extent and cost of the facility would be dependent on the number of OSW developers served by the facility. To address this uncertainty, this study has also considered a smaller facility which may support a single OSW developer, with an additional O&M facility to be constructed in San Luis Obispo Bay. For this scenario, it is assumed the third OSW developer would be located out of the region. This would marginally reduce the local impacts and the capital investment for the individual facility within Morro Bay but would increase the total capital costs required to serve the Morro Bay Wind Energy Area.

1 Introduction

Morro Bay Wind Energy Area is located approximately 20 miles offshore from the central California coastline and is comprised of three lease areas, OCS-P 0563, OCS-P 0564, and OCS-P 0565, as outlined by the Bureau of Ocean Energy Management (BOEM) in Figure 1.1. These lease areas are projected to provide a total installation capacity between 2.9 and 5.1 GW using floating offshore wind (OSW) technologies, sufficient to provide power to about 1 million homes (Lim & Trowbridge, 2023).

Marine facilities to support the Operations and Maintenance (O&M) requirements of the lease areas need to be identified and assessed to understand the level of effort required to convert existing infrastructure into an operational O&M hub, thus forming the basis of this study.

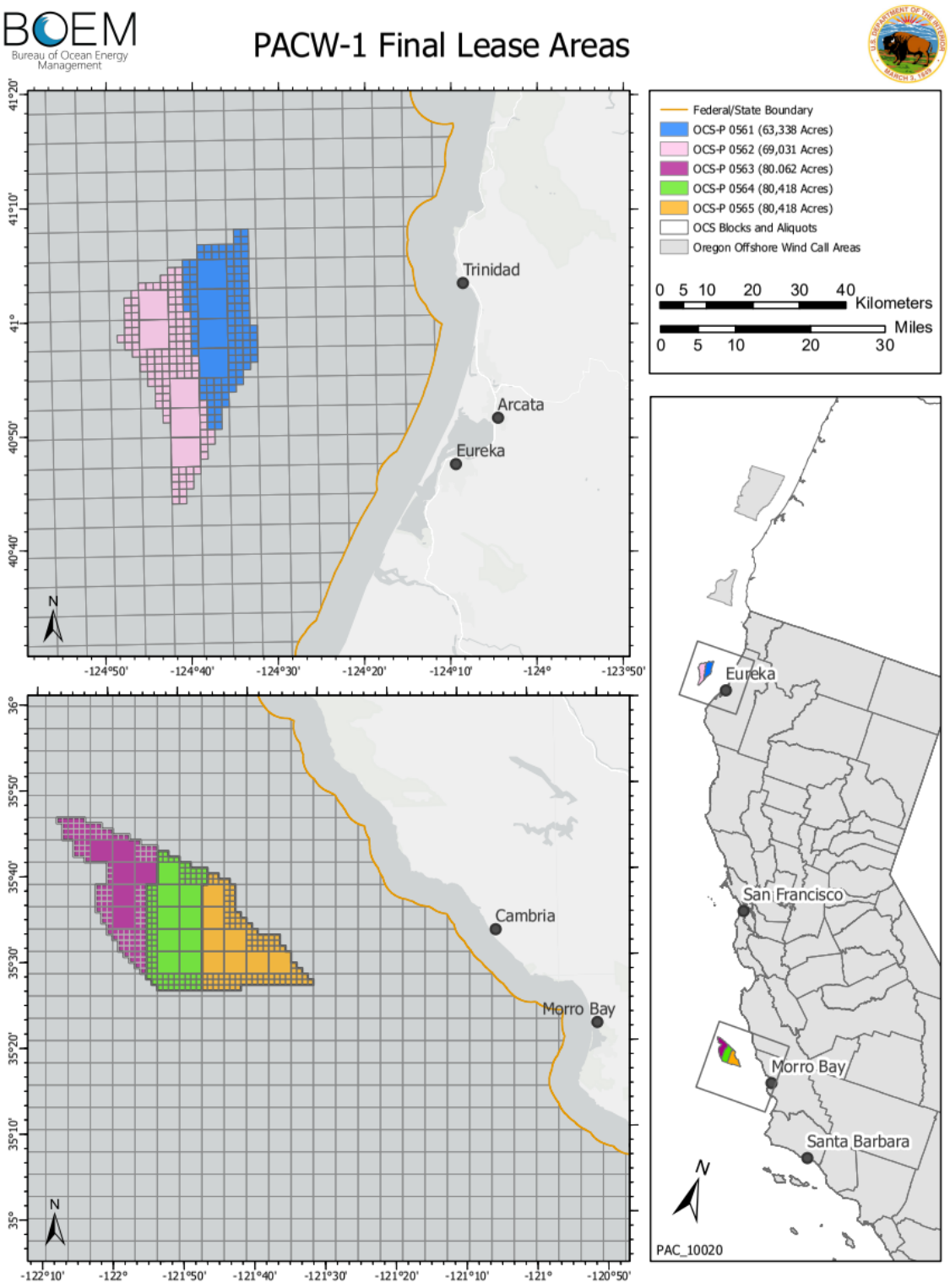
With close proximity to the Morro Bay Wind Energy Area, Morro Bay has been identified as a potential site to support the Offshore Wind (OSW) initiative as an Operations and Maintenance (O&M) facility for support vessels. O&M facilities are used as a base for technicians and engineers to travel to and from lease areas to restock supplies, crew members, and equipment for long-term maintenance support of the OSW facility. The facility is usually complemented by an upland area for staff offices and storage of repair and maintenance components.

This study aims to evaluate the technical suitability of Morro Bay to accommodate an OSW O&M facility. A combination of desktop studies, site visits, and a concept-level engineering analysis and design was used to provide a deeper understanding of the potential upgrades required to host O&M support functions.

The report contains the following sections (in chronological order):

- **Basis of Assessment**: Documents the assumptions to be used in the study and outline key functional requirements for O&M operations. Summarizes conditions and characteristics for existing waterfront infrastructure through desktop research and Morro Bay site visits.
- **O&M Waterfront Facility Concept Design**: Evaluates the Morro Bay waterfront for suitability for SOV berthing and develops high-level concept sketches and multi-criteria assessment (MCA) to identify the least constrained alternative. Presents concept drawings for site layouts and construction cost estimates.
- **Navigation & Dredging Assessment**: Compiles and contrasts different dredging techniques that could be used at Morro Bay. Identifies areas to be considered for dredging using vessel sizes and navigation requirements set forth in the Basis of Assessment. Provides concept-level estimates for dredge volumes and costs.
- **Environmental and Permitting Assessment**: Developed by Subconsultant, Rincon Consultants, Inc. (Rincon), this assessment identifies and maps environmental constraints for the impact assessment. Develops an environmental planning and permitting matrix, providing information on the likely permits required for an OSW O&M facility. The full report is attached within Appendix B.
- **Conclusions & Next Steps**: Summarizes findings and potential next steps.

Figure 1.1: Map of California Wind Lease Areas (BOEM, 2025)



2 Abbreviations and acronyms

Acronym	Description
AACE	Association for the Advancement of Cost Engineering
BoA	Basis of Assessment
BOEM	Bureau of Ocean Energy Management
CCC	California Coastal Commission
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
CSD	Cutter Suction Dredger
CTV	Crew Transfer Vessel
CY	Cubic Yard
FNC	Federal Navigation Channel
Ft	Feet
F&W	Fish & Wildlife
GW	Gigawatt
H&S	Health and Safety
LAT	Lowest Astronomical Tide
MBWEA	Morro Bay Wind Energy Area
MCA	Multi-Criteria Analysis
MLLW	Mean Lower-Low Water
NDBC	National Data Buoy Center
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
OSW	Offshore Wind
SLO	San Luis Obispo
SOV	Service Operations Vessel
TSHD	Trailing Suction Hopper Dredger
USACE	U.S. Army Corps of Engineers
USAV	U.S. Army Vessel
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey

3 Basis of assessment

A Basis of Assessment (BoA) was developed to outline all study inputs, assumptions, and criteria necessary to facilitate the conceptual design of a potential O&M site. This section provides a brief overview of existing conditions and design criteria. A copy of the full BoA is provided in Appendix A.

3.1 Site conditions

3.1.1 Site location

The project site at Morro Bay is located along the northeastern shore of the Morro Bay Navy Channel and spans approximately 2100 feet between Coleman Park and the junction of Embarcadero and Beach Street.

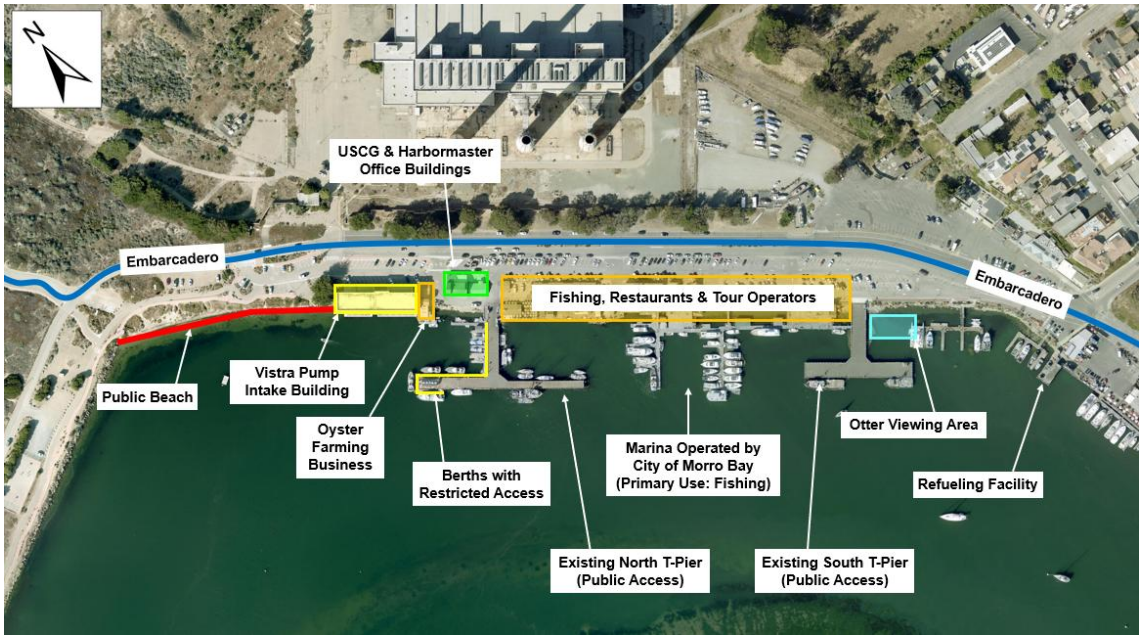
Figure 3.1: Morro Bay project vicinity map

Source: Vantor, Earthstar Geographics

3.1.2 Existing marine infrastructure

Existing infrastructure along the shoreline is labelled within Figure 3.2 and detailed in the following sections.

Figure 3.2: Existing conditions and land use at Morro Bay Waterfront



Sources: Maxar, Microsoft

3.1.2.1 Access road

The project site is accessible via Embarcadero, the main road connecting the coastal town of Morro Bay to Morro Rock and parts of the city north of the navigation channel.

3.1.2.2 South T-Piers

The South T-Pier extends 256ft into the channel with a 250ft pier head. The structure was constructed in 1952 and later reconstructed in 1992 following a fire.

The T-Pier is supported by a mix of creosote treated timber piles, and steel piles. A 2016 condition assessment report (Shoreline Engineering, Inc, 2016) recommended significant repairs to the timber piles, deck, bracing, fender piles, and utilities.

There's an otter viewing area and nursery to the south of the T-Pier.

3.1.2.3 North T-Pier

The North T-Pier is located to the west of the Harbor Department Building and was constructed between 1942 and 1945. The T-Pier extends approximately 168ft into the channel and features a pier head with a berthing length of approximately 400ft.

Whilst the T-Pier is publicly accessible, the north section of the pier head is secured with chains, restricting public access to a shed and berthing slips owned by the U.S. Coast Guard (USCG). There are also floating pontoons owned by the Harbor Department. The typical vessel mix of local and federal vessels using the North T-Pier is detailed in Table 3.1.

Table 3.1 Typical vessel mix at the North T-Pier for Harbor Department, USCG and U.S. Fish & Wildlife Service

Boat	Assumed Dimensions	Harbor Department	USCG	U.S. Fish and Wildlife Service
Small	30 x 10 ft	5	0	0
Medium	50 x 15 ft	1	4	0
Large	**70 x 30 ft**	**0**	**0**	**1**

The North T-Pier was last inspected in 2023 (Brady, 2024), with recommendations to undertake repairs to utilities, piles, pile caps, fender piles, guide piles. The recommendations are unsurprising for a structure of its kind and age, approaching end of life.

3.1.2.4 Marina

The marina and associated finger piers are owned by the City of Morro Bay Harbor Department and are present along the waterfront, offering moorage space for local fishing boats, vessels, and tour boats.

3.1.2.5 Fueling facility

A fueling facility (Figure 3.3) is present to the South of the junction between Embarcadero and Beach Street. The tank and berth for which is sized suitably for the existing vessel mix in the marina.

The largest vessel served at the facility is the Yaquina dredger with a length of 200 feet. These infrequent fueling events require special berthing arrangements, blocking adjacent docks. Due to the large capacity of the vessel fuel tanks, it needs to be fueled directly from fuel tankers. This fueling arrangement would not satisfy design standards for the O&M facility and would be unsuitable for fueling SOVs (up to 300ft in length). However, fueling is not addressed in the study due to uncertainty of vessel fueling methods and potential for vessel electrification.

Figure 3.3: Photos of the fueling facility at Morro Bay

Source: Mott MacDonald, 2024


Source: Mott MacDonald, 2024

3.1.2.6 Shoreline protection

Adjacent to the USCG and Harbor Department, the shoreline protection takes the form of a concrete capped revetment (Figure 3.4), and was generally observed in a poor condition.

To the north of the Vistra waterfront property (pump intake building), the shoreline appears to be cliffing from erosion next to the public beach (Figure 3.6).

To the west of the beach, Coleman Park is protected by a rock revetment (Figure 3.6), which was observed to be in a generally poor condition.

Figure 3.4: Photo of the shoreline protection adjacent to USCG and Harbor Dept.

Source: Mott MacDonald, 2024

Figure 3.5: Photo of the rock revetment protecting Coleman Park

Source: Mott MacDonald, 2024

3.1.2.7 Public beach

The public beach (Figure 3.6) is located on the north side of the Vistra waterfront property (pump intake building). The beach is well used by locals and tourists for recreational use and serves as a location to launch kayaks and paddle boards into the bay.

There is a much larger public beach (Morro Rock Beach), located to the north of Morro Rock.

Figure 3.6: Public beach at Morro Bay

Source: Mott MacDonald, 2024

3.1.2.8 Waterfront buildings and structures:

The Morro Bay waterfront is primarily used by restaurants, offering views over the Bay and Morro Rock. To the south of the beach lies the Vistra Waterfront Property and Pump Intake Building (Figure 3.9) associated with the Morro Bay Power Plant. To the south of the Vistra Waterfront Property lies the Morro Bay Oyster Company, and the nearby administrative buildings occupied by the U.S. Coast Guard (Figure 3.8) and Harbor Department (Figure 3.7). Waterfront buildings between the two T-Piers are primarily used by restaurants, fishing charters, local cruise and tour operators, and commercial fishing.

Figure 3.7: City of Morro Bay Harbor Dept.

Source: Mott MacDonald, 2024

Figure 3.8: USCG Surf Station

Source: Mott MacDonald, 2024

Figure 3.9: Vistra Pump Intake Waterfront Property

Source: Mott MacDonald, 2024

Figure 3.10: Power station pump intake

Source: Mott MacDonald, 2024

3.1.3 Environmental conditions

3.1.3.1 Tidal datums

Tidal datums at Morro Bay have been obtained from the neighboring Port San Luis Gauge Station (ID: 9412110) managed by National Oceanic and Atmospheric Administration (NOAA) as the difference in tidal levels at the study site and the gauge station is negligible for the purpose of this study. All water levels are in feet relative to mean lower-low water (MLLW) of the 1983-2001 tidal epoch.

Table 3.2: Tidal datums at the project location

Datum	Abbreviation	Elevation [ft MLLW]
Highest Astronomical Tide	HAT	7.10
Mean Higher High Water	MHHW	5.33
Mean High Water	MHW	4.62
Mean Sea Level	MSL	2.80
Mean Low Water	MLW	1.04
North American Vertical Datum of 1988	NAVD88	0.08
Mean Lower Low Water	MLLW	0.00
Lowest Astronomical Tide	LAT	-1.99

3.1.3.2 Currents

In lieu of accurate current records, current velocities were approximated in the navigation channel by recording the time needed for a semi-submersible float to pass a fixed distance of 100m (328ft) at peak ebb tides. Measurements were taken on a spring tide and repeated five times for each of the three locations marked in Figure 3.11.

Whilst the estimated current results should be seen as indicative only, the current speeds measured along the Morro Bay Channel were relatively high, reaching 1.9 knots near the South T-Pier (Location 3) and the narrow channel section between Morro Rock and the sand spit (Location 1). Current velocities near the North T-Pier (Location 2) were slightly lower, measuring 1.2 knots.

Figure 3.11 Current velocity measurement locations. (1 – Between Morro Rock and Sand Spit, 2 – North T-Pier, 3 – South T-Pier)

Sources: Maxar

3.1.3.3 Winds

Representative wind speeds at Morro Bay have been compiled by NOAA's National Data Buoy Center (NDBC), from the neighboring Port San Luis Station (ID: PSLC1) and Cal Poly Pier Station (ID: CPXC1). It was noted the local Morro Bay Station (ID: MBXC1) did not have any wind-related measurements available at the time of the study. The considered wind records were adjusted to a 60-minute average wind speed at an elevation of 32.8ft above site elevation.

Data for the wind stations suggest that wind speeds are generally less than 10 knots but may exceed 30 knots in storm conditions. The strongest winds usually blow landward from the West or Northwest directions.

3.1.3.4 Waves

Waves approaching Morro Bay are mainly comprised energetic swells originating from the Pacific Ocean. The existing U.S. Army Corps of Engineers (USACE) breakwaters provide good protection for Morro Bay and the navigation channel; however swells may occasionally pass through the channel opening and propagate upstream. Vessel access through the channel may be restricted by the USCG in times where the swell-tidal combination is unsafe for recreational vessels.

The inner reaches of the navigation channel are further protected by the sand spit and are less vulnerable to incoming waves.

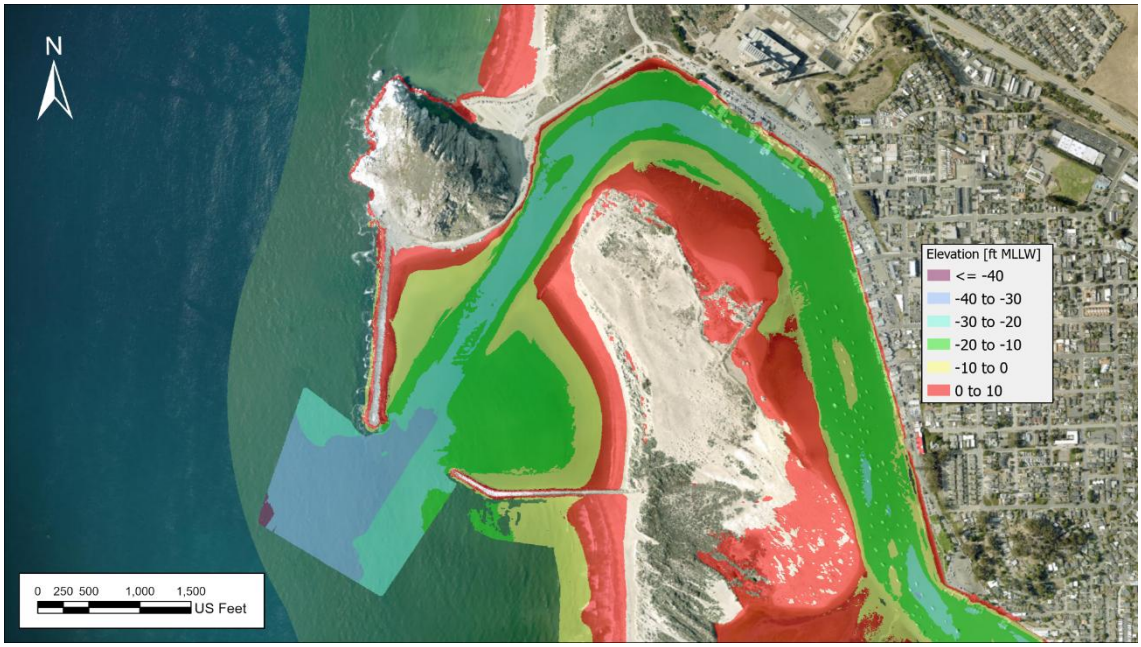
3.1.4 Bathymetry

Publicly available topographic and bathymetric datasets near the study site have been evaluated to support subsequent analysis and design processes. A basemap was created utilizing datasets listed in Table 3-3.

Table 3-3 – Topographic and bathymetric data sources

Dataset	Originator	Date
2024 Hydrographic Survey	USACE	Published in 2024.
2022 NOAA Topobathy Lidar DEM: Morro Bay, CA	NOAA	Data acquired in 2022.
2019 NOAA Topobathy Lidar: Morro Bay, CA	NOAA	Data acquired in 2019.
2018 FEMA Lidar: Region 9, CA	NOAA	Data acquired in 2018.
1929 – 2017 USGS CoNED Topobathy DEM (Compiled 2017): Central Coast of California	USGS	Published in 2018. Underlying topographic and bathymetric datasets from 1929-2017.

Figure 3.12: Morro Bay basemap. Numbers denote elevation in feet relative to the mean lower-low water (MLLW) tidal datum



Source: Maxar

3.1.5 Other site constraints

Potential constraints and obstructions near the project site that may interfere with the design process have been identified and summarized in Figure 3.13. The authorized depths of the Morro Bay Federal Navigation Channel (FNC) are summarized in Figure 3.13 and Table 3-4.

In addition, significant sand infilling was observed along the northeastern face of the sand spit. Water depths as shallow as 3 ft have been observed in parts of the FNC Channel and pose a vessel navigation hazard. Geotechnical, geological, and seismic constraints and hazards were also identified based on a desk study of previous studies and reports in vicinity of Morro Bay and have been summarized in the preliminary geotechnical report provided in Appendix C.

Figure 3.13 Summary of site constraints in Morro Bay, to be read in conjunction with Table 3-4.

Source: Maxar.

Table 3-4 – Morro Bay FNC authorized channel geometries

Identifier	Channel Section	Authorized Depth [ft]	Channel Width [ft]
A	Entrance Channel	30	350
B	Transition Channel	Varies from 16 – 30	350
C	Sand Trap	25	N/A
D	Main Channel	16	350
E	Navy Channel	16	350
F	Morro Channel	12	150

3.2 O&M facility infrastructure minimum functional requirements

This section provides an overview of the functional requirements used to develop O&M site plans. These requirements were developed through engineering experience from similar sites worldwide and through a series of interviews with MBWEA OSW.

3.2.1 Design vessels

Two (2) types of vessels were selected to support the O&M activities at the study site, namely:

- Service Operations Vessels (SOV)

- Crew Transfer Vessels (CTV).

SOVs typically remain offshore for extended periods of time (approximately two weeks) performing inspections and small repairs. Upon return to the O&M facility, they would typically be at berth for approximately 24 hours while being loaded with supplies before heading back to the MBWEA OSW lease areas. CTVs would shuttle personnel and minor supplies from the O&M facility to the lease area on a daily basis.

Due to this schedule, the facility would be expected to provide one dedicated SOV berth shared between developers, and a second transient mixed use SOV berth which would be used less frequently. For rare occasions where a third SOV is required at the site, this would use bow and stern mooring buoys in the channel or bay entrance.

Table 3-5 summarizes the vessel functions and dimensions to be used for design purposes, based on past project experience and developer feedback.

Table 3-5 – Design vessels

	Service Operations Vessel (SOV)	Crew Transfer Vessel (CTV)
Purpose	Supports multi-day O&M trips, provides accommodation for wind farm workers, and assists with servicing and repairing wind turbines.	Vessels used to transport and shuttle wind farm technicians and other personnel out to sites daily. No live aboard accommodation.
Length	260 – 300 feet	65 – 90 feet
Beam	65 – 75 feet	22 – 30 feet
Draft	18 – 25 feet	5 – 10 feet
Number	3 (1 per developer)	3 (1 per developer)
Speed Limit	10 knots	10 knots

Note, Service Accommodation Transfer Vessels have been listed within past studies such as REACH (Mott MacDonald, 2022). The developers interviewed for this study indicated that Service Accommodation Transfer Vessels did not form part of their planned O&M vessel mix for the Morro Bay Wind Energy Area.

3.2.2 Berthing and navigation

Table 3-6 outlines the requirements for vessel access and general berth geometry for safe mooring of vessels. These requirements are based on the anticipated vessel types and dimensions entering the waterfront as listed above and may be subject to future revisions.

Table 3-6 – Berthing and navigation requirements

Parameter	Value
Berth Length	CTV: 100ft (finger pier) or 120ft (linear berthing) SOV: 400ft (linear berthing) per SOV or 150-200ft (mooring dolphins)
Berth Pocket Width (CTV Only)	Single Slip: 35ft Double Slip: 70ft
Berth Draft	CTV: 12ft at LAT SOV: 28ft at LAT
Navigation Channel Width	300ft minimum
Navigation Channel Depth	30ft at MLLW + overdredge
Turning Basin Diameter	600ft minimum

3.2.3 Marine facility

This section addresses the marine infrastructure necessary to support O&M activities beyond vessel access, maneuvering, and berthing. It includes definitions of the various operational zones, followed by the functional requirements for both waterfront and upland facilities.

3.2.3.1 Operation area definitions

To support efficient SOV operations at the O&M site, the quayside area is organized into three spatial components, each serving a specific role in operation logistics:

- **Quayside Staging Apron**: The immediate interface between the vessel and shore, used for direct loadout activities and crew transfer.
- **Intermediate Staging Zone**: Located near but not necessarily on the quay, this area provides buffer for overflow staging and temporary container holding.
- **Upland Yard**: Positioned further inland, the upland yard supports long-term inventory storage and operational logistics beyond the immediate vessel loading operations.

Detailed descriptions for each component are shown in Table 3-7 below.

Table 3-7 – Operation zones definitions

Operation Zones	Quayside Staging Apron	Intermediate Staging Zone	Upland Yard
Description	Area for direct SOV operations and transfers (personnel and inventory/containers)	Buffer area between the quay and upland yard	Dedicated space for long-term inventory/container storage, and space for additional buildings supporting O&M operations
Location	On quay	Near quay but not required to be on the quay itself	Uplands
Features	• Secure site • Truck lane • Forklift maneuver area • Container handling and staging zone • Shared between developers through scheduling.	• Secure site • Short-term container staging • Pre/Post vessel berthing operation zones	• Long-term container storage • Office space • Warehouses and workshops • Crew parking
Minimum Size	60ft width. Min 0.5 aces	0.5 acre	3+ acres per developer

3.2.3.2 Quayside and waterfront facilities

This section defines the assumed requirements and characteristics for quayside and waterfront facilities to support O&M operations.

Table 3-8 – Moorage requirements and waterfront facilities

Parameter	Value
Wharf Width	Minimum 60 ft for dedicated quay
Over-water Construction	No multi-story buildings
Wharf Bearing Capacity	1,000 psf (2,000 psf for jib crane foundation)
Lifting Equipment	1 jib crane per SOV berth supporting quayside operations. 1 jib crane at CTV berth for vessel maintenance reaching the loading zone of vessel
Quayside Area	Quayside staging apron and intermediate staging zone shared between developers. Dedicated quay length for 1 SOV 1 transient mixed-use berth
Additional Moorage	Moorage for 1 SOV using mooring dolphins and/or mooring buoys
Fueling & Fuel Berth	Fueling not considered in this study due to uncertainties in fueling type (e.g., diesel or electrification at OSW lease site)
Helicopter Facilities / Helipads	Not required
Boat Lift	1 mixed-use boat lift capable of lifting CTVs

3.2.3.3 Upland facilities

This subsection covers the landside infrastructure beyond the immediate waterfront essential to O&M operations. Upland facilities can be located further inland, away from the bay. This section assumes the upland facilities for each OSW developer are sited together to gain potential efficiencies in planning and cost.

Table 3-9 – Upland facilities

Parameter	Value
Access Road	Shared access road between developers
Access Road Width	Minimum 30ft to accommodate 2 lanes of traffic
Total Upland Area	10 acres (3 acres per developer + access roads)
Warehouse	60,000 SF (20,000 SF per developer)
Office Facility	30,000 SF (10,000 SF per developer)

3.3 Study assumptions & exclusions

This study was based on the following assumptions:

- Marine infrastructure upgrades were developed to a conceptual, pre-feasibility assessment level of detail.
- The study was based upon prior project experience, publicly available information, engagement with offshore wind developers, information collected during the site visit on November 21, 2024, and project participants; it is not intended to be comprehensive.

- Dredging assessments were conducted at a conceptual level only; dredge volumes are estimated based on representative dredge prisms and side slopes. No detailed ground investigations were carried out to characterize soil conditions.
- Waterfront infrastructure conceptual designs were not developed with detailed engineering calculations. Conceptual layouts were developed based on review of site conditions and assumed loading criteria.
- It is assumed that upland area is available to support an upland yard for all layout options under consideration.
- Helicopter operations were assumed to be handled by neighboring airports.
- The following items were excluded from the study:
  - Wave and vessel mooring modeling
  - Detailed sedimentation and circulation modeling
  - Analysis of navigation channel sedimentation rates
  - Detailed geotechnical or structural analysis
  - Detailed construction schedules
  - Phased construction options and considerations
  - Skilled labor workforce estimates
  - Fueling studies:
    - There are currently too many uncertainties to assess requirement for fueling at Morro Bay.
    - If marine fuel is used by SOVs, the fuel type, vessel tank capacity and fueling frequency would need to be understood. Fueling methodology would also need to be understood from developers; ie, fueling barges or a shoreside fueling facility.
    - If the OSW developer decides to use a hybrid or electrified fleet, a recharge station might be provided at the offshore wind lease area. Uncertainties remain over potential battery capacity, range, and requirements to recharge in port.

3.3.1 Guidelines

The following guidelines, and standards will be referenced throughout the study:

- Planning and Design Guidelines for Small Craft Harbors (ASCE, 2020)
- Harbor Approach Channels Design Guidelines (PIANC, 2014)
- Hydraulic Design of Deep-Draft Navigation Projects (USACE, 2006)
- Port Designer's Handbook, 3rd Edition (Theoresen, 2014)

4 O&M facility infrastructure concept design

As described earlier, MBWEA is expected to host three OSW developers. The conceptual design efforts for an O&M facility at Morro Bay were initially focused on the development of a single site at Morro Bay shared by all three OSW developers. However, an additional scenario was later added, whereby the O&M facility at Morro Bay would only host one OSW developer. In this case, the second developer would be located at San Luis Obispo Bay and the third developer assumed to be located out of the County limits.

4.1 Gap assessment

This section intends to identify the infrastructure gaps that exist at the Morro Bay North and South T-Piers for the development of the Offshore Wind O&M facility. This gap assessment is primarily based on observations made during a site visit conducted in November 2024. Additional information such as aerial pictures, existing condition assessments and other available supporting documents has been used to supplement information to support the assessment.

Table 4-1 below summarizes the functional requirements for the proposed O&M facility, the existing pier characteristics, and the upgrades that would be required to meet the O&M facility infrastructure functional requirements.

Table 4-1 – Functional requirements and upgrades to support an O&M facility

Functional Requirements	Existing Pier Characteristics	Upgrades Needed	Commentary
Berth length CTV: 100ft (finger pier[1]) or 120ft (linear berthing) SOV: 400ft (linear berthing) or mooring dolphins	**Existing North T-Pier** Length: ~400ft	Finger pier to accommodate CTV's at a lower elevation than the pier deck	The existing pier and finger pier would need to be demolished to build a new pier along with finger piers.
Navigation Channel Channel width: 300ft minimum Channel depth: 30ft at MLLW + overdredge Turning basin dia.: 600ft minimum	**Navigation channel** Channel width: >300ft Channel depth: -15ft MLLW Basin dia.: <600ft	Dredging would be needed	Dredging would be needed to get the required navigation channel depth and to widen the turning basin.
Access road Road width: 30ft minimum (2 lanes traffic)	Access road width: ~26ft	Widening of access road	New pier access would need to have a minimum width of 30ft to accommodate 2 traffic lanes; therefore new pier with adequate access road width would need to be built.

[1] Pier arrangement with narrow, shorter docks extending perpendicularly from a main, larger dock to create individual boat slips.

Functional Requirements	Existing Pier Characteristics	Upgrades Needed	Commentary
Wharf geometry Width: minimum of 60ft	Existing T-Pier Quayside Width: ~23ft	T-piers ideally widened	New T-Pier should be wider than existing, however developer may accept narrower width for cost savings.
Wharf live load capacity 1000psf (2000 psf for crane)	Existing capacity: 12,000 lbs.	New pier able to resist the minimum live load capacity	Existing timber pier does not have the required capacity. New pier would need to be built with adequate capacity.
Cranes 1 jib crane[2] per SOV berth 1 jib crane per CTV berth	No current crane operation	1 jib crane per SOV 1 jib crane per CTV	The new pier would need to be able to support both SOV and CTV crane operation. Jib cranes would be required to transfer equipment to/from pier to vessel.
Offices Facility: 30,000 SF (10,000 per OSW developer)	Pier head area: < 30, 000 SF	-	Office space assumed to be situated in upland yard.
Quayside Area: 0.5-1 acre Length: to accommodate 2 SOV's	Existing quayside (North Pier) Area: ~0.27 acre Length: ~440ft	-	The new pier would need to meet the minimum quayside area requirement.
Additional moorage Use of mooring dolphins[3] And/ or mooring buoys	No mooring dolphins No mooring buoys No fenders	Mooring dolphins, buoys, and fenders	Dolphins may not be required if the new pier has sufficient berth area.
Boat Lift 1 boat lift for CTV's	No current boat lift on site	New boat lift station	Boat lift capable of lifting the vessels.
Fueling	Existing nearby fueling facility unsuitable for SOVs	-	Fueling not considered at this stage of development due to uncertainties in fueling methods (Diesel vs electrification from OSW lease area).

4.2 Concept design for a facility shared by three developers

4.2.1 List of concept designs

The study focused on the North T-Pier as the primary pier for redevelopment. North T-Pier was chosen because it is positioned closer to the entrance channel, is less constrained than the South T-Pier, and presents greater potential for utilization of existing industrial land use.

A list of concept designs was then developed, considering different variables that could be considered in design; these include but are not limited to:

- Location of Harbor Department and USCG

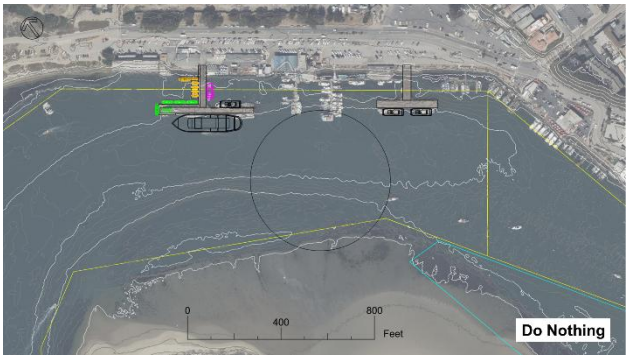
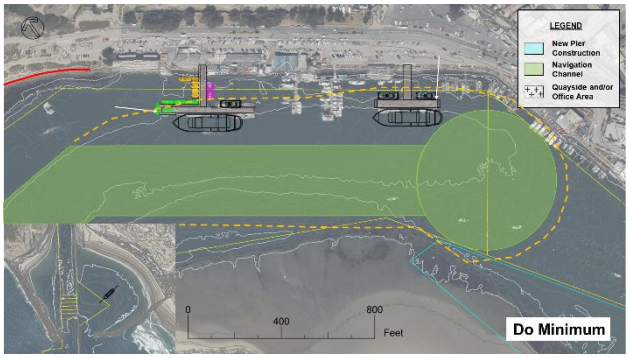
[2] Freestanding/base-mounted crane with a horizontal boom (jib) supporting a movable hoist to move loads.

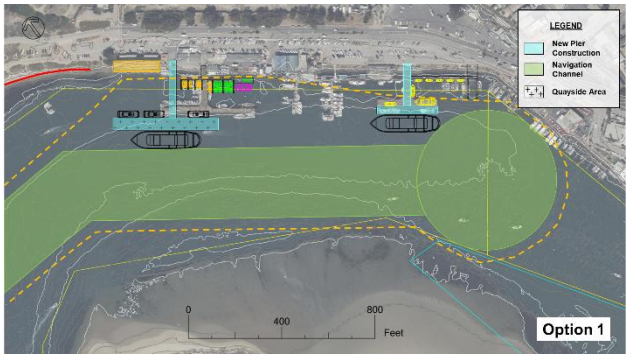
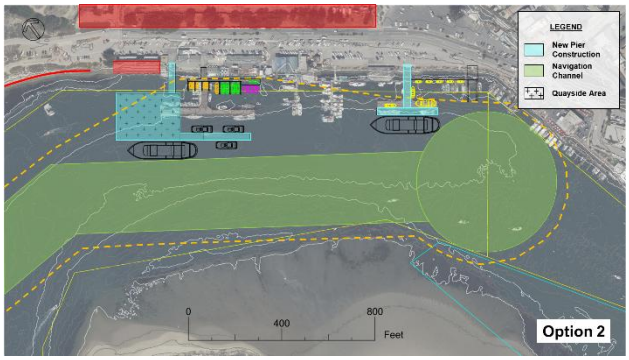
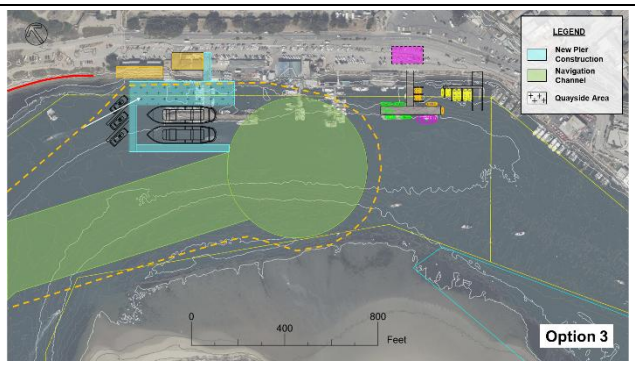
[3] Standalone group of piles supporting a concrete block and bollard on top to secure mooring lines connected to a vessel.

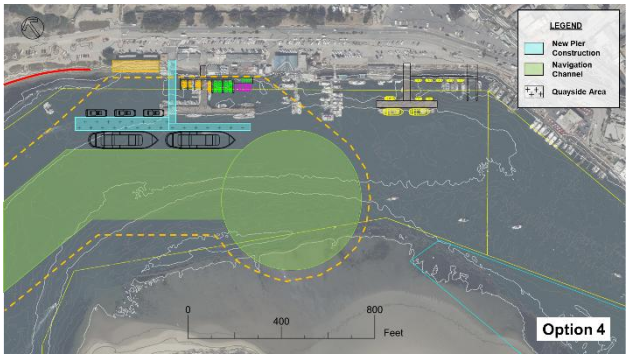
- Leasing or purchase of Vistra waterfront property:
  - The waterfront building was once an intake pump house for the power station and is currently understood to be vacant. Successful redevelopment of this land would provide good access to waterfront facilities with minimal disruption to local businesses.
  - Note that redevelopment of this property would require liaison and agreement with the Vistra property and may be subject to permitting challenges. While Vistra have been contacted as part of this study, it is noted that formal engagement with Vistra has not been undertaken, nor have any agreements been formed.

Brief descriptions of all concept designs considered are provided in Table 4.2.

Table 4.2: List of concept designs

Concept Design	Conceptual Layout	Description
Do Nothing		• Existing layout of Morro Bay without modifications. • The do-nothing alternative is typically added for comparative purposes only. • The T-Piers in current condition and configuration do not satisfy the minimum functional requirements for an O&M facility. • **Option unsuitable for further development.**
Do Minimum		• Existing layout of Morro Bay with structural modifications. • Due to age and structural conditions, existing piers cannot be reasonably modified for O&M purposes. • Further, existing length of South T-Pier would be too short for SOV vessels. • **Option unsuitable for further development.**

Concept Design	Conceptual Layout	Description
Option 1		• Reconstruction of both T-Piers to satisfy O&M operations. • North T-Pier reconstructed with longer, wider berth, suitable for SOVs and CTVs. • Vistra property leased and converted into O&M space. • USCG and Harbor Dept. vessels located on redeveloped finger piers. • South T-Pier reconstructed in current form, to withstand SOV berthing loads, and used as a public mixed-use berth. It's noted that length may be less than ideal for SOVs.
Option 2		• Reconstruction of both piers to satisfy O&M operations. • North Pier extended to include intermediate staging zone, facilities or office space, assuming Vistra property is not leased. • USCG and Habor Department located on redeveloped finger piers. • South T-Pier reconstructed in current form, to withstand SOV berthing loads, and used as a public mixed-use berth. It's noted that length may be less than ideal for SOVs.
Option 3		• Reconstruction of North T-Pier in U-shape to accommodate all O&M vessels. • Office space location dependent on Vistra property lease/purchase. • South T-Pier repaired in keeping with original. USCG and Harbor Department to be relocated to South T-Pier. • All O&M operations on North Pier so a reduced dredge footprint possible.

Concept Design	Conceptual Layout	Description
Option 4		• Reconstruction of North T-Pier with a longer berthing face to accommodate all O&M vessels. • Vistra property leased/purchased and converted into office space. • USCG and Harbor Department located on new finger piers near the North T-Pier. • South T-Pier repaired in keeping with original and open to public use. • All O&M operations on North Pier so a reduced dredge footprint possible.

4.2.2 Least constrained concept design

From the list of concepts above, the Do Nothing and the Do Minimum did not meet the minimum functional requirements of an O&M facility and were not be considered for further development.

Between the remaining Options 1 to 4, Option 4 was selected by the Project Team for further evaluation and refinement in subsequent sections of the report; the justification for selection is detailed below:

- Option 4 featured the lowest construction and dredging footprint compared to other options that satisfied the minimum functional requirements of an O&M facility.
- With the O&M operations constrained to the North T-Pier, local impact to the town would be lessened, compared to Options 1.
- The South T-Pier would remain fully open to public and would not face disruption due to construction or operation of O&M facilities.
- The facility would resemble the existing T-Piers to help maintain local character and fabric.
- The majority of overwater construction and seabed impacts are located from the shoreline, therefore minimizing impacts to the eelgrass habitat in the shallow waters.
- Should it be required, the south side of the North T-pier could potentially open to public co-use as a mixed-use berth in normal operational conditions. It is however noted there will be times when two SOV's would be required at the facility simultaneously; during such times it is expected that public use of the T-Pier would be temporarily restricted for safety.
- It was noted that the location of finger piers to service USCG and Harbor Dept. in Option 4 would be unacceptable in its current configuration due to proximity to the fishing wharf and resultant negative impact on fishing activities; this would be later resolved in Concept Design Development (Section 4.2.4).

4.2.3 Strategic development scenarios

Two strategic development scenarios were then developed for Option 4, comprising identical marine infrastructure but covering different property acquisition and leasing outcomes. Conceptual sketches for the scenarios are provided in and respectively.

- **Option 4A** – Development of O&M facility with acquisition of the Vistra Waterfront Property and conversion to an Intermediate Staging Zone. USCG and Harbor Dept. would remain in place with access to upgraded finger piers.
- **Option 4B** – Development of O&M facility without acquisition of the Vistra Waterfront Property. An Intermediate Staging Zone would instead be constructed within the "Triangle Lot," north of the Morro Bay Maritime Museum. USCG and Harbor Dept. would remain in place with access to upgraded finger piers.

4.2.4 Concept design development

The concept designs were then further developed and refined in line with the two strategic development scenarios previously described. Figure 4.1 and Figure 4.2 illustrate the conceptual plans for Option 4A and Option 4B, respectively.

Both options would be expected to comprise the same dredging footprint and marine infrastructure:

- The pier width was sized as 60ft to provide suitable width for a truck lane, maneuvering space for forklifts, cargo staging, with a no-vehicle zone on the berthing faces of the pier structure.

- The northern extent of the North T-Pier would be dedicated for O&M use and access would be secure with a gated entry. The primary SOV berth would be located on the outer edge, with the CTVs moored linearly on the inside edge of the T-Pier. The CTVs would be accessed via a gangway ramp and floating pontoons to suit the comparatively lower freeboard of the CTVs. It is envisioned small jib cranes could be used from the pier to lift lightweight materials and tools to the CTVs.
- The southern side of the T-Pier could potentially be open for public use, subject to agreement with O&M operators. It is however noted there will be times when two SOVs would require moorage simultaneously at the facility; during such times it is assumed that public use of the T-Pier would be temporarily prevented for public safety.
- The existing USCG shed and gated facility has been moved from the north side of the T-Pier to the South side. The spatial extents of this compound would be no less than their existing compound and would be secure from public access as per the existing arrangement. USCG would have access to their vessels via a private gangway ramp and floating pontoons accessed from within the gated compound. It is noted there may be concerns that USCG would be situated a greater distance from the entrance to the bay than the current arrangement which may slightly hinder emergency response times.
- The Harbor Dept. would have access to dedicated floating finger pontons accessed from the shoreline in a similar arrangement to existing.
- The fishing wharf would be left open for fishing operations as per the existing arrangement.
- Morro Bay Oyster Company, Dockside, and Morro Bay Fish Company, may be impacted these concepts. Full assessment of impacts would be required at a later stage, and mitigations or relocation addressed before a development could progress.
- A boatlift could be included to the south of the waterfront. This would be sized for CTV vessels and would be open to public use. The location shown is indicative and would be subject to the wider Morro Bay Waterfront Masterplan. Any moorage slips impacted by the boatlift location would be relocated to avoid negative impacts.
- As per the minimum functional requirements, a third SOV may be required to reside in Morro Bay in abnormal scenarios. As such it is assumed that this third vessel could be located on dual mooring buoys (bow and stern) within the mouth of the bay.

Both concept design variations were assumed to include the following structural components, which were conceptually sized for the purpose of drawings and cost estimates in Section 4.4:

- Reinforced Concrete deck slab
- Reinforced concrete beams
- Reinforced concrete pile cap beams
- Concrete filled steel pipe piles
- Steel pipe piles
- Steel dolphin deck
- New floating pontoons for USCG and Harbor Dept. and gangways for access.

A navigation and dredging assessment was undertaken to support the design development; this is detailed in Section 4.3.

Both conceptual design variations feature a turning basin that extends beyond the current limits of the FNC; although it is important to note that the basin dimensions were based on conservative preliminary design guidance. This guidance specifies a diameter equal to at least twice the length of the largest vessel which may be overly conservative for a vessel as maneuverable as an SOV. As described in Section 4.3, this size could potentially be reduced to

1½ times the vessel length with validation through ship simulation modelling at later design phases.

The difference between Option 4A and Option 4B lies within the upland layout.

- Option 4A assumed that a leasing or purchase agreement could be formed with Vistra for the waterfront property. It is envisioned that this land be used for O&M operations for an Intermediate Staging Zone. This would likely be a secure area, gated from public access.
- Option 4B assumes that a leasing or land purchase agreement is not made with Vistra. Instead, the Triangle Lot would be converted to a secure compound for use as an Intermediate Staging Zone.

Figure 4.1: Morro Bay Option 4A Conceptual Plan

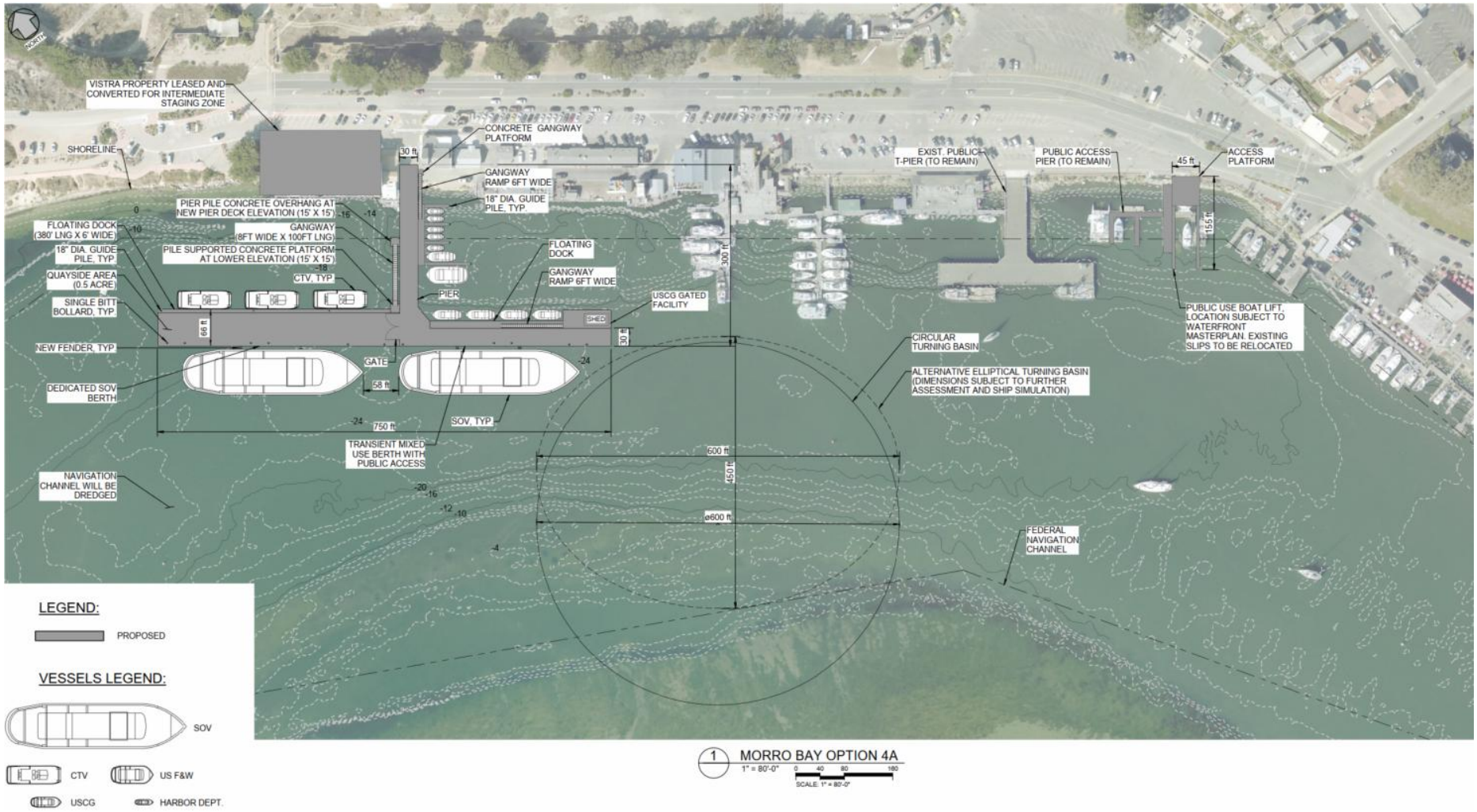
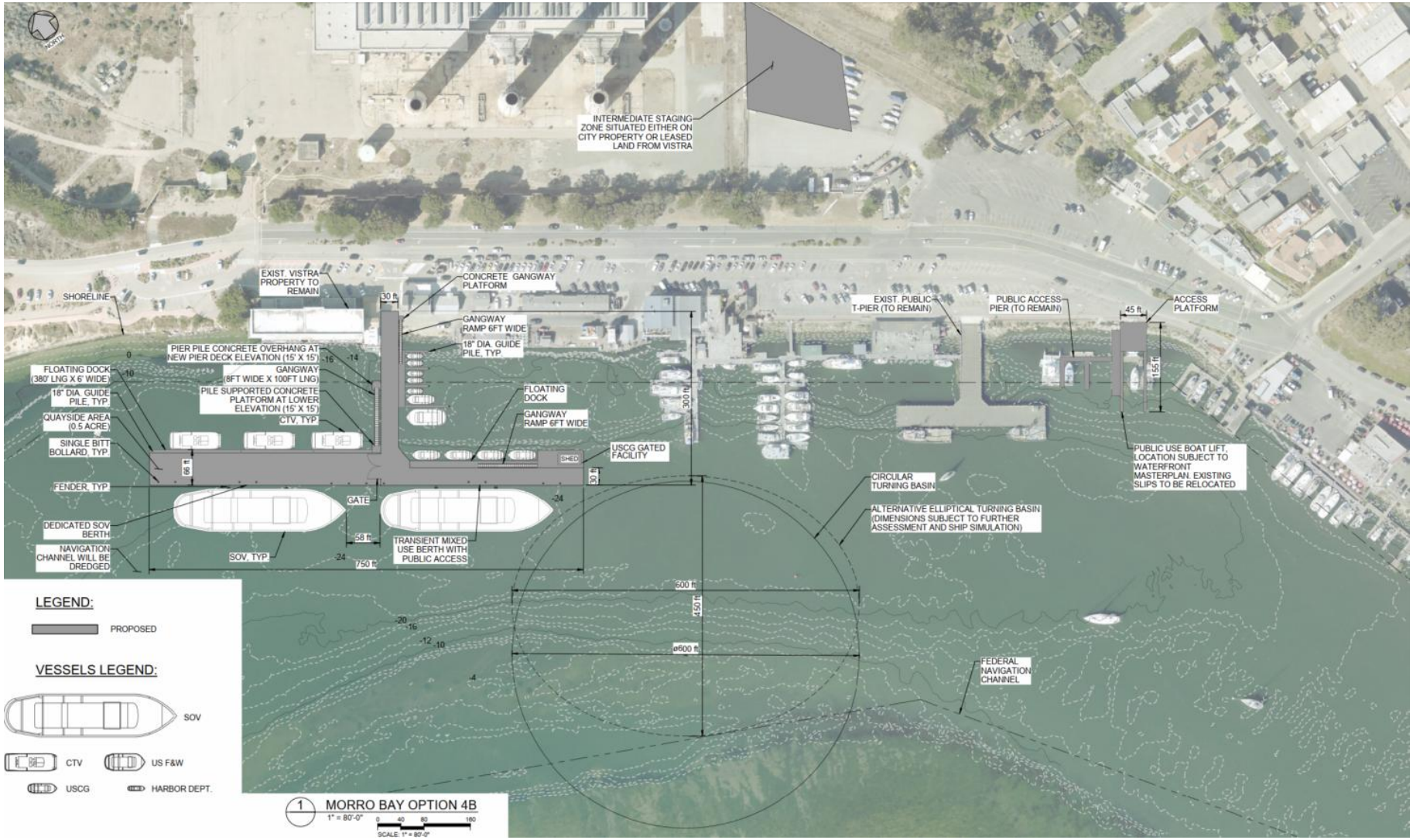


Figure 4.2: Morro Bay Option 4B Conceptual Plan



4.3 Navigation and dredging assessment

A navigation and dredging assessment was performed for Morro Bay to support the conceptual O&M Facility Infrastructure Design. The key objective of the assessment was to develop dredging alternatives incorporating the following items:

- Dredging methodology and anticipated equipment requirements
- Potential dredged material placement locations
- Dredge volumes
- Dredge cost estimates

4.3.1 Background

The navigation channel at Morro Bay once served as an important waterway for the harbor to export dairy and ranch products in the 19th century, with the original entrance of the natural channel located east of Morro Rock. Between 1933 to 1936 a causeway was built to connect Morro Rock and the mainland, and the entrance was further modified during World War II to construct two additional breakwaters to provide enhanced protection for Navy patrol boats (USACE, 2023). The navigation channel, however, has experienced significant navigation problems since then due to a combination of exposure to storm wave conditions in the Pacific and continuous sedimentation, leading to numerous deaths and injuries over several decades. The entrance channel was finally deepened and expanded in 1995-1996 to reduce wave breaking and improve safety for vessels entering and leaving the harbor, alongside the dredging of an additional sand trap within the harbor entrance (Thompson, Bottin & Shak, 2002).

As pointed out by Alfving (2019), majority of sedimentation occurring along the shores of Morro Bay are likely attributed to nearby seasonal offshore and littoral origins due to a convergence of sedimentation flow at Morro Rock, therefore effectively making the deeper navigation channel a sediment sink.

4.3.2 Maintenance dredging history and methodology

The USACE oversees the maintenance dredging of the Morro Bay FNC. The entrance channel, transition channel, sand trap, main channel, and parts of the navy channel are regularly dredged by the USACE to maintain its authorized depth for safe passage to the back bay, and approximately 150,000 to 200,000 cubic yards (CY) of sediment are removed on an annual basis. Dredging of the inner channels (Navy Channel & Morro Channel) are often considered as a separate operation and dredged at a much lower frequency by a specialist dredge contractor, with the last dredging operation conducted in 2016-2017 to remove approximately 240,000 CY of sediment (City of Morro Bay, 2016).

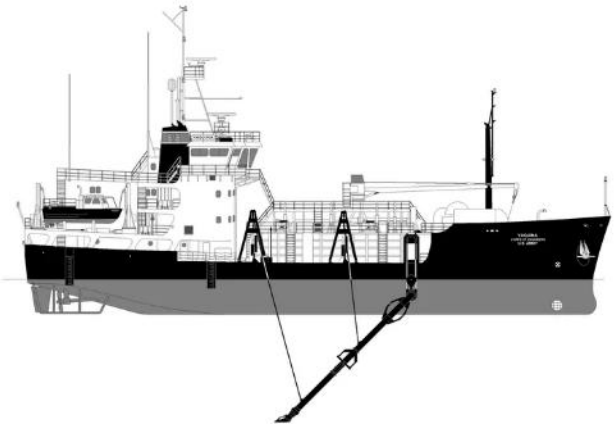
Due to the loose sandy sediment type and high volumes, hydraulic dredging is likely to be the most efficient method. The two main types of dredgers historically used in Morro Bay are:

- **Trailing Suction Hopper Dredger (TSHD):** A self-propelled vessel equipped with suction pipes on either side that descend to the seafloor and vacuum up sediment upon trailing. Sediment that has been removed from the seafloor is temporarily stored onboard and released once the vessel arrives at a designated placement site, by dumping through the split bottom of the hull, pumping, or rainbowing. Recent dredging operations have been undertaken by a 200ft TSHD vessel owned by USACE and named the U.S. Army Vessel (USAV) Yaquina (Figure 4.3).

- **Cutter Suction Dredger (CSD)**: A barge equipped with a cutterhead or auger that loosens the sediment and subsequently removes it via sucking up and pumping the sediment-water slurry to the vessel. CSD's rarely have slurry storage on board but instead use powerful internal pumps to discharge the slurry along a pipeline to a nearby onshore placement site, typically on a beach. Alternatively, the dredger can pump the slurry into a hopper barge moored alongside for material placement further offshore. In comparison to a TSHD, CSDs offer greater maneuverability in confined locations and can work in shallower water and where shoaling is an issue. CSD's that have previously been used to dredge in the Morro Bay back bay include the 200ft H.R. Morris and the La Encina.

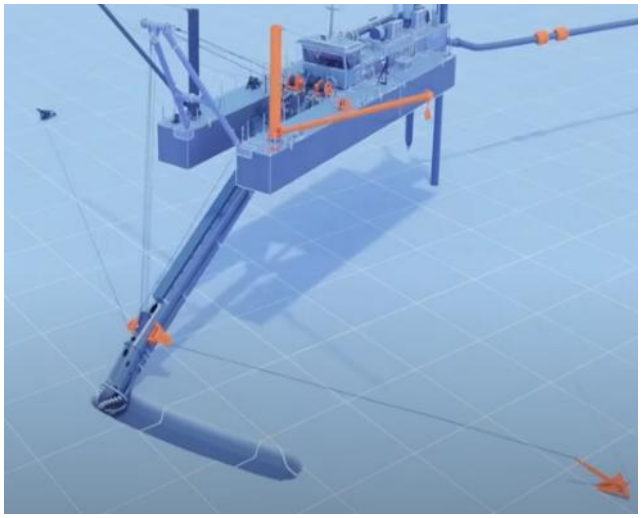
TSHD and CSD have historically handled total dredge volumes up to 580,000 CY and 660,000 CY in the 1998 and 2001-2002 maintenance dredging campaigns (USACE, 2013). The average dredge production rates for the two methods were similar (6,000 CY/day) but varied by operation, depending on the barge and crew composition and the environmental conditions where the dredging operation took place.

Figure 4.3: Schematic a Trailing Hopper Suction Dredger (USAV Yaquina)



Source: Marine Traffic

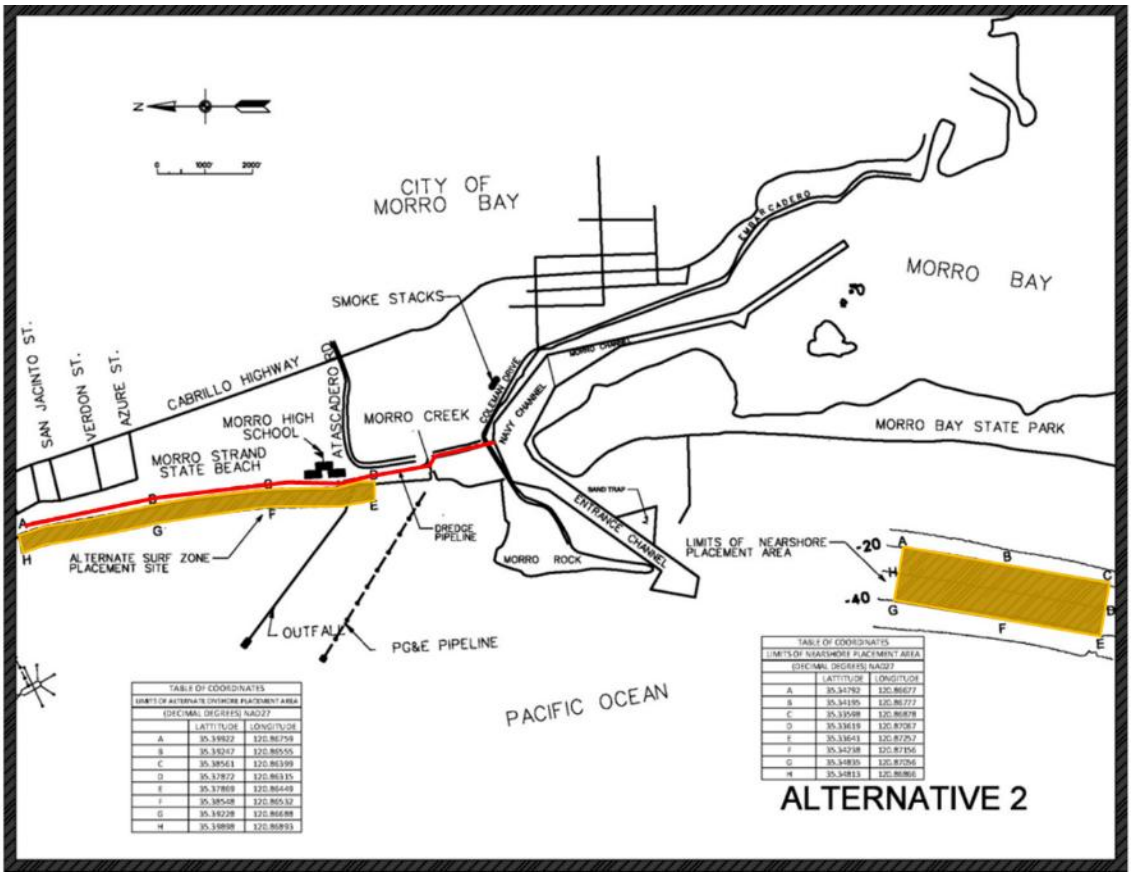
Figure 4.4: Example of a Cutter Section Dredger



Source: Damen, 2018

The selection of dredge platforms has historically been determined by the areas of the FNC being dredged. A TSHD is typically employed in the entrance channel due to its greater depth and straight alignment, which reduces the need for turning maneuvers. A CSD is commonly used in the shallower waters of the inner channels. Dredged material is usually placed in the nearshore area off the Morro Bay State Park sand spit and in the surf zone at Morro Strand State Beach for the two dredge platforms, respectively.

Figure 4.5: Dredge material placement sites (USACE, 2013). Orange boxes indicate dredge placement pipes. Red line indicates temporary dredge pipeline.



4.3.3 Preliminary dredging assessment

Given the USACE has undertaken dredging using TSHDs and CSDs in the past, they are both considered technically feasible options and are discussed in more detail in subsequent sections below. Impacts due to the capital dredging for this study are likely to be significant and therefore a full dredging assessment would be required to confirm an agreed methodology and material placement site. The assessment could evaluate beneficial reuse and would be subject to sediment transport modeling, environmental studies, and discussions with USACE, the City of Morro Bay, and key stakeholders.

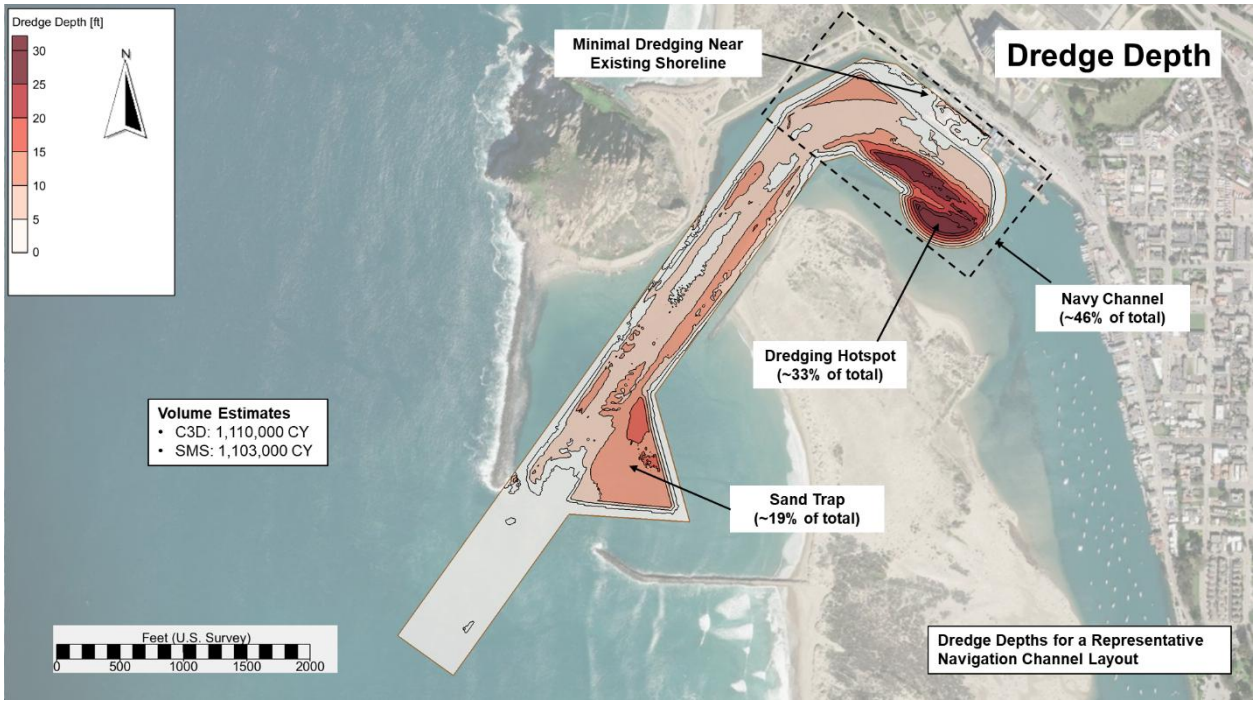
4.3.3.1 Dredge volumes

Annual dredging operations conducted by the USACE have historically maintained a navigable depth of approximately 20 to 25 ft in the channels leading up to the waterfront. Significant dredging is therefore expected to deepen the channels to 30 ft below MLLW for improved navigability and safe operation of an SOV at the newly constructed T-Pier. It is also assumed that the existing sand trap would be deepened to 30 ft below MLLW simultaneously to keep its purpose and reduce sedimentation rates in the main channels.

Based on bathymetry data, and the assumption of a 4H:1V stable sediment slope, the total dredge volume was estimated to be 1,110,000 CY for a representative navigation channel layout. Approximately half of the material would result from dredging at the entrance, transition,

main channels, and sand trap, with the remaining half coming from the Navy Channel where the turning basin is placed. Dredging near the existing shoreline is expected to be minimal.

Figure 4.6: Dredging depths in feet for a representative navigation channel layout at Morro Bay



4.3.3.2 Environmental considerations

Morro Bay is home to several threatened & endangered species, most notably the Western Snowy Plover and Southern Sea Otter, and is an active eelgrass habitat (USACE, 2013). Capital dredging works at Morro Bay may temporarily affect these habitats and present a permitting challenge. It is assumed that dredging would occur from mid-September through late February (outside the breeding seasons) to minimize impact on the species above. Due to the high volume of dredge material, it is likely that the dredging operation would either need to span multiple dredge seasons, or use additional dredgers to increase productivity.

It is also noted that dredging could result in positive environmental and safety benefits. A deeper channel would result in waves of lower height propagating through the harbor entrance improving navigability and safety for vessels. Beneficial reuse of dredged material could have significant benefits too; previous dredging campaigns that deposited sand at Morro Strand State Beach were shown to provide and protect nesting habitats for Western Snowy Plovers and improve shoreline protection through better beach response in storm events.

See Appendix B for further information.

4.3.3.3 Placement alternatives

Based on past operations in Morro Bay, two dredging placement methodologies could be used, subject to further assessment:

- Nearshore Placement
- Beach Placement

Beach placement

Significant dredging would need to be undertaken in the Navy Channel; as such the use of CSD represents a viable option capable of removing large amounts of sediment, followed by placement on the beach as a means of beach nourishment. Reusing dredged sediment on the beach replenishes the sediment lost due to tide and wave actions and may help alleviate erosion and protect nesting habitat for the federally threatened Western Snowy Plover population along the shoreline.

It should be noted that the placement of dredged material on a public beach may lead to potential public health and safety questions. Whilst no issues are expected at this stage, sediment sampling would need to be performed in the design stage to comply with regulations, confirm material suitability and to test for potential contamination. Agreement on the dredging and sediment placement plans would require engagement with the City of Morro Bay and other key stakeholders to address public safety concerns, and potential impacts of the operation to businesses and recreational use.

While the beach capacity is currently unknown, the volume of capital dredging required exceeds that previously placed at Morro Strand State Beach. As such, there may be a requirement to also place dredge material nearshore to Morro Bay State Park.

Nearshore placement

Nearshore placement of dredged sediment could be undertaken using an additional dredger such as a TSHD or CSD-barge spread, the choice of which depends on the detailed dredging assessment conducted at a later phase.

4.3.3.4 Other dredging considerations

Some other considerations regarding the dredging operation are discussed as follows:

- **Maintenance dredging**: Regular maintenance dredging in the back bay region may be required if significant sedimentation is observed in the absence of coastal protection measures. As pointed out in Section 3.1, the northeastern face of the sand spit currently experiences shoaling as sand migrates continuously into the navigation channel and poses a potential navigation hazard for deep draft vessels.
- **Geotechnical conditions**: Previous USACE dredging operations do not seem to have encountered rocky material or hard substrate. According to the Geo Hazard and Resources report by City of Morro Bay, depth to bedrock is approximately 70 ft below ground surface which was observed from multiple boreholes in the vicinity of the site. Nevertheless, a detailed geotechnical investigation is needed to characterize subsurface geological conditions and confirm feasibility of dredging operations listed above. Further Geotechnical information can be found in Appendix C.
- **Training wall**: A training wall is an underwater structure built to guide and stabilize channel flow such that the amount of sedimentation in the channel is controlled while ensuring neighboring regions do not suffer from unintentional shoreline erosion. Given the significant amount of dredging expected near the sand spit, a training wall may be required as well as other coastal measures to help direct current flow and maintain navigable depth for SOV access. This would be subject to further assessment should the project progress.
- **Impact on USCG**: By deepening the channel and reducing wave heights, the mission of the USCG could possibly change from a surf station to a security station. USCG surf station is a Coast Guard small-boat station formally designated for locations where wave (surf) conditions exceed 8 feet for at least 36 days per year, and typically feature 50-foot vessels. USCG security station is a Coast Guard unit focused on providing maritime security and may

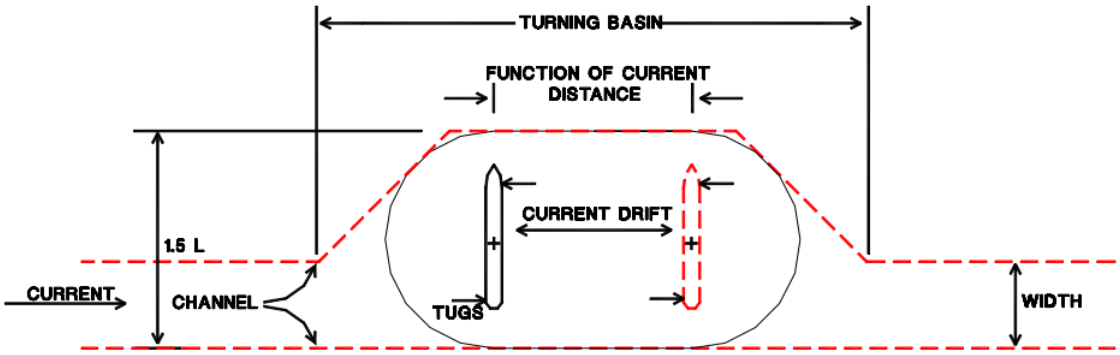
feature larger 87-foot Marine Protector Class vessels. Should this happen, there may be motivation to initiate further changes to the T-Pier to service larger USCG vessels, such as Marine Protector-Class patrol vessels (87 ft) which would be of similar size to the CTV vessels. The impact of this change on the necessary office space and upland yard is currently unknown.

4.3.3.5 Turning basin

Current dredging volumes were calculated under a conservative design assumption of a turning basin with diameter twice the length of a SOV. While suitable for predesign purposes, this configuration has the turning basin extending beyond the existing FNC and encroaches into the shoal adjacent to the sand spit, thereby increasing the dredge volume.

If design work were to be carried forward, the designer would be expected to employ ship simulation to reduce the turning basin diameter; USACE provides an alternative elliptical-shaped turning basin aligned with prevailing currents with the transverse axis being 1.5 times the SOV length, as shown in Figure 4.7. By configurating the turning basin as such, the longitudinal axis would then be able to account for current drifts during turning maneuvers, while the dimensions along the transverse axis can be minimized to reduce dredge volumes and costs, the exact dimensions of which would need to be confirmed through a ship simulator in later design stages. A turning basin that is aligned with the natural channel geometry may also see less maintenance dredging in the long term due to reduced flow disruption and sedimentation, as well as a reduced potential for a training wall for flow redirection.

Figure 4.7: Turning basin design for high current configuration (USACE, 2006)



4.3.3.6 Dredging conclusions

Overall, dredging at Morro Bay remains a challenging task due to the large dredge volume involved. Conventional hydraulic dredging methods that have been used in the past by the USACE for maintenance dredging, such as TSHD and CSD, are expected to remain utilized in future dredging campaigns. It is estimated that the entire dredging operation would take about 6 months to complete using a single dredge spread that operates continuously within this period, at a total cost estimated between $25M to $30M. However, due to scheduling constraints, the contractor may also utilize a second dredge spread, with open-water placement at the nearshore region off the Morro Bay State Park sand spit.

Sediment removed from the channel may potentially see beneficial reuse as beach nourishment at the neighboring Morro Strand State Beach to restore lost nesting habitat of the federally endangered Western Snowy Plover population.

Dredging a wider and deeper channel at Morro Bay would reduce the vessel navigation hazard at the harbor due to the absence of shoaling and the potentially improved wave conditions.

Should an O&M facility be proposed in the future, detailed coastal engineering analyses such as circulation modelling, wave modelling, and vessel motion analysis would be required. This is to better understand environmental loading conditions and determine the need of other coastal structures, such as training walls and expected maintenance dredging volumes.

Finally, it should be noted that dredging in a navigation channel may cause disruption to the public, and navigation of commercial vessels would need to be coordinated to minimize disruption. It is therefore recommended that a dredging plan is thoroughly explained with safety concerns addressed upon engagement with the City of Morro Bay, members of the public, and other relevant stakeholders.

4.4 Cost estimate

Construction and engineering cost estimates were developed in accordance with the Association for the Advancement of Cost Engineering (AACE) Class 5 estimate. For this estimate class, the accuracy level ranges from -20% to -50% on the low range and from +30% to +100% on the high range. The order of magnitude estimate typically ranges from -30% to +50%. Class 5 estimates, by definition, are prepared based on very limited information; thus, they have a wide range of accuracy. The purpose of a Class 5 estimate is to conduct a concept screening with the project between 0% and 2% of complete definition. The costs are determined based on past projects with similar infrastructure and prior experience on similar projects, conceptual engineering analyses, and professional judgment. The following approach was followed:

- Understand and determine the functional requirements for the selected location.
- Create different concept designs for the selected location.
- Conduct a quantity take-off for the types of improvements required such as demolition of existing infrastructure, construction of new infrastructure, upland improvements, dredging, etc.
- Once quantity take-off is complete, a unit cost was assigned to each line item based on prior studies, projects, and experience.

A contingency consideration of 50% was included to cover undefined items due to the level of engineering carried out at this stage. The contingency was added to cover items or additional undefined steps that would need to be taken that are not fully detailed during this predesign stage.

The scope of the cost estimate covers OSW O&M waterfront infrastructure only. As such, the following items were excluded from the cost estimates:

- Potential relocation of USCG property, shed, and relocation of floating pontoons.
- Relocation of Harbor Department.
- Relocation of impacted restaurants and other businesses.
- Relocation of commercial fishing docks/facilities.
- OSW O&M Upland yard, utilities, office construction and interior fit-out.
- Environmental mitigation for development.

The costs are summarized in Table 4.3 and detailed in Table 4.4 and Table 4.5.

Table 4.3: Morro Bay site alternative options cost estimate

Site Alternatives Option	Cost Estimate	Cost Accuracy Range (-30% / +50%)
Morro Bay Option 4A	$128.8M	$90.15M to $193.2M
Morro Bay Option 4B	$140.8M	$98.55M to $211.2M

Table 4.4: Morro Bay Option 4A cost estimate

OSW - Central California Offshore Wind Ports Assessment

OPINION OF PROBABLE COST - MORRO BAY O & M Facility - OPTION 4A

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST ($/UNIT)	COST ($)	ROUNDED COST ($)
1	**Mobilization and Demobilization**					
1.1	Mobilization and Demobilization	LS	1	$1,500,000.00	**$1,500,000.00**	**$1,500,000**
	NORTH T-PIER					
2	**Demolition**					
2.1	Existing T-pier demolition	SF	16000	$100.00	$1,600,000.00	
	Additional Yard Improvements for Laydown Area					
2.2	Site Rough Grading (for 0.5 acre)	SY	2420	$5.00	$12,100.00	
2.3	Crushed Rock Surfacing (6" gravel bedding)	CY	403	$70.00	$28,210.00	
2.4	Lighting	SF	21780	$10.00	$217,800.00	
				Sub-total	**$1,858,110.00**	**$1,900,000**
3	**New T-Pier (Pile supported)**					
31	New T-Pier (Pile supported)	SF	42365	$1,000.00	$42,365,000.00	
3.2	Lighting	SF	42365	$10.00	$423,650.00	
3.3	Power	SF	42365	$10.00	$423,650.00	
3.4	Double Drive Swing Gate	EA	1	$2,000.00	$2,000.00	
				Sub-total	**$43,214,300.00**	**$43,300,000**
4	**Finger Pier (Harbormaster & USCG)**					
4.1	Finger Pier (aluminum framing)	SF	8032	$500.00	$4,016,000.00	
4.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	50	$5,300.00	$265,000.00	
4.3	Vertical ladder	EA	0	$10,000.00	$0.00	
4.4	Lighting	SF	8032	$10.00	$80,320.00	
4.5	Power	SF	8032	$10.00	$80,320.00	
				Sub-total	**$4,441,640.00**	**$4,500,000**
5	**Finger Pier (CTV's)**					
5.1	Finger Pier (aluminum framing)	SF	2280	$500.00	$1,140,000.00	
5.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	20	$5,300.00	$106,000.00	
5.3	Vertical ladder	EA	0	$10,000.00	$0.00	
5.4	Gangway	LF	100	$1,500.00	$150,000.00	
5.5	Pile Supported Concrete Platform	SF	450	$1,000.00	$450,000.00	
5.6	Lighting	SF	2280	$10.00	$22,800.00	
5.7	Power	SF	2280	$10.00	$22,800.00	
				Sub-total	**$1,891,600.00**	**$1,900,000**
6	**SOV Mooring/ Berthing Equipment**					
6.1	Fenders	EA	4	$75,000.00	$300,000.00	
6.2	Bollards	EA	12	$4,100.00	$49,200.00	
6.3	Dolphins (mooring)	EA	0	$665,000.00	$0.00	
6.4	Aluminum Bridge (from pier to dolphins)	LF	0	$1,500.00	$0.00	
6.5	Bridge support (piles + pile cap)	LS	0	$30,000.00	$0.00	
				Sub-total	**$349,200.00**	**$400,000**
7	**New Onshore Office Space (building) (N/A)**					
7.1	Office Space Building Construction_ Commercial	SF	0	$800.00	$0.00	
				Sub-total	**$0.00**	**$0**
	SOUTH T-PIER					
8	**Demolition**					
8.1	Existing finger pier demolition	SF	1720	$100.00	$172,000.00	
				Sub-total	**$172,000.00**	**$180,000**
9	**New Public Access Pier (Pile supported)**					
9.1	New Public Access Pier (Pile supported)	SF	3150	$1,000.00	$3,150,000.00	
9.2	Lighting	SF	3150	$10.00	$31,500.00	
9.3	Power	SF	3150	$10.00	$31,500.00	
				Sub-total	**$3,213,000.00**	**$3,300,000**
10	**New Boat Lift**					
10.1	New Boat Lift	LS	1	$1,000,000.00	$1,000,000.00	
				Sub-total	**$1,000,000.00**	**$1,000,000**
11	**Dredging**					
11.1	Sand Dredging	CY	1110000	$25.00	$27,750,000.00	
11.2	Rock Dredging	CY	0	$150.00	$0.00	
				Sub-total	**$27,750,000.00**	**$27,800,000**
				Total	**$85,389,850.00**	**$85,780,000**
				Contingency (%)	**50**	**$43,000,000**
				GRAND TOTAL		**$128,780,000**

Table 4.5: Morro Bay Option 4B cost estimate

OSW - Central California Offshore Wind Ports Assessment

OPINION OF PROBABLE COST - MORRO BAY O & M Facility - OPTION 4B

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST ($/UNIT)	COST ($)	ROUNDED COST ($)
1	**Mobilization and Demobilization**					
1.1	Mobilization and Demobilization	LS	1	$1,500,000.00	**$1,500,000.00**	**$1,500,000**
	NORTH T-PIER					
2	**Demolition**					
2.1	Existing T-pier demolition	SF	16000	$100.00	$1,600,000.00	
	Additional Yard Improvements for Laydown Area					
2.2	Site Rough Grading (for 0.5 acre)	SY	2420	$5.00	$12,100.00	
2.3	Crushed Rock Surfacing (6" gravel bedding)	CY	403	$70.00	$28,210.00	
2.4	Lighting	SF	21780	$10.00	$217,800.00	
				Sub-total	**$1,858,110.00**	**$1,900,000**
3	**New T-Pier (Pile supported)**					
31	New T-Pier (Pile supported)	SF	42365	$1,000.00	$42,365,000.00	
3.2	Lighting	SF	42365	$10.00	$423,650.00	
3.3	Power	SF	42365	$10.00	$423,650.00	
3.4	Double Drive Swing Gate	EA	1	$2,000.00	$2,000.00	
				Sub-total	**$43,214,300.00**	**$43,300,000**
4	**Finger Pier (Harbormaster & USCG)**					
4.1	Finger Pier (aluminum framing)	SF	8032	$500.00	$4,016,000.00	
4.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	50	$5,300.00	$265,000.00	
4.3	Vertical ladder	EA	0	$10,000.00	$0.00	
4.4	Lighting	SF	8032	$10.00	$80,320.00	
4.5	Power	SF	8032	$10.00	$80,320.00	
				Sub-total	**$4,441,640.00**	**$4,500,000**
5	**Finger Pier (CTV's)**					
5.1	Finger Pier (aluminum framing)	SF	2280	$500.00	$1,140,000.00	
5.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	20	$5,300.00	$106,000.00	
5.3	Vertical ladder	EA	0	$10,000.00	$0.00	
5.4	Gangway	LF	100	$1,500.00	$150,000.00	
5.5	Pile Supported Concrete Platform	SF	450	$1,000.00	$450,000.00	
5.6	Lighting	SF	2280	$10.00	$22,800.00	
5.7	Power	SF	2280	$10.00	$22,800.00	
				Sub-total	**$1,891,600.00**	**$1,900,000**
6	**SOV Mooring/ Berthing Equipment**					
6.1	Fenders	EA	4	$75,000.00	$300,000.00	
6.2	Bollards	EA	12	$4,100.00	$49,200.00	
6.3	Dolphins (mooring)	EA	0	$665,000.00	$0.00	
6.4	Aluminum Bridge (from pier to dolphins)	LF	0	$1,500.00	$0.00	
6.5	Bridge support (piles + pile cap)	LS	0	$30,000.00	$0.00	
				Sub-total	**$349,200.00**	**$400,000**
7	**New Onshore Office Space (building)**					
7.1	Office Space Building Construction_ Commercial	SF	10000	$800.00	$8,000,000.00	
				Sub-total	**$8,000,000.00**	**$8,000,000**
	SOUTH T-PIER					
8	**Demolition**					
8.1	Existing finger pier demolition	SF	1720	$100.00	$172,000.00	
				Sub-total	**$172,000.00**	**$180,000**
9	**New Public Access Pier (Pile supported)**					
9.1	New Public Access Pier (Pile supported)	SF	3150	$1,000.00	$3,150,000.00	
9.2	Lighting	SF	3150	$10.00	$31,500.00	
9.3	Power	SF	3150	$10.00	$31,500.00	
				Sub-total	**$3,213,000.00**	**$3,300,000**
10	**New Boat Lift**					
10.1	New Boat Lift	LS	1	$1,000,000.00	$1,000,000.00	
				Sub-total	**$1,000,000.00**	**$1,000,000**
11	**Dredging**					
11.1	Sand Dredging	CY	1110000	$25.00	$27,750,000.00	
11.2	Rock Dredging	CY	0	$150.00	$0.00	
				Sub-total	**$27,750,000.00**	**$27,800,000**
				Total	**$93,389,850.00**	**$93,780,000**
				Contingency (%)	**50**	**$47,000,000**
				GRAND TOTAL		**$140,780,000**

4.5 Concept design for a facility operated by one developer (Split-Location)

4.5.1 Split-location introduction

Initial conceptual design efforts were focused on the development of a single site at Morro Bay shared by three OSW developers for O&M activities. However, an additional scenario was added whereby the O&M facility would only host one OSW developer. A second developer would be located at San Luis Obispo Bay, and it is assumed the third developer would be located out of the region.

This section provides a summary of the additional split-location conceptual design. The existing functional requirements were reviewed and subsequently updated with modifications tailored to a single OSW developer in Morro Bay, followed by several conceptual layouts that satisfy the adjusted requirements.

4.5.2 Modified basis of assessment for a single OSW developer

This section presents the modified minimum functional requirements for the O&M facilities, adjusted in alignment with the reduced demands and needs for a single OSW developer. The proposed modifications are summarized in Table 4-6 below, along with a brief justification of changes made.

Table 4-6: Updated functional requirements for a single developer at Morro Bay

Functional Requirements	Adjusted Requirements	Justification
Quay length for 1 dedicated SOV berth and 1 transient mixed-use berth	Quay length for 1 SOV	1 OSW developer only. Offsite moorage for 2nd SOV available through mooring dolphins and/or mooring buoys.
0.5 acre, 60ft wide quayside staging apron + 0.5 acre intermediate staging zone	Unchanged	Same laydown space requirements needed.

The following key assumptions were used in the split-location design concept conditions:

- Development to be focused on the North T-Pier.
- Development to take the form of a T-Pier to respect the local fabric of the waterfront.
- The T-Pier should be partially publicly accessible.
- T-Pier development should be respectful to neighboring local businesses and restaurants by keeping O&M activities to the north side of the North T-Pier.
- Layouts to avoid partitioning up sections of the promenade for secured access.
- USCG and Morro Bay Harbor Department to be kept at or near the North T-Pier. Secured access would be preferred.

4.5.3 Least constrained site layout

A short-list of site layouts satisfying the updated functional requirements were developed with the following design considerations:

- Location of Morro Bay Harbor Department and USCG:

  - Direct access and views to the Morro Bay Entrance Channel are assumed to be preferred by the USCG and Harbor Department to safeguard and monitor vessel traffic in the FNC; however video cameras could also be used.
  - Secure access required to USCG floats and property.
- Lease or purchase arrangements for the Vistra waterfront property and upland property:
  - The Vistra property represents a suitable industrial property near the waterfront, subject to land-use and zoning designation change.
  - If successfully leased or purchased, the Vistra waterfront property that was historically used as an intake pump house could potentially be converted for use as an OSW intermediate staging zone or USCG/Harbor Department office space with minimal disruption to the local community. It is noted that there have been no agreements made with Vistra at this time.
- Degree of disturbance to neighboring businesses:
  - The waterfront to the south of the North T-Pier is primarily used by fishing vessels, restaurants, and tour operators. Development of the new pier should aim to minimize impact on existing users by keeping O&M activities to the north.

Three variants of the same base design were developed from the list of design concepts to cover potential property acquisition outcomes. Conceptual sketches for each variant are provided in Figure 4.8 through Figure 4.10 respectively, with brief descriptions of each variant provided below:

- **Variant A – Development of the O&M facility without acquisition or leasing of any Vistra property**: New T-Pier constructed. Harbor Department office to be demolished. A USCG facility could be constructed on the north tip of the pier head, and the Harbor Department could either have access to the existing USCG building or an adjacent plot such as a conversion of the public restrooms. The public restroom structure would likely be expanded into a two-story building with the second floor used exclusively by the Harbor Department for their operations. The intermediate staging zone could be located within the “triangle lot,” north of Morro Bay Maritime Museum.
- **Variant B – Development of the O&M facility with a lease or purchase arrangement for the Vistra waterfront property and conversion into an intermediate staging zone**: Similar to Variant A, a USCG facility could be constructed on the pier head, while the Harbor Department gains access to the existing USCG building or site of the public restrooms. The triangle lot would not be required.
- **Variant C – Development of the O&M facility with a lease or purchase arrangement for the Vistra waterfront property and powerplant property**: The Harbor Department would need to be relocated; a new Harbor Department office could either be constructed above the public restrooms, or a redevelopment of the Vistra waterfront property could host both USCG and Harbor Department, with secure berths. The intermediate staging zone could then be located on the opposite side of Embarcadero on the Vistra powerplant property.

Figure 4.8: Split-Location Conceptual Design, Variant A – Vistra property not acquired

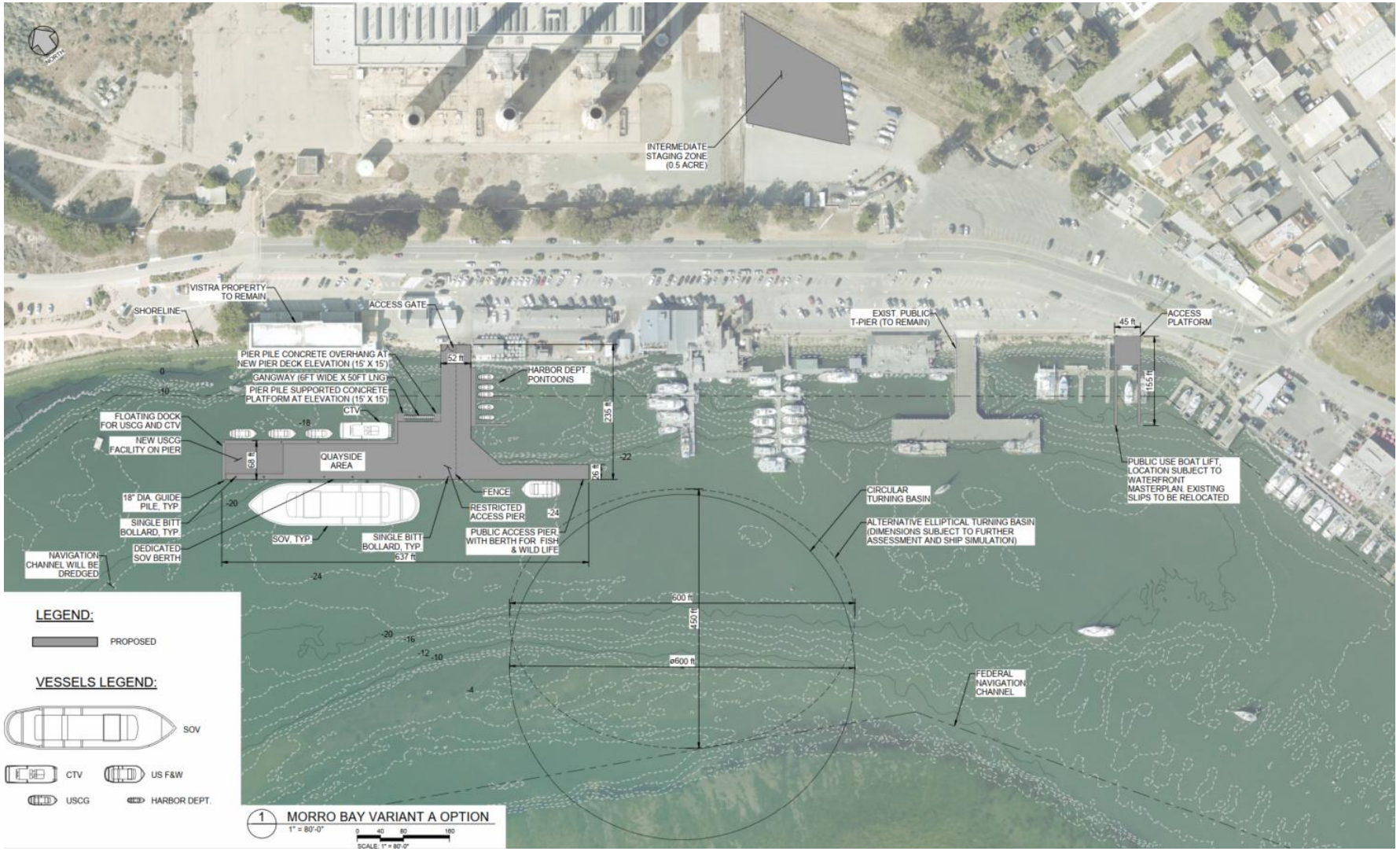


Figure 4.9: Split-Location Conceptual Design, Variant B – Vistra waterfront property leased or acquired

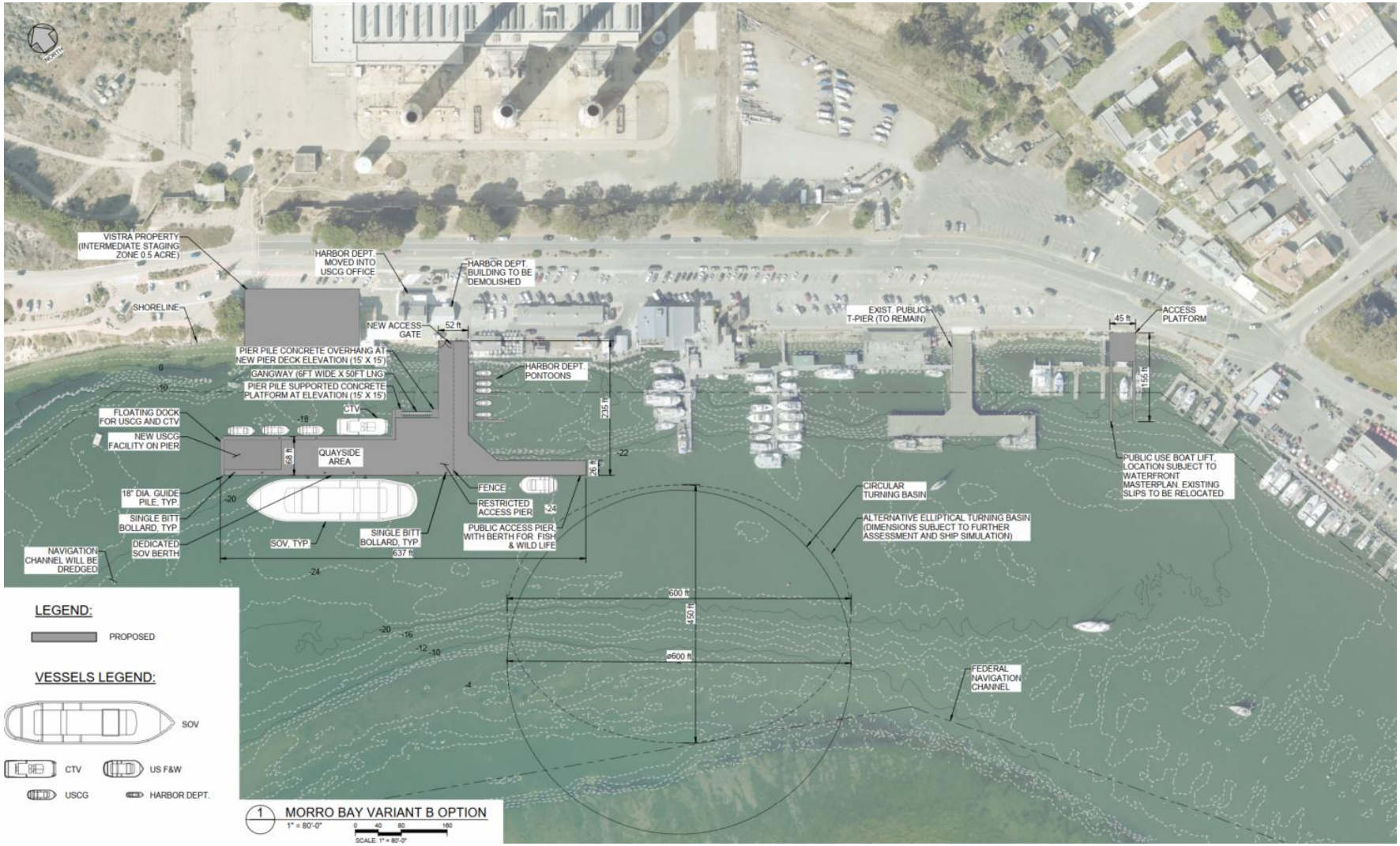
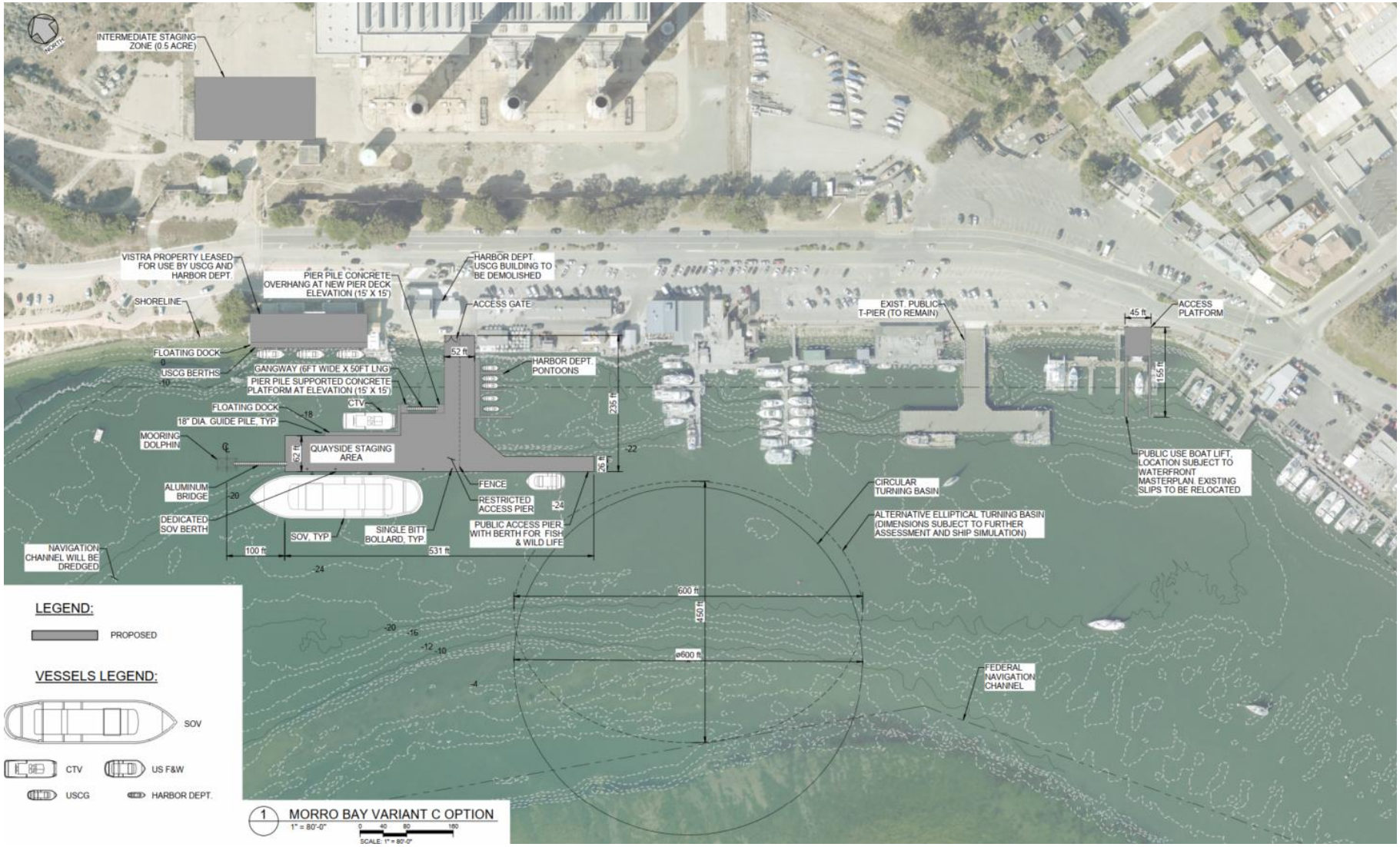


Figure 4.10: Split-Location Conceptual Design, Variant C – Vistra waterfront and powerplant property leased or acquired



4.5.4 Split-location cost

Construction and engineering cost estimates for the Split-Location Options were developed to AACE Class 5 accuracy, in accordance with the methodology presented Section 4.4.

The scope of the cost estimate covers OSW O&M waterfront infrastructure only. As such, the following items were excluded from the cost estimates:

- Potential relocation of USCG property, shed, and relocation of floating pontoons.
- Relocation of Harbor Department.
- Relocation of impacted oyster farming business.
- OSW O&M Upland yard, utilities, office construction and fit out.
- Environmental mitigation for development.
- Other waterfront infrastructure upgrades that may be negotiated in planning stages such as coastal protection upgrades.

Table 4-7 shows a summary of the total cost estimates with the Class 5 cost accuracy range. Table 4-8 to Table 4-10 show the detailed itemized cost estimates for the additional options.

Table 4-7 Morro Bay site alternative variant options cost estimate

Site Alternatives Option	Cost Estimate	Cost Accuracy Range (-30% / +50%)
Split-location Variant A	$122.1M	$85.5M to $183M
Split-location Variant B	$122.1M	$85.5M to $183.1M
Split-location Variant C	$114.0M	$79.8M to $171.0M

Table 4-8 Split-Location Option Variant A detailed cost estimate

OSW - Central California Offshore Wind Ports Assessment

OPINION OF PROBABLE COST - MORRO BAY O & M Facility - OPTION VARIANT A

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST ($/UNIT)	COST ($)	ROUNDED COST ($)
1	**Mobilization and Demobilization**					
1.1	Mobilization and Demobilization	LS	1	$1,500,000.00	**$1,500,000.00**	**$1,500,000**
	NORTH T-PIER					
2	**Demolition**					
2.1	Existing T-pier demolition	SF	16000	$100.00	$1,600,000.00	
	Additional Yard Improvements for Laydown Area					
2.2	Site Rough Grading (for 0.5 acre)	SY	2420	$5.00	$12,100.00	
2.3	Crushed Rock Surfacing (6" gravel bedding)	CY	403	$70.00	$28,210.00	
2.4	Lighting	SF	21780	$10.00	$217,800.00	
				Sub-total	**$1,858,110.00**	**$1,900,000**
3	**New T-Pier (Pile supported)**					
31	New T-Pier (Pile supported)	SF	44520	$1,000.00	$44,520,000.00	
3.2	Lighting	SF	44520	$10.00	$445,200.00	
3.3	Power	SF	44520	$10.00	$445,200.00	
3.4	Double Drive Swing Gate	EA	1	$2,000.00	$2,000.00	
				Sub-total	**$45,412,400.00**	**$45,500,000**
4	**Finger Pier/ Floating Dock (Harbormaster & USCG)**					
4.1	Finger Pier (aluminum framing)	SF	1600	$500.00	$800,000.00	
4.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	50	$5,300.00	$265,000.00	
4.3	Vertical ladder	EA	0	$10,000.00	$0.00	
4.4	Lighting	SF	1600	$10.00	$16,000.00	
4.5	Power	SF	1600	$10.00	$16,000.00	
				Sub-total	**$1,097,000.00**	**$1,100,000**
5	**Finger Pier (CTV's Floating Dock)**					
5.1	Finger Pier (aluminum framing)	SF	2400	$500.00	$1,200,000.00	
5.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	20	$5,300.00	$106,000.00	
5.3	Vertical ladder	EA	0	$10,000.00	$0.00	
5.4	Gangway	LF	60	$1,500.00	$90,000.00	
5.5	Pile Supported Concrete Platform	SF	450	$1,000.00	$450,000.00	
5.6	Lighting	SF	2400	$10.00	$24,000.00	
5.7	Power	SF	2400	$10.00	$24,000.00	
				Sub-total	**$1,894,000.00**	**$1,900,000**
6	**SOV Mooring/ Berthing Equipment**					
6.1	Fenders	EA	2	$75,000.00	$150,000.00	
6.2	Bollards	EA	6	$4,100.00	$24,600.00	
6.3	Dolphins (mooring)	EA	0	$665,000.00	$0.00	
6.4	Aluminum Bridge (from pier to dolphins)	LF	0	$1,500.00	$0.00	
6.5	Bridge support (piles + pile cap)	LS	0	$30,000.00	$0.00	
				Sub-total	**$174,600.00**	**$200,000**
	SOUTH T-PIER					
7	**Demolition**					
7.1	Existing finger pier demolition	SF	1720	$100.00	$172,000.00	
				Sub-total	**$172,000.00**	**$180,000**
8	**New Boat Lift**					
8.1	New Boat Lift	LS	1	$1,000,000.00	$1,000,000.00	
				Sub-total	**$1,000,000.00**	**$1,000,000**
9	**Dredging**					
9.1	Sand Dredging	CY	1110000	$25.00	$27,750,000.00	
9.2	Rock Dredging	CY	0	$150.00	$0.00	
				Sub-total	**$27,750,000.00**	**$27,800,000**
				Total	**$80,858,110.00**	**$81,080,000**
				Contingency (%)	**50**	**$41,000,000**
				GRAND TOTAL		**$122,080,000**

Table 4-9 Split-Location Option Variant B detailed cost estimate

OSW - Central California Offshore Wind Ports Assessment

OPINION OF PROBABLE COST - MORRO BAY O & M Facility - OPTION VARIANT B

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST ($/UNIT)	COST ($)	ROUNDED COST ($)
1	**Mobilization and Demobilization**					
1.1	Mobilization and Demobilization	LS	1	$1,500,000.00	**$1,500,000.00**	**$1,500,000**
	NORTH T-PIER					
2	**Demolition**					
2.1	Existing T-pier demolition	SF	16000	$100.00	$1,600,000.00	
	Additional Yard Improvements for Laydown Area					
2.2	Site Rough Grading (for 0.5 acre)	SY	2420	$5.00	$12,100.00	
2.3	Crushed Rock Surfacing (6" gravel bedding)	CY	403	$70.00	$28,210.00	
2.4	Lighting	SF	21780	$10.00	$217,800.00	
				Sub-total	**$1,858,110.00**	**$1,900,000**
3	**New T-Pier (Pile supported)**					
31	New T-Pier (Pile supported)	SF	44520	$1,000.00	$44,520,000.00	
3.2	Lighting	SF	44520	$10.00	$445,200.00	
3.3	Power	SF	44520	$10.00	$445,200.00	
3.4	Double Drive Swing Gate	EA	1	$2,000.00	$2,000.00	
				Sub-total	**$45,412,400.00**	**$45,500,000**
4	**Finger Pier/ Floating Dock (Harbormaster & USCG)**					
4.1	Finger Pier (aluminum framing)	SF	1600	$500.00	$800,000.00	
4.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	50	$5,300.00	$265,000.00	
4.3	Vertical ladder	EA	0	$10,000.00	$0.00	
4.4	Lighting	SF	1600	$10.00	$16,000.00	
4.5	Power	SF	1600	$10.00	$16,000.00	
				Sub-total	**$1,097,000.00**	**$1,100,000**
5	**Finger Pier (CTV's Floating Dock)**					
5.1	Finger Pier (aluminum framing)	SF	2400	$500.00	$1,200,000.00	
5.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	20	$5,300.00	$106,000.00	
5.3	Vertical ladder	EA	0	$10,000.00	$0.00	
5.4	Gangway	LF	60	$1,500.00	$90,000.00	
5.5	Pile Supported Concrete Platform	SF	450	$1,000.00	$450,000.00	
5.6	Lighting	SF	2400	$10.00	$24,000.00	
5.7	Power	SF	2400	$10.00	$24,000.00	
				Sub-total	**$1,894,000.00**	**$1,900,000**
6	**SOV Mooring/ Berthing Equipment**					
6.1	Fenders	EA	2	$75,000.00	$150,000.00	
6.2	Bollards	EA	6	$4,100.00	$24,600.00	
6.3	Dolphins (mooring)	EA	0	$665,000.00	$0.00	
6.4	Aluminum Bridge (from pier to dolphins)	LF	0	$1,500.00	$0.00	
6.5	Bridge support (piles + pile cap)	LS	0	$30,000.00	$0.00	
				Sub-total	**$174,600.00**	**$200,000**
	SOUTH T-PIER					
7	**Demolition**					
7.1	Existing finger pier demolition	SF	1720	$100.00	$172,000.00	
				Sub-total	**$172,000.00**	**$180,000**
8	**New Boat Lift**					
8.1	New Boat Lift	LS	1	$1,000,000.00	$1,000,000.00	
				Sub-total	**$1,000,000.00**	**$1,000,000**
9	**Dredging**					
9.1	Sand Dredging	CY	1110000	$25.00	$27,750,000.00	
9.2	Rock Dredging	CY	0	$150.00	$0.00	
				Sub-total	**$27,750,000.00**	**$27,800,000**
				Total	**$80,858,110.00**	**$81,080,000**
				Contingency (%)	**50**	**$41,000,000**
				GRAND TOTAL		**$122,080,000**

Table 4-10 Split-Location Option Variant C detailed cost estimate

OSW - Central California Offshore Wind Ports Assessment

OPINION OF PROBABLE COST - MORRO BAY O & M Facility - OPTION VARIANT C

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST ($/UNIT)	COST ($)	ROUNDED COST ($)
1	**Mobilization and Demobilization**					
1.1	Mobilization and Demobilization	LS	1	$1,500,000.00	**$1,500,000.00**	**$1,500,000**
			NORTH T-PIER			
2	**Demolition**					
2.1	Existing T-pier demolition	SF	16000	$100.00	$1,600,000.00	
	Additional Yard Improvements for Laydown Area					
2.2	Site Rough Grading (for 0.5 acre)	SY	2420	$5.00	$12,100.00	
2.3	Crushed Rock Surfacing (6" gravel bedding)	CY	403	$70.00	$28,210.00	
2.4	Lighting	SF	21780	$10.00	$217,800.00	
				Sub-total	**$1,858,110.00**	**$1,900,000**
3	**New T-Pier (Pile supported)**					
31	New T-Pier (Pile supported)	SF	38500	$1,000.00	$38,500,000.00	
3.2	Lighting	SF	38500	$10.00	$385,000.00	
3.3	Power	SF	38500	$10.00	$385,000.00	
3.4	Double Drive Swing Gate	EA	1	$2,000.00	$2,000.00	
				Sub-total	**$39,272,000.00**	**$39,300,000**
4	**Finger Pier/ Floating Dock (Harbormaster & USCG)**					
4.1	Finger Pier (aluminum framing)	SF	3650	$500.00	$1,825,000.00	
4.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	50	$5,300.00	$265,000.00	
4.3	Vertical ladder	EA	0	$10,000.00	$0.00	
4.4	Lighting	SF	3650	$10.00	$36,500.00	
4.5	Power	SF	3650	$10.00	$36,500.00	
				Sub-total	**$2,163,000.00**	**$2,200,000**
5	**Finger Pier (CTV's Floating Dock)**					
5.1	Finger Pier (aluminum framing)	SF	810	$500.00	$405,000.00	
5.2	Finger Pier Piles (18" dia x 5/8" thk)	TN	10	$5,300.00	$53,000.00	
5.3	Vertical ladder	EA	0	$10,000.00	$0.00	
5.4	Gangway	LF	50	$1,500.00	$75,000.00	
5.5	Pile Supported Concrete Platform	SF	450	$1,000.00	$450,000.00	
5.6	Lighting	SF	810	$10.00	$8,100.00	
5.7	Power	SF	810	$10.00	$8,100.00	
				Sub-total	**$999,200.00**	**$1,000,000**
6	**SOV Mooring/ Berthing Equipment**					
6.1	Fenders	EA	2	$75,000.00	$150,000.00	
6.2	Bollards	EA	6	$4,100.00	$24,600.00	
6.3	Dolphins (mooring)	EA	1	$665,000.00	$665,000.00	
6.4	Aluminum Bridge (from pier to dolphins)	LF	100	$1,500.00	$150,000.00	
6.5	Bridge support (piles + pile cap)	LS	1	$30,000.00	$30,000.00	
				Sub-total	**$1,019,600.00**	**$1,100,000**
			SOUTH T-PIER			
7	**Demolition**					
7.1	Existing finger pier demolition	SF	1720	$100.00	$172,000.00	
				Sub-total	**$172,000.00**	**$180,000**
8	**New Boat Lift**					
8.1	New Boat Lift	LS	1	$1,000,000.00	$1,000,000.00	
				Sub-total	**$1,000,000.00**	**$1,000,000**
9	**Dredging**					
9.1	Sand Dredging	CY	1110000	$25.00	$27,750,000.00	
9.2	Rock Dredging	CY	0	$150.00	$0.00	
				Sub-total	**$27,750,000.00**	**$27,800,000**
				Total	**$75,733,910.00**	**$75,980,000**
				Contingency (%)	**50**	**$38,000,000**
				GRAND TOTAL		**$113,980,000**

4.5.5 Split-location conceptual design summary

A conceptual layout capable of supporting O&M operations for one OSW developer was selected and refined through a series of study meetings, with three sub-variants developed, dependent on the following unknown variables:

- Vistra property purchase/leasing arrangements.
- Preferred relocation of harbor department.
- Arrangements for USCG.

When compared to the original three-developer approach, the size of the waterfront facilities to service one developer could be marginally reduced under the condition that only one SOV berth is required. The North T-Pier would still require replacement; a new purpose-built T-Pier would likely be the preferred structural form, with the north side of the T-Pier dedicated to OSW use.

The volume of capital dredging and the associated environmental impacts would be largely unchanged.

Through use of adjacent land at the Vistra property, the USCG operations could be moved off the pier, thus reducing the size of the T-Pier, lowering cost and overwater coverage. This would be subject to discussion and agreement from USCG and Harbor Dept.

It is currently assumed the SOV would in berth for up to 24hrs, before returning offshore for one-to-two-week periods. Therefore, the split-location design concept would also result in less frequent SOV activity since only one SOV would utilize the area. The split-location design concept would also result in reduced development costs and less vehicular traffic to the O&M facility. In addition, the south side of the North T-pier could potentially remain open to public use.

5 Environmental and permitting assessment

5.1 Summary

Rincon Consultants, Inc. (Rincon) has conducted an Environmental Constraints and Feasibility Analysis Report (Constraints and Feasibility Report) to help inform the Central Coast Offshore Wind O&M Infrastructure Study. The full report by Rincon is included within Appendix B.

The Study Area includes the City of Morro Bay and surrounding nearshore and coastal areas and contains sensitive terrestrial and marine resources, including environmentally sensitive habitat areas, essential fish habitat, designated critical habitat, and special status species. Development of OSW O&M facilities would require comprehensive environmental review under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and coordination with multiple agencies, including the California Coastal Commission (CCC), California State Lands Commission, U.S. Army Corps of Engineers (USACE), City of Morro Bay, and resource agencies.

While recent legislation such as Senate Bill 286 provides opportunities to streamline permitting through a consolidated Coastal Development Permit (CDP), OSW O&M development in Morro Bay would remain subject to substantial regulatory review due to coastal resource sensitivities, land use constraints established by City of Morro Bay Measures A-24 and D, and public trust considerations. Furthermore, Senate Bill 286 does not preempt the City of Morro Bay's authority to require the necessary City of Morro Bay land use permits (e.g., Conditional Use Permits), rezoning, and land use designation changes, in accordance with the City's zoning code and applicable voter initiatives. The following broad steps and agency approvals would be anticipated to be required to permit development of the least constrained concept designs:

- City of Morro Bay and USACE adopt CEQA and NEPA documents for OSW O&M facilities.
- City of Morro Bay approves a land use and zoning designation change at the North T-Pier to permit OSW O&M facility development (applies to all the least constrained concept designs). The land use element map change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24. Development would have to comply with Measure D use limitations, which prioritize commercial fishing.
- City of Morro Bay approves land use and zoning designation change via a voter ballot initiative, to permit an Intermediate Staging Zone facility within the Vistra properties (applies to Option 4A, Split Location Variant B, and Split Location Variant C). The land use element map change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24. Development would have to comply with Measure D use limitations, as applicable, which prioritize commercial fishing.
- City of Morro Bay issues a Conditional Use Permit for OSW O&M facilities (applies to all of the least constrained concept designs).
- Federal and State environmental resources agencies (e.g., USACE, National Marine Fisheries Service, California Department of Fish and Wildlife, etc.) issue environmental permits (e.g., Clean Water Act Section 404 permit[s], Federal Endangered Species Act Section 7 incidental take statement[s], etc.).

- CCC issues a consolidated CDP.

OSW O&M development is potentially inconsistent with the City's current and recently updated General Plan, Zoning Code, and voter initiatives, all of which prioritize visitor serving and commercial fishing uses on the City's waterfront. Additionally, with a grant from the California Coastal Commission, the City is currently updating its Waterfront Master Plan to reinforce the existing zoning and General Plan designations and to further define its vision for transitioning former industrial and utility sites into visitor serving, recreational, cultural, and commercial fishing uses. While OSW O&M development is potentially feasible from an environmental and regulatory perspective, it would potentially require land use and zoning changes following the City of Morro Bay's entitlement process, including voter approval of land use designation changes in accordance with Measure A-24. Given this regulatory context, any future OSW developer would need to conduct significant public outreach, including community workshops to determine the actual feasibility of such facilities.

6 Summary

6.1 Conclusions

Waterfront facilities at Morro Bay were assessed for their potential in supporting Operations and Maintenance (O&M) activities for the offshore wind OSW industry. Using minimum functional requirements agreed with the Study Team, opportunities and constraints for the Morro Bay Waterfront study site were identified and technically viable options were developed as independent concept designs.

For an O&M facility serving multiple developers, Option 4 was selected for further evaluation based on site characteristics, and two strategic development scenarios were developed to cover potential property acquisition outcomes. For an O&M facility serving one developer, three variants (A, B, C) were developed covering different property aquistition outcomes.

Pre-feasibility level conceptual layouts and construction and dredging cost estimates were developed to inform future decision-making processes. The key findings were as follows:

- **O&M facility serving three developers**: The existing waterfront infrastructure at Morro Bay has the physical characteristics needed to support the development of an O&M facility to service the OSW industry. While key physical factors such as the presence of a natural channel and availability of land parcels with waterfront access makes development a viable option, Morro Bay also faces challenges from a congested navigation channel and dilapidated marine infrastructure. Development would require a complete rebuild of the North T-Pier to support the navigation and berthing of OSW vessels. Construction cost estimates for the least constrained alternatives were estimated to be approximately $130 to $140 million, but may be in the range of $90 to $210 million according to the Advancement of Cost Estimating's Class 5 cost estimate scheme (-30% to +50%) for concept-level assessments.
- **O&M facility serving one developer (Split-Location Option)**: To investigate the feasibility of simultaneously utilizing Morro Bay and San Luis Obispo Bay for OSW O&M activities, several conceptual designs were prepared using a reduced set of functional requirements applicable to having a single OSW developer operating at Morro Bay. A conceptual layout involving the complete reconstruction of the North T-Pier capable of supporting O&M operations was selected as the least constrained alternative, with three sub-variants made available based on different Vistra property agreement outcomes. This split-location option kept the South portion of the North T-Pier publicly accessible and was expected to have a reduced impact on the local fabric of the City. Cost estimates for the Split-Location alternatives were estimated to be approximately $114 to $122 million, but may be in the range of $80 to $183 million according to the Advancement of Cost Estimating's Class 5 cost estimate scheme (-30% to +50%) for concept-level assessments.
- **Dredging**: Significant dredging would be expected to lower the mudline elevation to -30 feet Mean Lower Low Water (MLLW) for SOV access into the bay, with a high-level volume estimate of 1.1 million cubic yards (CY). Dredging methods would likely be consistent with those that have been used in the past, such as Trailing Suction Hopper Dredge (TSHD) and Cutter Suction Dredge (CSD). Sandy sediment that has been dredged may see beneficial reuse as beach nourishment at the Morro Strand State Beach for habitat creation and erosion control, or placement at the nearshore placement area off the Morro Bay State Park sand spit. The associated dredging cost is projected to be in the order of $25-30 million but could potentially be reduced by optimizing the turning basin layout with support from an

analysis of ship simulators. It is also noted that by deepening the navigation channel, waves propagating through the harbor entrance would have a reduced height, improving navigability to recreational and fishing vessels. This change in wave conditions has potential to trigger a change in the mission of the USCG facility from a surf station to a security station.

- **Permitting (Rincon, 2026)**:
  - The study area contains sensitive terrestrial and marine resources, including environmentally sensitive habitat areas, essential fish habitat, designated critical habitat, and special status species. Development of OSW O&M facilities would require comprehensive environmental review under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and coordination with multiple agencies, including the California Coastal Commission (CCC), California State Lands Commission, U.S. Army Corps of Engineers (USACE), City of Morro Bay, and resource agencies.
  - The Permitting Assessment concluded that an O&M development would be potentially inconsistent with the City's current and recently updated General Plan, Zoning Code, and voter initiatives, all of which prioritize visitor serving and commercial fishing uses on the City's waterfront. Additionally, with a grant from the California Coastal Commission, the City is currently updating its Waterfront Master Plan to reinforce the existing zoning and General Plan designations and to further define its vision for transitioning former industrial and utility sites into visitor serving, recreational, cultural, and commercial fishing uses. While OSW O&M development is potentially feasible from an environmental and regulatory perspective, it would potentially require land use and zoning changes following the City of Morro Bay's entitlement process, including voter approval of land use designation changes in accordance with Measure A-24. Given this regulatory context, any future OSW developer would need to conduct significant public outreach, including community workshops to determine the actual feasibility of such facilities.

In summary, the study found that the reconstruction of the North T-Pier as a purpose-built OSW O&M facility would be technically viable from a construction perspective, owing to the adjacent industrial land and sheltered waterway. However, such a development would face multiple challenges that would need to be resolved in the pursuit of sustainable development. The outstanding issues include the following:

- Environmental concerns due to the extent of dredging required, and the increase in maritime and road traffic.
- Changes to the waterfront viewscape and waterfront character, conflicts with coastal access, commercial fishing, marine life, and recreational uses.
- Fueling arrangements (excluded from this study due to uncertainty on vessel fueling methods and electrification).
- Onerous permitting process due to potential inconsistency with the General Plan, Zoning Code, and voter initiatives, as well as environmental impacts and potential impacts to a federal facility and the FNC channel.
- Relatively high capital investment costs due to the necessity to construct a new T-Pier to accommodate the expected vessel and material loads.

6.2 Next steps

Below are additional activities which could be conducted for further investigation for an OSW O&M facility at Morro Bay:

- Technical
  - Conduct ship simulation and review turning basin layout for dredge volume optimization.
  - Conduct detailed coastal engineering analyses such as circulation modelling, wave modelling, and vessel motion analysis. This is to better understand environmental loading conditions and determine the need of other coastal structures, such as training walls and expected maintenance dredging volumes.
  - Undertake a mooring assessment to estimate downtime associated with adverse environmental conditions not suitable for quayside operations.
  - Detailed geotechnical and structural analysis to confirm design assumptions.
  - Detailed construction schedules.
  - Construction phasing to ensure USCG and Harbor Department operations are not impeded during construction.
  - Better understand fueling requirements of developers and potential impacts on the waterfront masterplan.
  - Cost estimates for excluded items and capital cost comparison between Morro Bay and other candidate OSW O&M sites, and review of economic benefits.
- Social
  - Potential advantages to waterfront and to the City of Morro Bay should be assessed.
  - Undertake stakeholder and public engagement.
  - Coordination with waterfront parcel owners and an assessment of impacts on local business and mitigation strategies.
  - Skilled labor workforce estimates.
- Environmental and permitting
  - Identify, inform, and engage with stakeholders involved in the permitting process including but not limited to: U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), U.S. Fish and Wildlife Service, and other relevant federal, state, and local agencies.

7 References

Alfving, C. J. (2019) *Assessing the Environmental Impacts of a Beach Nourishment Operation, Morro Bay, CA.* MS thesis. California State University, Fresno.

BOEM. (2025) *Overview Map of the California Final Lease Areas.* Available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CA%20FSN%20Lease%20Area%20Maps.pdf [Accessed 15 July 2025]

City of Morro Bay. (2016) *Army Corps of Engineers Dredging Morro Bay Harbor* [Press Release]. 16 December issued. Available at: https://www.morrobayca.gov/DocumentCenter/View/10302/Corps-dredging-press-public-release-Dec-2016-Final?bidId= [Accessed June 2025].

City of Morro Bay. (n.d.) Geo Hazard and Resources report by City of Morro Bay Available at: https://www.morrobayca.gov/DocumentCenter/View/15266/Geo-Hazards-and-Resources [accessed Nov 2024]

Lim, J. & Trowbridge, M. (2023) *AB 525 Port Readiness Plan, Final Report.* California State Lands Commission.

Mott MacDonald. (2022) REACH *Central Coast Emerging Industries Waterfront Siting + Infrastructure Study.* REACH.

Rincon. (2026) County of San Luis Obispo Operations and Maintenance Waterfront Infrastructure and Site Readiness Plan Study: City of Morro Bay.

Shoreline Engineering, Inc. (2016). Routine Inspection And Structural Condition Assessment - South T-Pier & Commercial Docks.

Thompson, E. F., Bottin, R. R. Jr., & Shak, A. T. (2002) *Monitoring of Entrance Channel Navigation Improvements at Morro Bay Harbor, Morro Bay, California.* USACE. Report number: ERDC/CHL TR-02-18.

U.S. Army Corps of Engineers. (2006) *Hydraulic Design of Deep-Draft Navigation Projects.* USACE

U.S. Army Corps of Engineers. (2013) *Draft Environmental Assessment, Morro Bay, Six Year Federal Maintenance Dredging Program, San Luis Obispo County, California*. USACE.

U.S. Army Corps of Engineers. (2023) *Final Environmental Assessment for Morro Bay, Six Year Federal Maintenance Dredging Program, San Luis Obispo County, California.* USACE.

Appendices

A. Basis of design 59
B. Environmental constraints and feasibility analysis report (Rincon, 2026) 60
C. Preliminary geotechnical desk study 61

A. Basis of design

DRAFT

MOTT MACDONALD

CA Central Coast OSW Phase II

Basis of Assessment

DRAFT

Agenda

1. Introduction - What is an O&M facility and why is it needed
2. Study Approach
3. Functional requirements
4. Site conditions and Constraints Map
5. GIS session (Rincon)

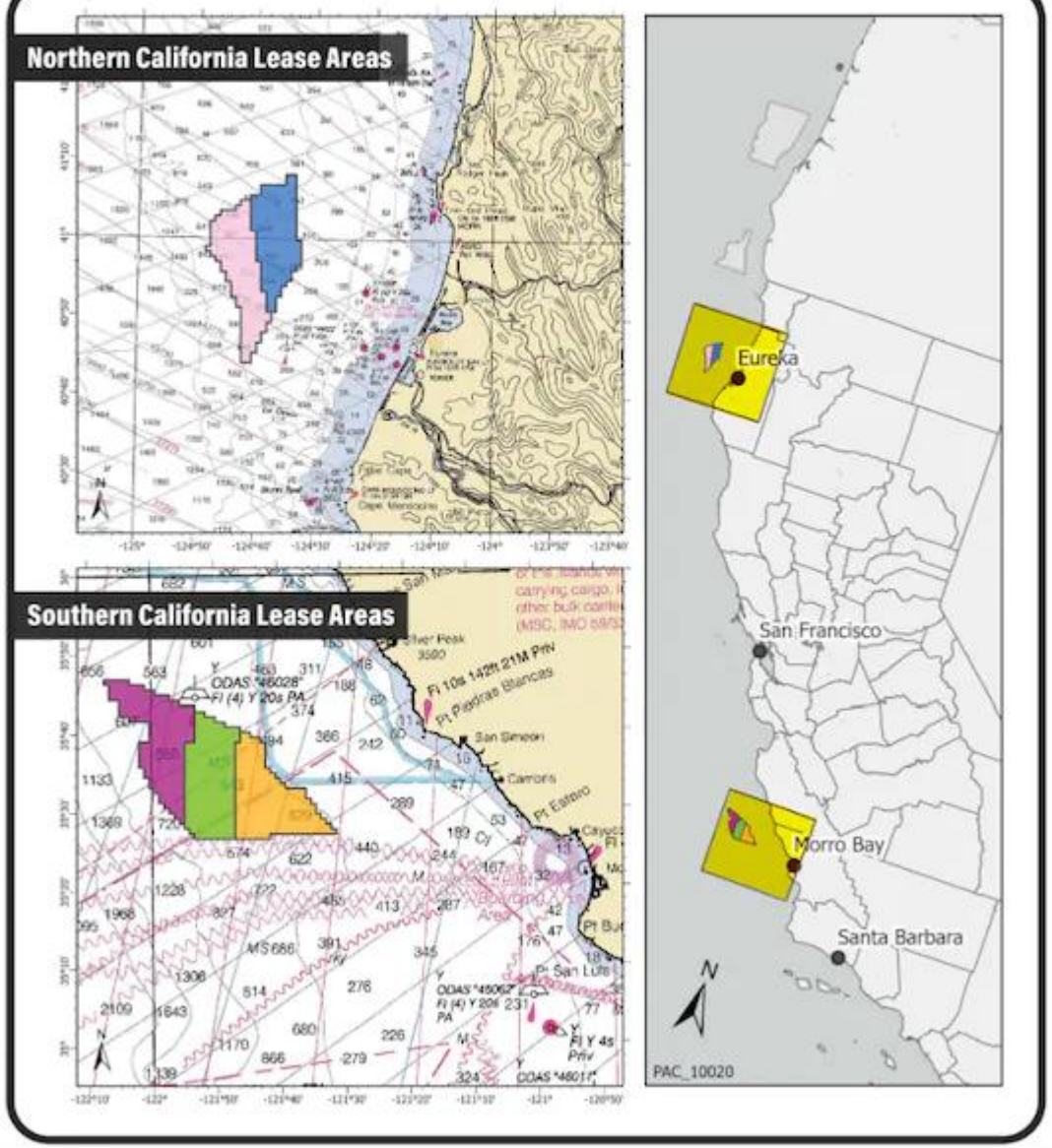
DRAFT

What is an O&M facility and why is it needed

DRAFT

Potential Energy Impact of the California Lease Areas

LEASE AREA	DEVELOPABLE ACRES	INSTALLATION CAPACITY (MW)[1]	POWER PRODUCTION (MWh/yr)[2]	HOMES POWERED[3]
OCS-P0561	63,338	769	2,694,436	269,136
OCS-P0562	69,031	838	2,936,632	293,328
OCS-P0563	80,062	972	3,405,888	340,200
OCS-P0564	80,418	976	3,421,025	341,712
OCS-P0565	80,418	976	3,421,025	341,712



BOEM Bureau of Ocean Energy Management

[1]Megawatts (MW) based on 3MW/sqkm
[2]Based upon 350 homes per MW
[3]Formula = Capacity (MW) * 8760 (hrs/yr) * 0.4 (capacity factor)


DRAFT
N
Morro Bay Wind Energy Area
Morro Bay
San Luis Obispo Bay
SLO County
California
0 5 10 20 30 40
Miles

What is an O&M facility and why is it needed

Depending on contractual agreement and developer maturity various scope of services are arranged to balance risk and cost control.

Foundations and cables

- Typically performed on an ad-hoc basis by contractors
- Routine visual inspections
  - ROVs, divers checking foundations or cable routes for burial issues
  - Mooring inspections
- Structural integrity checks
  - Structural analysis
  - Structural repairs
  - Fatigue: main consideration (from WTG and Metocean)
- Maintenance campaigns
  - Remove marine growth
  - Replace damaged anodes
  - Repair painting

WTGs

- Usually performed by the OEM in the first years at least
- Regular WTG inspection regime
  - Scheduled maintenance (3 – 6 – 12-month plans)
- Unscheduled maintenance
  - Alarms
  - Reactive inspections
  - Major maintenance

DRAFT

MOTT MACDONALD

Study Approach

DRAFT

Study Approach

How will we determine the feasibility of an O&M port in this location

Basis of Assessment:

Existing Conditions:
Establish existing conditions through:
- Data collection from client and publicly available sources.
- Site visit
- Perform initial coastal and geotechnical studies to appraise the existing conditions on site.

Functional Requirements/Design Basis:
Establish minimum function requirements through:
- Literature reviews
- Experience from global Mott MacDonald projects
- Developer outreach to confirm assumptions

Gap assessment:
- Determine what upgrades are required to meet the functional requirements

Environmental Constraints:
- Data collection
- Waterfront land use planning due diligence
- Environmental constraints assessment and mapping

Conceptual waterfront infrastructure design
- Preliminary concept options
- Dredging assessment
- Downtime assessment and breakwater sizing (SLO only)
- Concept drawings
- Environmental and Permitting matrix
- Cost

Public Engagement Event
- Final concept overview

DRAFT

MOTT MACDONALD

Functional Requirements

Functional Requirements

Design Vessels

Functional requirements preliminary and subject to developer outreach

Vessel	Service Operation Vessel **(SOV)**
Purpose	Supports multi-day O&M trips, provides accommodations for wind farm workers and assists with servicing and repairing wind turbines
Length	300 ft
Draft	25ft
Beam	75ft

Vessel	Service Accommodation Transfer Vessel **(SATV)**
Purpose	Combines elements of SOV and CTV to provide a smaller live aboard vessel for technicians. Heavy equipment not required.
Length	130 ft
Draft	16ft
Beam	50ft

Vessel	Crew Transfer Vessel **(CTV)**
Purpose	These vessels are used to transport and shuttle wind farm technicians and other personnel out to sites on a daily basis. No live aboard accommodation.
Length	90ft
Draft	10ft
Beam	30ft

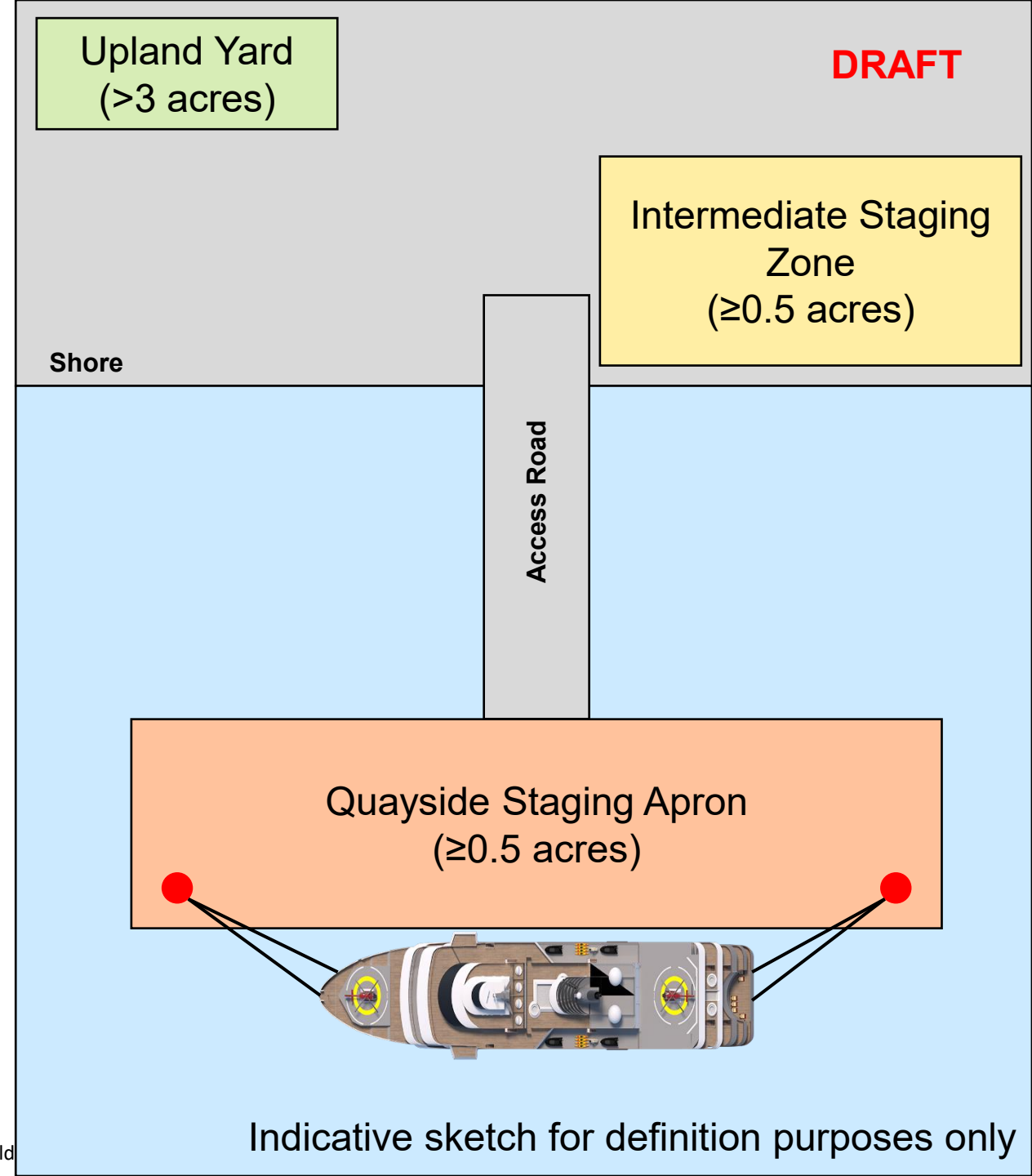
BoD Recap

Definitions

Quayside Staging Apron (≥0.5 acres)
- Immediately adjacent to quay wall
- Area for SOV/CTV operations, short term material staging and transfers (materials & personnel)

Intermediate Staging Zone (≥0.5 acres)
- Buffer area between the quay and upland yard
- Positioned near the quay but not required to be on the pier itself.
- Used for short term staging, and pre/post vessel operations.
- Includes a small welfare unit, and a small parking lot for personnel shuttle services

Upland Yard (>3 acres)
- Warehouses, workshops, and office space
- Dedicated space for inventory, spare parts, anchor chains, and long-term containerized storage
- Staff parking included



Mott MacDonald

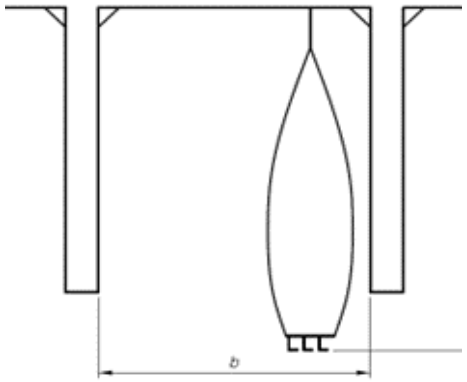
Functional Requirements

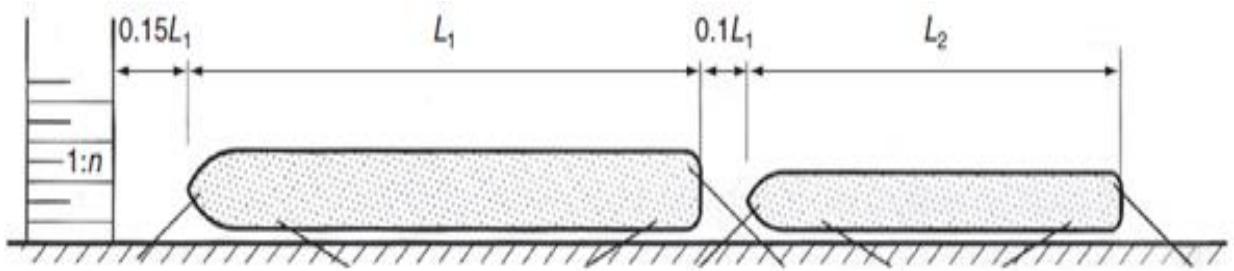
Berths

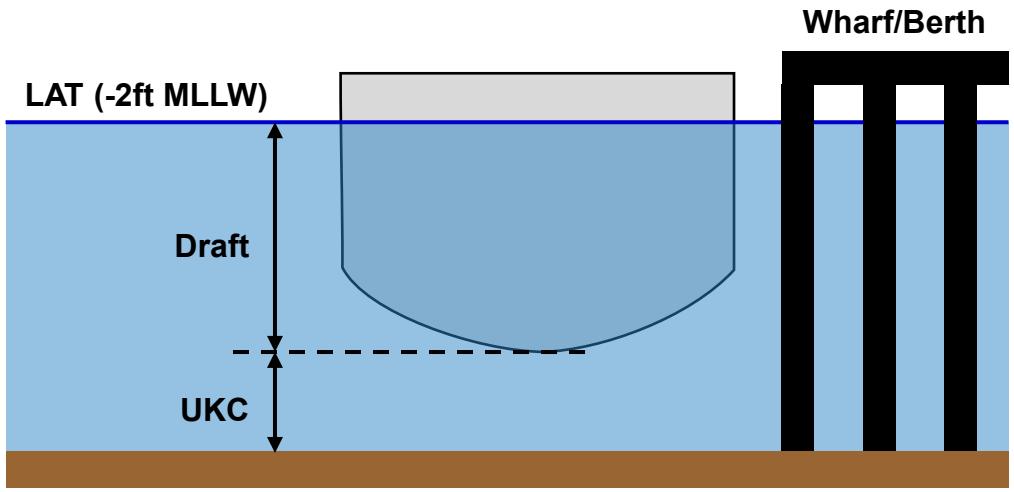
Berth Depth (REACH)
- Under keel clearance (UKC) 10% of draft

Berth Length (Port Designer's Handbook)
- 10% of LOA between vessels
- 15% of LOA at both ends of the vessel

Finger Pier Width (AS 3962)
- 2x maximum beam + 5ft







Vessel Draft	Design Water Level	UKC [ft]	Concept Berth Bed Elevation [ft MLLW]
10ft (CTV)	LAT (-2ft MLLW)	1.0	-13.0
12ft		1.2	-15.2
16ft (SATV)		1.6	-19.6
20ft		2.0	-24.0
25ft (SOV)		2.5	-29.5

Functional Requirements

Berths

Harbor tranquility in operational conditions

- Facility should remain operational in all storm events up to the limit of offshore design vessel operations
- Offshore vessels (CTV Mothership) can operate in up to 8-10 ft waves.
- Assume inshore O&M facility is not operational when offshore waves exceed 8-10 ft

Harbor tranquility in storm conditions

- Facility should provide safe harbor for vessels in a storm event that might probabilistically be expected in a 1 in 100year return period.
- Wave conditions TBD and beyond scope of study.

Functional Requirements

Turning Basin

Turning Basin Diameter (PIANC)

- Depends on vessel maneuverability and presence of bow thrusters and Dynamic Positioning (DP) systems.
- Minimum 2x LOA, unless ship simulations undertaken.
- Existing turning basin diameter ~400ft (REACH)
- It is noted that most vessels used in O&M applications will be highly maneuverable with ability to turn on a dime, however allowance should be made for wind, currents, and avoidance of small recreational craft.

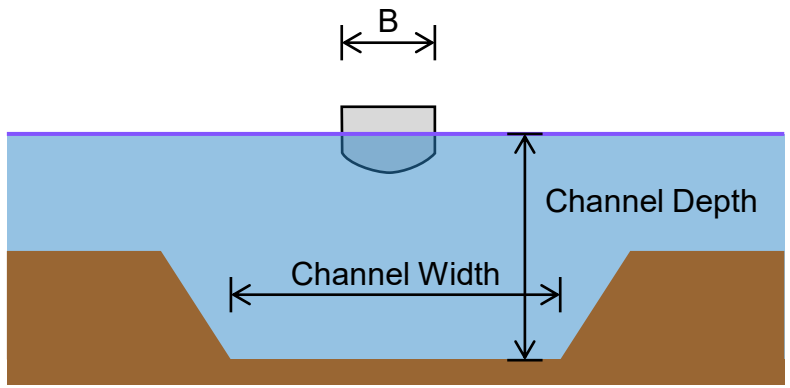
LOA	Minimum Diameter
90ft (CTV)	180ft
130ft (SATV)	260ft
200ft (Yakima)	400ft
300ft (SOV)	600ft

Functional Requirements

Navigation Channel

Extents
- TBD

Channel Depth
- For sheltered conditions, assume Channel Depth is draft of largest vessel +3ft UKC.
- Assume SOV not operational at LAT as tides can be planned around.
- Assume all vessels to be operational at MLLW.
- Preliminary channel depth:
  - 28ft below MLLW for SOV channel
  - 19ft below MLLW, assuming SOV not required (subject to developer outreach)
- Note, UKC to be refined upon assessment of wave climate



Channel Width
- Assume one-way traffic for SOVs
- Channel width 2-2.5x beam of largest vessel

DRAFT

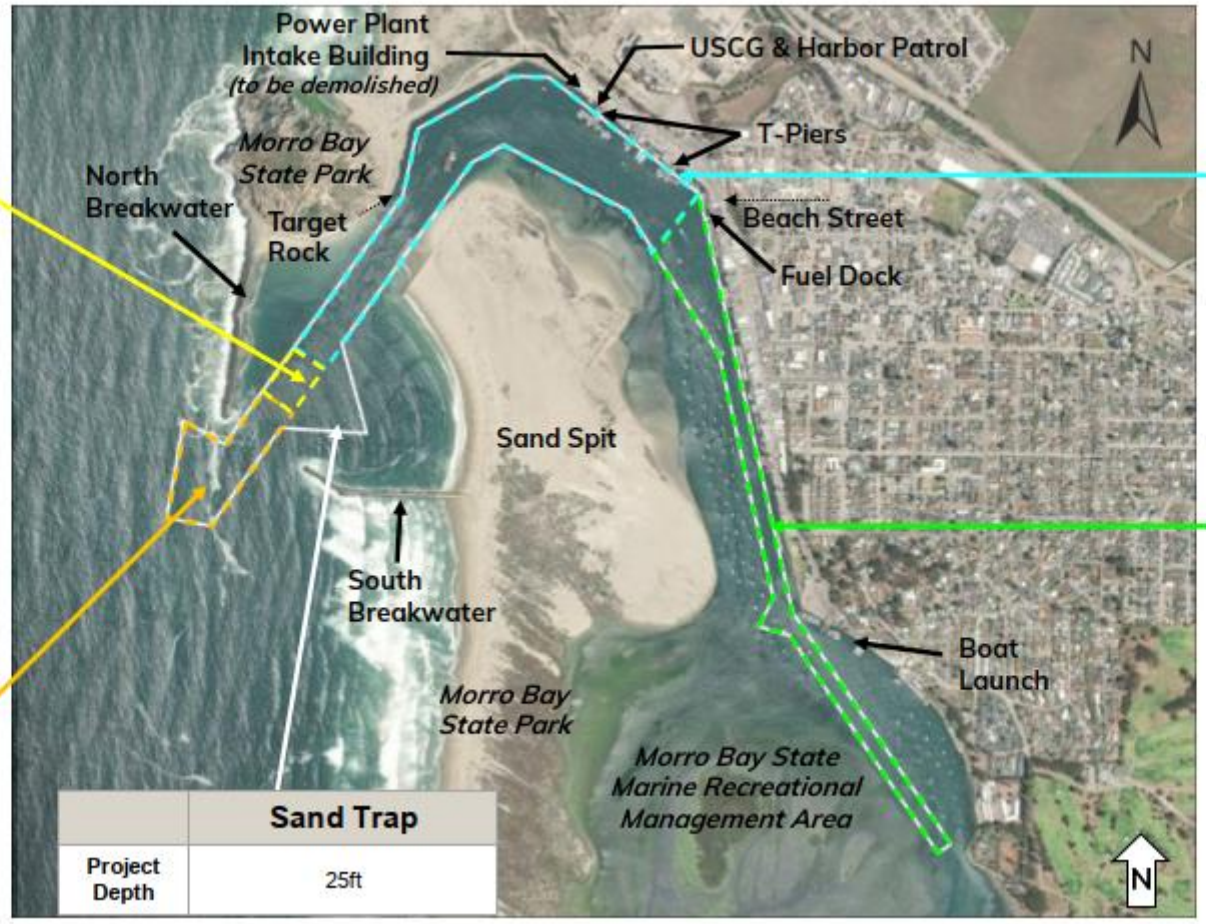
MOTT MACDONALD

Morro Bay - Site Conditions and Constraints

Federal Navigation Channel

	Transition Channel
Project Depth	Transitioning from 30 feet to 16 feet
Width	350 feet

	Entrance Channel
Project Depth	30 feet, with 10 feet advanced maintenance dredging
Width	350 feet

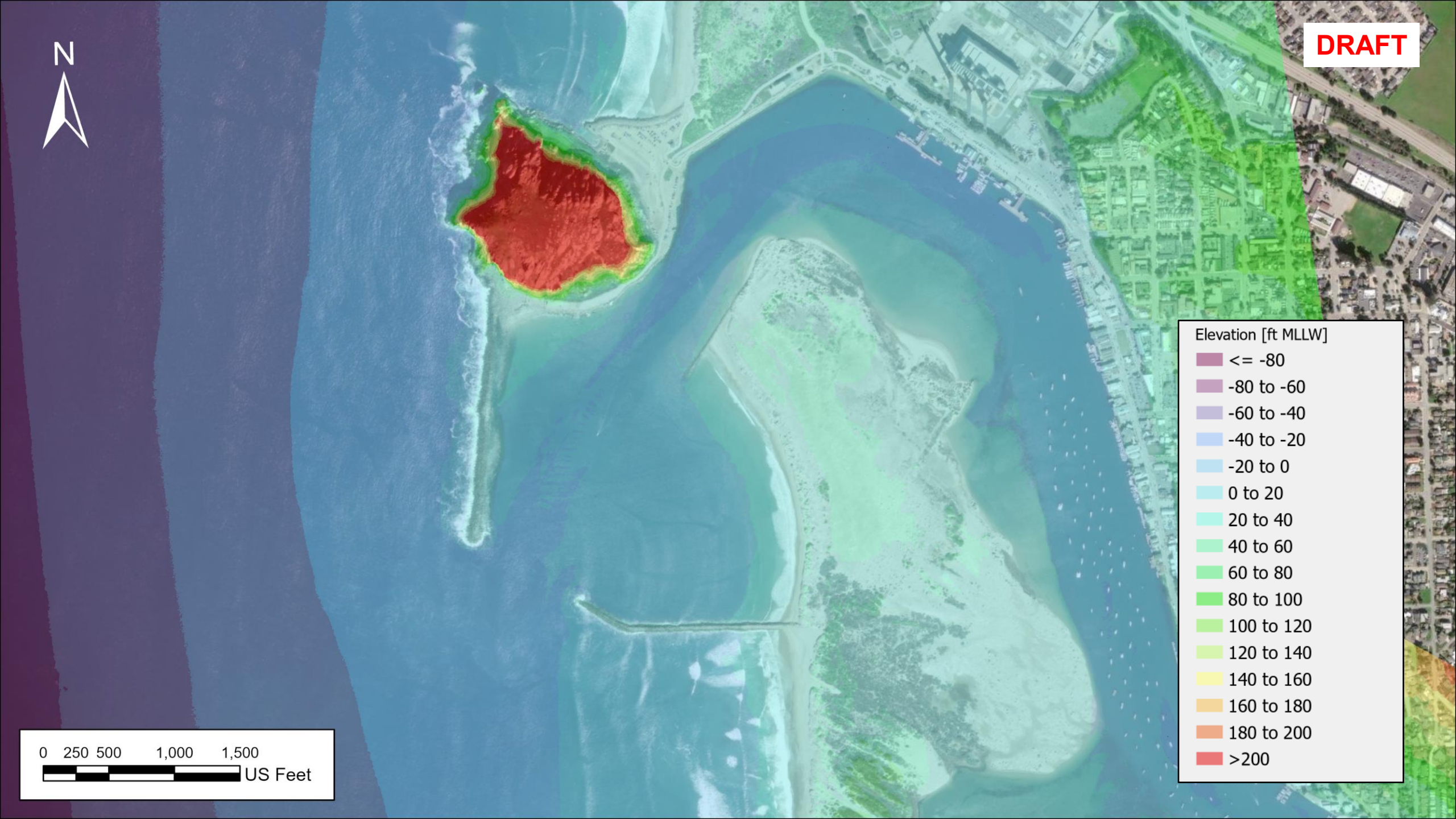


	Sand Trap
Project Depth	25ft

	Main Channel & Navy Channel
Project Depth	16 feet
Width	350 feet

	Morro Channel
Project Depth	12 feet
Width	150 feet

Measure D: Morro Bay law, known as “Measure D” stipulates that no new development can occur within the state-owned tidelands subject to city lease between Beach Street and Target Rock unless its primary use is commercial and noncommercial recreational fishing.
Figure & excerpt from REACH report (2022)

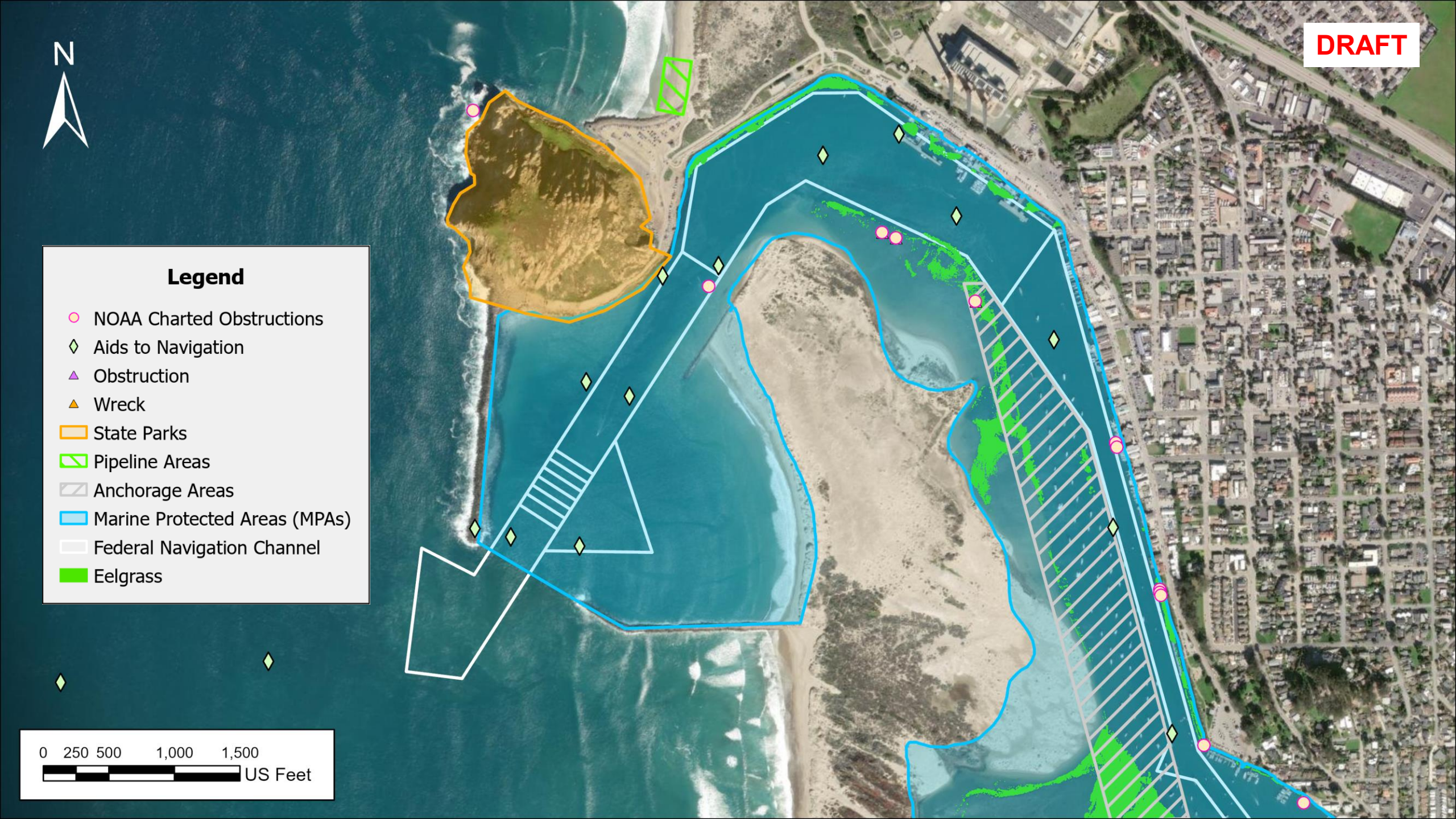

N
DRAFT
Elevation [ft MLLW]
<= -80
-80 to -60
-60 to -40
-40 to -20
-20 to 0
0 to 20
20 to 40
40 to 60
60 to 80
80 to 100
100 to 120
120 to 140
140 to 160
160 to 180
180 to 200
>200
0 250 500 1,000 1,500
US Feet


N
DRAFT
Hillshade figure generated using
USACE's survey data (2024-06-27)
0 250 500 1,000 1,500
US Feet

MPA

Notes

- State MPA
- Covers entire back bay


N
DRAFT
Legend
NOAA Charted Obstructions
Aids to Navigation
Obstruction
Wreck
State Parks
Pipeline Areas
Anchorage Areas
Marine Protected Areas (MPAs)
Federal Navigation Channel
Eelgrass
0 250 500 1,000 1,500
US Feet

B. Environmental constraints and feasibility analysis report (Rincon, 2026)

County of San Luis Obispo Operations and Maintenance Waterfront Infrastructure and Site Readiness Plan Study: City of Morro Bay

Environmental Constraints and Feasibility Analysis Report

prepared for

Mott MacDonald

prepared by

Rincon Consultants, Inc.
1530 Monterey Street, Suite D
San Luis Obispo, California 93401

April 2026

RINCON CONSULTANTS

Table of Contents

1 Executive Summary 1

2 Introduction 3
- 2.1 Study Area 3
- 2.2 Study Description 6
- 2.3 Purpose and General Methodology of this Constraints and Feasibility Report 13

3 Land Use and Zoning Setting 15
- 3.1 Environmental Setting 15
- 3.2 Regulatory Setting 18
  - 3.2.1 Federal and State Regulations 18
  - 3.2.2 Local Regulations 20

4 Biological Resources Setting 23
- 4.1 Regulatory Overview 23
  - 4.1.1 Definition of Special Status Species 23
  - 4.1.2 Environmental Statutes 23
- 4.2 Literature and Database Review 24
- 4.3 Existing Conditions 25
  - 4.3.1 Physical Characteristics 25
  - 4.3.2 Watershed and Drainages 25
  - 4.3.3 Vegetation Communities and Land Cover 27
  - 4.3.4 Marine Habitat Types 30
- 4.4 Sensitive Biological Resources 33
  - 4.4.1 Potential Special-Status Species 33
  - 4.4.2 Essential Fish Habitat, Habitat Areas of Particular Concerns, Environmentally Sensitive Habitat Areas, Designated Critical Habitat, and Marine Protected Areas 37
- 4.5 Biological Resources Recommendations 42

5 Environmental Compliance Pathways 43
- 5.1 Concept design Overview and Considerations 43
- 5.2 Environmental Permitting Requirements 43
  - 5.2.1 Federal Permitting 44
  - 5.2.2 State Permitting Overview 46
  - 5.2.3 Local Permitting Overview 48
- 5.3 Land Use and Zoning Considerations 51
- 5.4 CEQA and NEPA Requirements 57
  - 5.4.1 California Environmental Quality Act 57
  - 5.4.2 National Environmental Policy Act 58

6 Environmental Planning and Regulatory Permitting – Timelines and Costs 61
- 6.1 Environmental Planning 61
- 6.2 Regulatory Permitting 61
  - 6.2.1 Federal Permitting 62
  - 6.2.2 State Permitting 63
  - 6.2.3 Local Permitting 64

7 References 65

Tables

Table 1 Vegetation Communities and Land Cover Types in the APE 27
Table 2 Special-Status Species with Potential to Occur within the Study Area 34
Table 3 Federal, State, and Local Permitting Matrix 49
Table 4 Allowable Land Uses and Permit Requirements 53

Figures

Figure 1 Regional Location Map 4
Figure 2 Study Area and Area of Potential Effects 5
Figure 4 Option 4A Concept Design 8
Figure 5 Option 4B Concept Design 9
Figure 6 Split Location Variant A Concept Design 10
Figure 7 Split Location Variant B Concept Design 11
Figure 8 Split Location Variant C Concept Design 12
Figure 9 Land Use Plan Boundaries 16
Figure 10 Land Use Designations 17
Figure 11 Watershed and Drainages within the APE and adjacent Study Area 26
Figure 12 Vegetation Communities and Land Cover Types within the APE and adjacent Study Area 28
Figure 13 Marine Habitat Types within the APE 31
Open Water with Sandy Bottom 32
Figure 14 Essential Fish Habitat within the APE and adjacent Study Area 38
Figure 15 ESHA within the APE and adjacent Study Area 40
Figure 16 Critical Habitat within the APE and adjacent Study Area 41
Figure 17 Environmental Review and Land Use Permitting Flowchart 59

1 Executive Summary

Rincon Consultants, Inc. (Rincon) prepared this Environmental Constraints and Feasibility Analysis Report (Constraints and Feasibility Report) to support the Central Coast Offshore Wind Operations and Maintenance (OSW O&M) Infrastructure Study – Morro Bay (the Study), led by Mott MacDonald. The Study evaluates the feasibility of developing shore-based OSW O&M facilities to support offshore wind infrastructure in the Morro Bay Wind Energy Area. The Study evaluates multiple concept designs at two primary infrastructure locations, the North T-Pier and South T-Pier, and identifies five "least constrained" concepts. This Constraints and Feasibility Report evaluates the environmental feasibility of those least constrained concepts through a desktop-level analysis focused on the Study Area as a whole, as well as a refined Area of Potential Effects, addressing land use regulations, biological resources, environmental review requirements, and federal, State, and local permitting processes.

The Study Area includes the City of Morro Bay and surrounding nearshore and coastal areas and contains sensitive terrestrial and marine resources, including environmentally sensitive habitat areas, essential fish habitat, designated critical habitat, and special status species. Development of OSW O&M facilities would require comprehensive environmental review under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and coordination with multiple agencies, including the California Coastal Commission (CCC), California State Lands Commission, U.S. Army Corps of Engineers (USACE), City of Morro Bay, and resource agencies.

While recent legislation such as Senate Bill 286 provides opportunities to streamline permitting through a consolidated Coastal Development Permit (CDP), OSW O&M development in Morro Bay would remain subject to substantial regulatory review due to coastal resource sensitivities, land use constraints established by City of Morro Bay Measures A-24 and D, and public trust considerations. Furthermore, Senate Bill 286 does not preempt the City of Morro Bay's authority to require the necessary City of Morro Bay land use permits (e.g., Conditional Use Permits), rezoning, and land use designation changes, in accordance with the City's zoning code and applicable voter initiatives. The following broad steps and agency approvals would be anticipated to be required to permit development of the least constrained concept designs:

- City of Morro Bay and USACE adopt CEQA and NEPA documents for OSW O&M facilities.
- City of Morro Bay approves a land use and zoning designation change at the North T-Pier to permit OSW O&M facility development (applies to all the least constrained concept designs). The land use element map change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24. Development would have to comply with Measure D use limitations, which prioritize commercial fishing.
- City of Morro Bay approves land use and zoning designation change via a voter ballot initiative, to permit an Intermediate Staging Zone facility within the Vistra properties (applies to Option 4A, Split Location Variant B, and Split Location Variant C). The land use element map change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24. Development would have to comply with Measure D use limitations, as applicable, which prioritize commercial fishing.
- City of Morro Bay issues a Conditional Use Permit for OSW O&M facilities (applies to all of the least constrained concept designs).

- Federal and State environmental resources agencies (e.g., USACE, National Marine Fisheries Service, California Department of Fish and Wildlife, etc.) issue environmental permits (e.g., Clean Water Act Section 404 permit[s], Federal Endangered Species Act Section 7 incidental take statement[s], etc.).
- CCC issues a consolidated CDP.

OSW O&M development is potentially inconsistent with the City's current and recently updated General Plan, Zoning Code, and voter initiatives, all of which prioritize visitor serving and commercial fishing uses on the City's waterfront. Additionally, with a grant from the California Coastal Commission, the City is currently updating its Waterfront Master Plan to reinforce the existing zoning and General Plan designations and to further define its vision for transitioning former industrial and utility sites into visitor serving, recreational, cultural, and commercial fishing uses. While OSW O&M development is potentially feasible from an environmental and regulatory perspective, it would potentially require land use and zoning changes following the City of Morro Bay's entitlement process, including voter approval of land use designation changes in accordance with Measure A-24. Given this regulatory context, any future OSW developer would need to conduct significant public outreach, including community workshops to determine the actual feasibility of such facilities.

2 Introduction

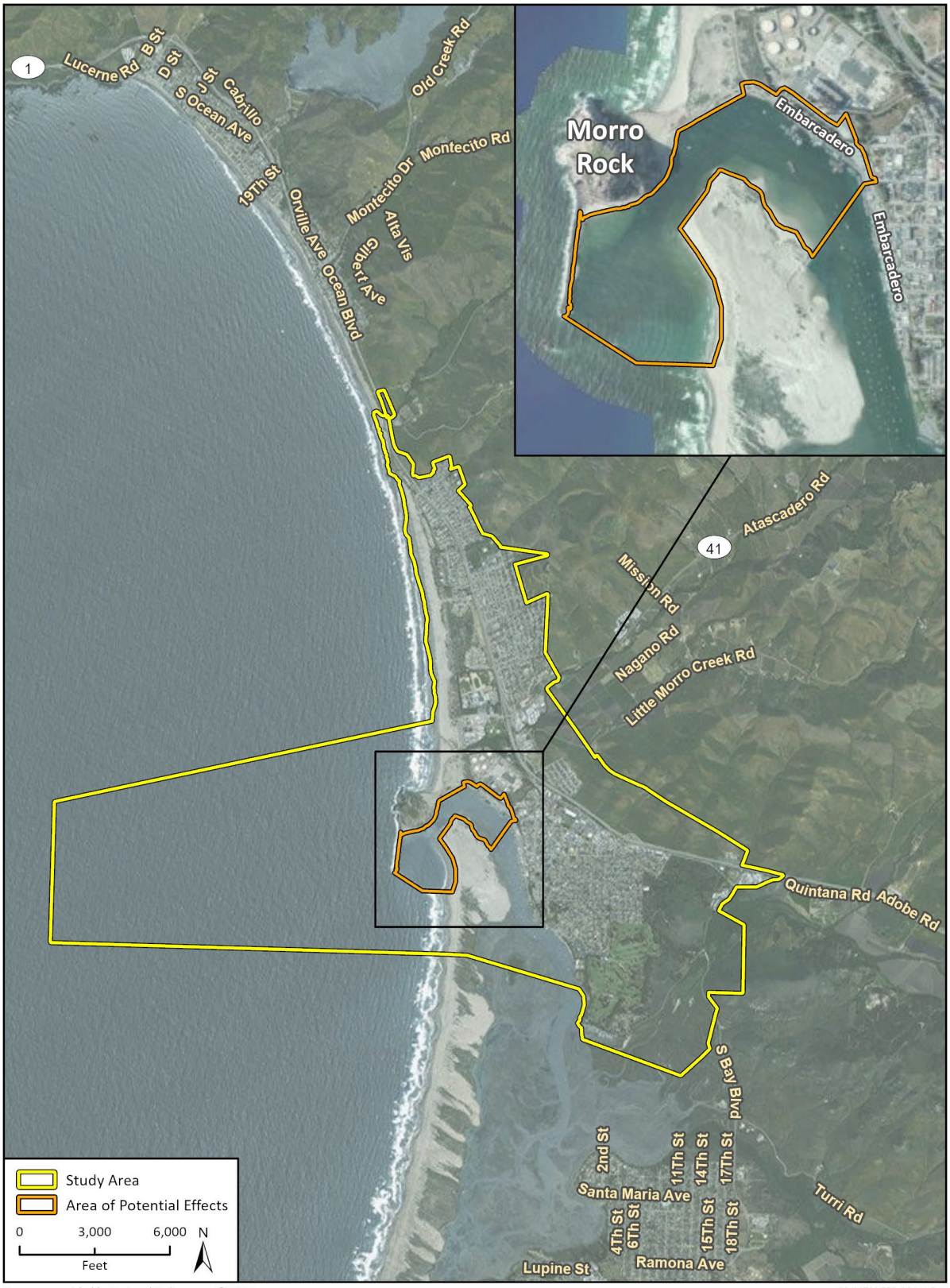
Rincon Consultants, Inc. (Rincon) prepared this Environmental Constraints and Feasibility Analysis Report (Constraints and Feasibility Report) for Mott MacDonald to inform the Central Coast Offshore Wind Operations and Maintenance Infrastructure Study—Morro Bay (the Study) commissioned by the County of San Luis Obispo (County) for the purposes of evaluating the requirements of an Offshore Wind (OSW) Operations and Maintenance (O&M) shore based facilities to serve offshore wind projects in the Morro Bay Wind Energy Area. The Study examines OSW O&M facility sites and conceptual designs in the Morro Bay Study Area (Study Area). The purpose of this Constraints and Feasibility Report is to identify, evaluate, and perform a technical analysis of the environmental planning, resources, and permitting constraints related to the conceptual designs identified in the Study for Morro Bay.

2.1 Study Area

The Study Area encompasses the City of Morro Bay, located in San Luis Obispo County, California (Figure 1). The Study Area is within the *Morro Bay North* and *Morro Bay South, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangles. The Public Land Survey System depicts the Study Area within Township 29S, Range 11E, Sections 11, 13-14, 23-26, 30-32, and 35-26 and Township 30S, Range 10E, Sections 01, 02, 05, and 06, Mount Diablo Meridian. The Study Area encompasses all of Morro Bay Harbor, as well as landside portions the City of Morro Bay. The Study Area includes a total of approximately3,352 acres of land and approximately 2,931 acres of water, including intertidal or submerged lands below Mean High Water (MHW) (Figure 2).

Figure 1 Regional Location Map

Figure 2 Study Area and Area of Potential Effects



Imagery provided by Esri and its licensors © 2025.

23-14713 EPS_Morro Bay
Fig 3 APE and Study Area

2.2 Study Description

San Luis Obispo County, as part of Assembly Bill (AB) 178, was awarded a $1,000,000 earmark for "the Deep Water Port Feasibility Study for Offshore Wind Procurement" and the County selected Mott MacDonald to complete a technical analysis pertaining to topics related to OSW O&M facility development. The Study, prepared by Mott MacDonald, provides an analysis of infrastructure, workforce development, and environmental matters pertaining to OSW O&M sites and identifies a range of concept designs that include a diversity of nearshore ocean, waterfront, and land development components and locations. Rincon, as part of the Mott MacDonald team, is serving as the local and regional environmental planning and permitting technical expert and works as an integrated Study team member to develop environmental constraints and feasibility assessments for the OSW O&M infrastructure concept designs described in the Study.

Mott MacDonald identified potential OSW O&M facility sites in Morro Bay as the first step in developing the Study. Site options were informed by previous siting studies and the functional requirements such as area, length, depth, and capacity needed to support OSW O&M vessels, maintenance activities, material and equipment storage, and administrative functions. The sites identified for the development of concept designs included areas centered around the North and South T-Piers in the northern portion of Morro Bay. Once site options were selected, concept designs were developed based on vessel berthing and operational requirements drawn from prior studies and direct coordination with OSW developers holding lease agreements in the Morro Bay Wind Energy Area. A functional requirements Basis of Assessment (BOA), described in detail in the Study, was developed to evaluate the potential sites and concept designs identified based on OSW O&M functional requirements alongside land use, environmental, and community considerations. Study Participants then scored the concept designs to identify the least constrained options. The sites and concept designs were evaluated and scored through collaborative virtual and in person meetings, site visits, and information sharing involving study participants including Mott MacDonald, Rincon, the County, City of Morro Bay, Morro Bay Harbor Department, California Coastal Commission (CCC), California State Lands Commission (CSLC), and U.S. Coast Guard (USCG). The Study describes the process of arriving at the initial concept designs and additional concept design modifications, identifies the least constrained concept designs, and reviews the land use and environmental constraints, and estimated OSW O&M development costs and timelines for the concept designs to inform future siting and decision making around OSW O&M facilities in Morro Bay.

The Study considers seven concept designs (including the Do Nothing concept), some of which include multiple variants. Three of the concept designs (Do Minimum, Option 1, and Option 2) would involve use of both the North and South T-Piers for OSW O&M facilities and activities. Three of the concept designs (Option 3, Option 4, and Split Location) would limit OSW O&M facilities and activities to the North T-Pier. Additionally, several concept designs (Option 1, Option 3, Option 4, and Split Location) include the purchase or lease of space on the Vistra properties located in the north of the Morro Bay harbor for development of an Intermediate Staging Zone and/or Upland Yard. The Intermediate Staging Zone would be a secure site used for short-term equipment and material staging, pre/post vessel operations, and personnel shuttle parking. The Upland Yard would be utilized for long-term O&M facilities, including warehouses, office space, workshops, and staff parking. For a full list of all the concept designs considered, refer to Table 4.4 and Section 4.6 of the Study.

As described in depth in the Study, Option 4 was determined to be the least constrained concept design. Two variants for Option 4 were developed to cover potential property acquisition and leasing outcomes, as described below:

- **Option 4A: Development of O&M facility with partial acquisition of the Vistra Waterfront Property.** Existing USCG and Morro Bay Harbor Department offices would remain in place with access to upgraded finger piers. An Intermediate Staging Zone would be developed on the acquired portion of the Vistra property. Refer to Figure 4.
- **Option 4B: Development of O&M facility without acquisition of the Vistra Waterfront Property.** An Intermediate Staging Zone would be constructed in the "triangle lot" north of the Morro Bay Maritime Museum. The USCG and Morro Bay Harbor Department offices would remain in place with access to upgraded finger piers. Refer to Figure 5.

In addition, a split-location conceptual design, which would be utilized in the event that the Morro Bay OSW O&M facility would only host one (rather than three) OSW developers, was also considered in the Study. Three variants of the Split-Location concept design, all using the same base design, were developed, as described below:

- **Split Location Variant A: Development of the O&M facility without acquisition or leasing of Vistra property.** The existing North T-Pier would be reconstructed. The Morro Bay Harbor Department and the USCG office would remain in place. A new USCG facility or hut could be constructed on the north tip of the pier head, and the Morro Bay Harbor Department would either have access to the existing USCG building or an adjacent plot such as a conversion of the public restrooms. The Intermediate Staging Zone could be located within the "triangle lot", north of the Morro Bay Maritime Museum. Refer to Figure 6.
- **Split Location Variant B: Development of the O&M facility with a lease or purchase arrangement for the Vistra waterfront property**. Similar to Variant A, the existing North T-Pier would be reconstructed. The Morro Bay Harbor Department office would be demolished and the USCG office would remain in place. A new USCG facility or hut could be constructed on the north tip of the pier head, and the Morro Bay Harbor Department would either have access to the existing USCG building or an adjacent plot such as a conversion of the public restrooms. The Intermediate Staging Zone would be located within the Vistra waterfront property. Refer to Figure 7.
- **Split Location Variant C: Development of the O&M facility with a lease or purchase arrangement for the Vistra Waterfront Property and Power Station property**. The existing North T-Pier would be reconstructed. The Morro Bay Harbor Department office would be demolished. A new Morro Bay Harbor Department office could either be constructed above the existing public restrooms, or a new building on the Vistra waterfront property could host both USCG and Harbor Department, with secure berths. The intermediate staging zone would be located on the opposite side of Embarcadero on the Vistra powerplant property. Refer to Figure 8.

Figure 3 Option 4A Concept Design

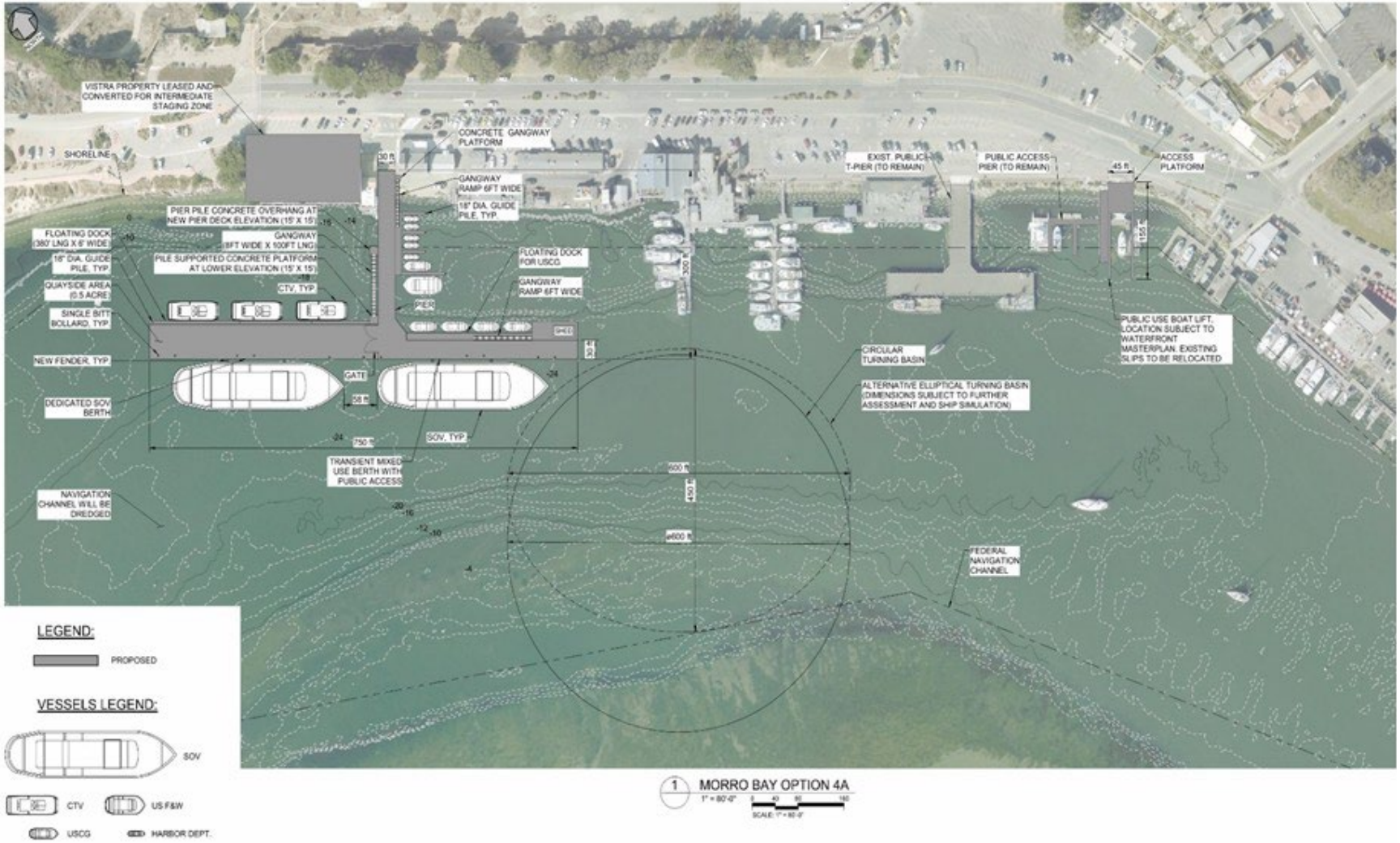


Figure 4 Option 4B Concept Design

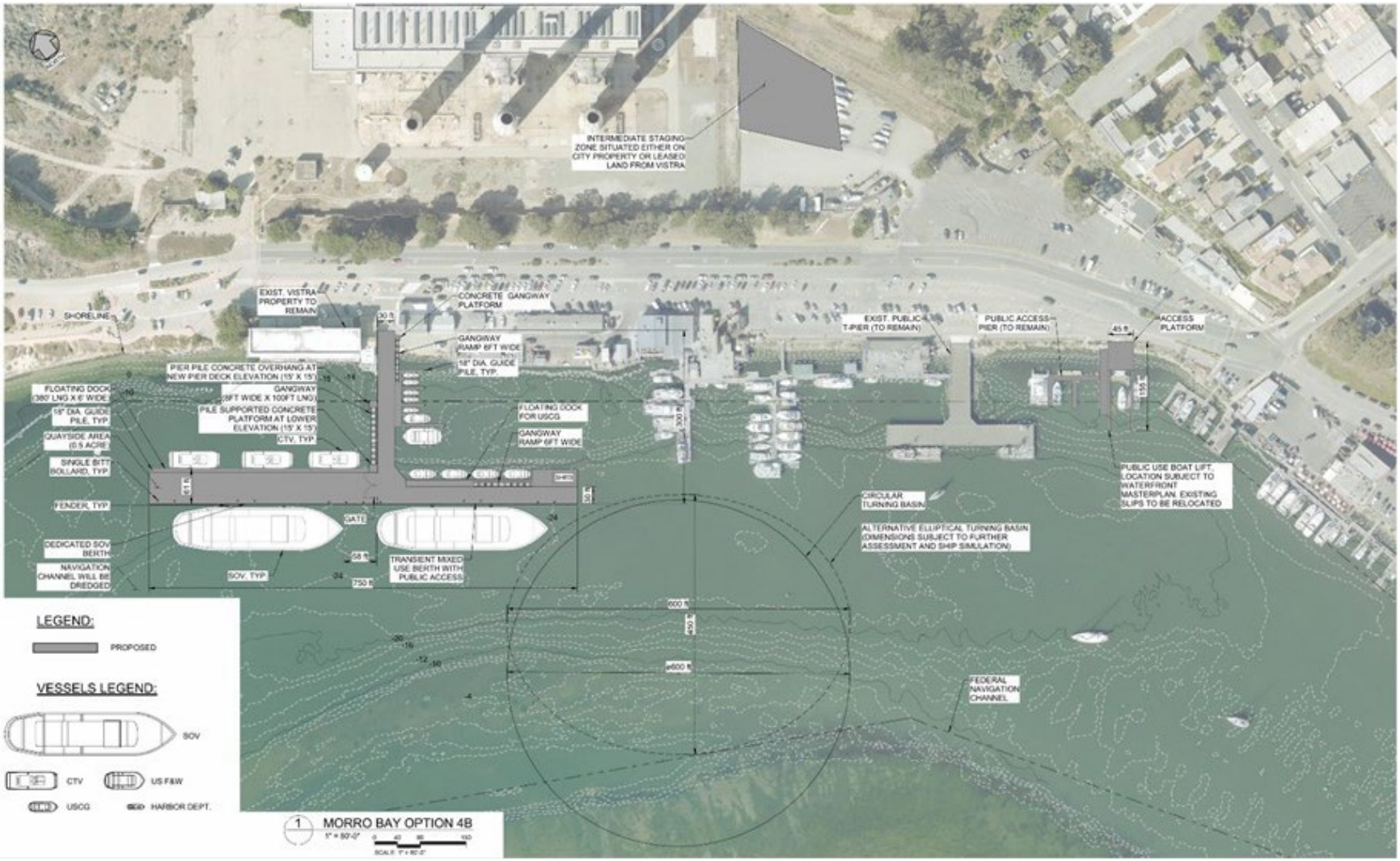


Figure 5 Split Location Variant A Concept Design

Figure 6 Split Location Variant B Concept Design

Figure 7 Split Location Variant C Concept Design

2.3 Purpose and General Methodology of this Constraints and Feasibility Report

This Constraints and Feasibility Report, included as Appendix C of the Study, is intended to assist the Study Team with evaluating land use, environmental review, biological resource, and regulatory permit constraints, processes, anticipated timelines, and estimated costs for studies and permitting to develop OSW O&M facilities in Morro Bay, including the least constrained concept designs. This Constraints and Feasibility Report is not intended to select or identify a preferred concept design but rather to define and describe the environmental review and resource parameters and considerations that would be needed for the development of an OSW O&M facility in the Study Area.

This Constraints and Feasibility Report provides a comprehensive assessment of land use, environmental planning, and biological resources constraints within the Study Area based on a desktop review. The assessment of landside locations was conducted based on Accessor Parcel Number (APN) size and proximity to the Morro Bay harbor. Parcels of one to 100 acres within the Study Area were reviewed for feasibility of development of OSW O&M facilities. During the development and evaluation of potential concept designs for OSW O&M facilities, significant portions of the Study Area were removed from future consideration due to operational, resource, or land use constraints. Therefore, this Constraints and Feasibility Report also provides a refined analysis that focuses on an Area of Potential Effects (APE) based on the least constrained concept designs identified in the Study. The APE is illustrated in (Figure 2).

This Constraints and Feasibility Report contains a detailed review of 1) regional and local land use ordinances; 2) environmental planning and associated special studies needed; 3) biological resources in the Study Area and APE; and 4) regulatory agency approvals and permitting considerations for the least constrained concept designs.

This page intentionally left blank.

3 Land Use and Zoning Setting

3.1 Environmental Setting

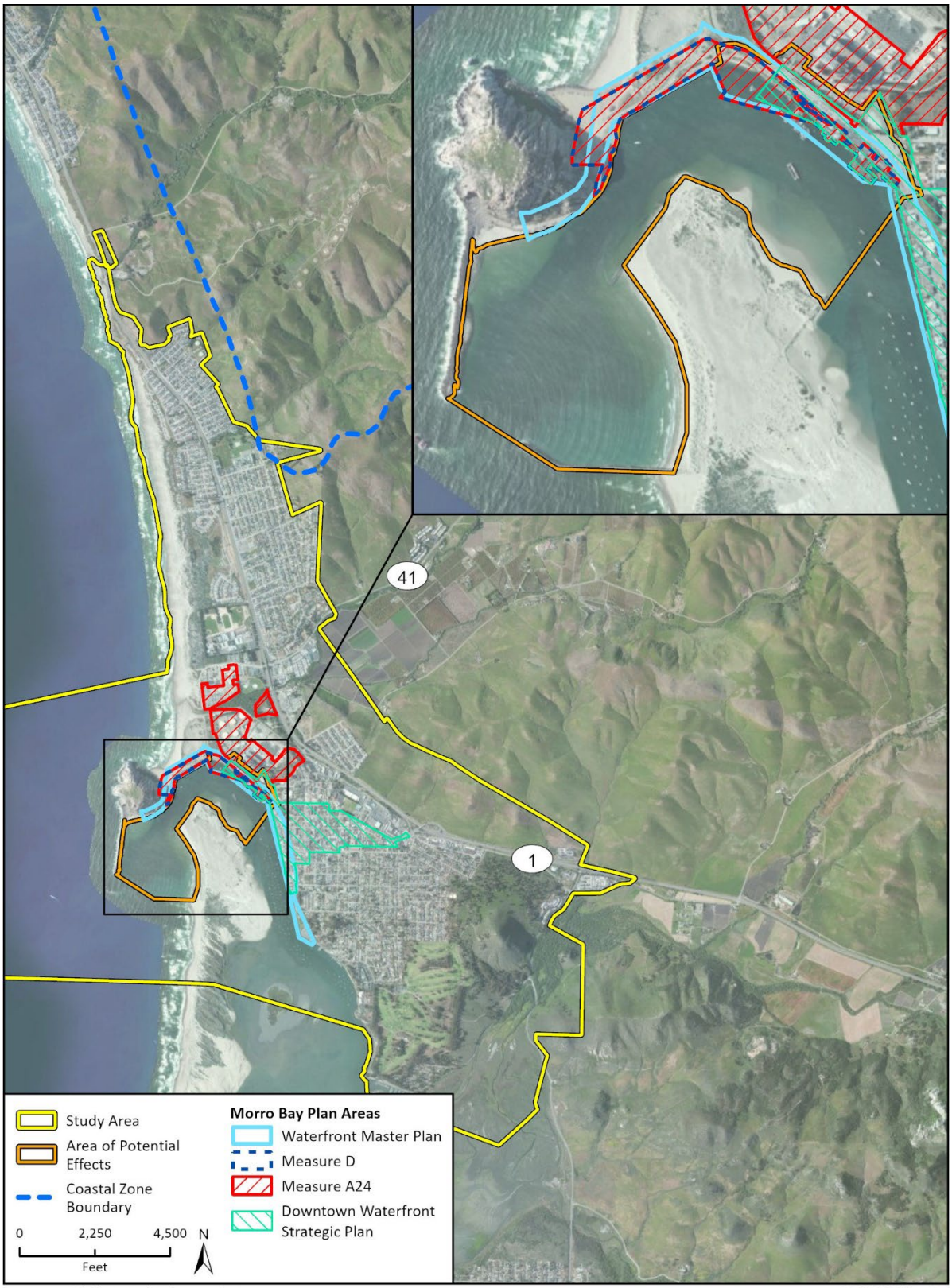
The Study Area is limited to land within the City of Morro Bay (City) and is entirely within the Coastal Zone. The land uses within the Study Area are governed by the Morro Bay General Plan and zoning code, as well as the Waterfront Master Plan, Downtown Waterfront Strategic Plan, Measures A-24 and D, and State Tidelands Grant conditions. The Study Area boundary and applicable land use plan areas are illustrated in Figure 9.

The least constrained concept designs include alterations and new facilities at the North T-Pier within Morro Bay harbor. The North T-Pier has a land use designation of commercial/Recreational Fishing and zoning designation of Commercial Fishing. Measures A-24 and D apply to the North T-Pier. The following land use designations apply to the Intermediate Staging Zone locations included in the least constrained concept designs:

- Option 4A: Intermediate Staging Zone is located on parcel with a land use designation of Commercial/Recreational Fishing and zoning designation of Commercial Fishing. Measures A-24 and D apply to this site.
- Option 4B: Based on the City's land use and zoning GIS maps and concept design figures, the Intermediate Staging Zone appears to be located within City property (a parking area) within the public right-of-way (no zoning or land use designation is established for this location). Measure A-24 and Measure D do not apply to this site.
- Split Location Variant A: Intermediate Staging Zone is located on parcel with a land use designation of Public/Institutional and zoning designation of Public Facility. Measures A-24 and D do not apply to this site.
- Split Location Variant B: Intermediate Staging Zone is located on parcel with a land use designation of Commercial/Recreational Fishing and zoning designation of Commercial Fishing. Measures A-24 and D apply to this site.
- Split Location Variant C: Intermediate Staging Zone is located on parcel with land use and zoning designations of Visitor Serving Commercial. Measure A-24 applies to this site, but Measure D does not apply.

Land use designations within the City of Morro Bay city limits (Study Area) are illustrated in Figure 10.

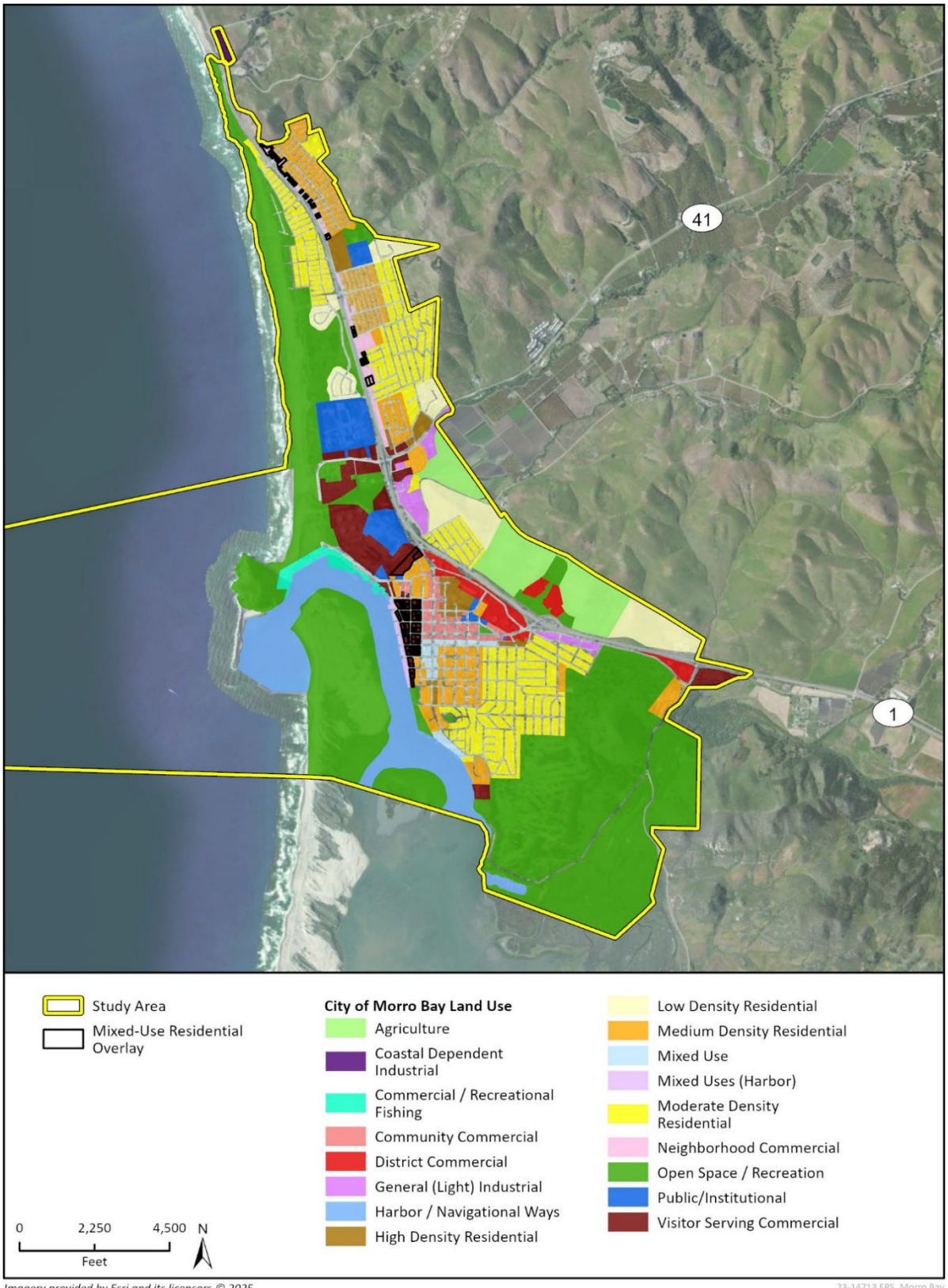
Figure 8 Land Use Plan Boundaries



Imagery provided by Esri and its licensors © 2026.
Additional data provided by City of Morro Bay, 2025.

23-14713 EPS_Morro Bay
Fig X Land Use Plan Boundaries

Figure 9 Land Use Designations



3.2 Regulatory Setting

The OSW O&M facility concept designs evaluated in this report are located at least in part in City of Morro Bay public trust tidelands and submerged lands administered by CSLC and granted to San Luis Obispo County, which later transferred the Grant to the City of Morro Bay (Chapter 1076, Statutes of 1947). These public trust lands are required to be managed in the public's interest for the promotion and accommodation of commerce and commercial as well as recreational navigation by air and by water. Additional trust purposes include recreational use, a public park, parking, highway, playground, and business incidental to these uses. Each concept design involves complex environmental review and permitting processes that require coordinated authorizations and concurrence from federal, State, and local agencies due to the multi-jurisdictional scope and overlapping priorities and policies.

Given the above, each of the concept designs would be subject to CCC and CSLC concurrence and City of Morro Bay regulations and policies. Any future proposals for OSW O&M development would also be subject to the California Environmental Quality Act (CEQA), with potential requirements for the National Environmental Policy Act (NEPA) depending on funding sources and agency permit requirements. The various federal, State, and local regulations applicable to the Study Area are described in the following subsections.

3.2.1 Federal and State Regulations

National Environmental Policy Act

NEPA was signed into law in 1970. NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. The range of actions covered by NEPA is broad and includes:

- Making decisions on permit applications,
- Adopting federal land management actions, and
- Constructing highways and other publicly-owned facilities.

Using the NEPA process, federal agencies must evaluate the environmental and related social and economic effects of their proposed actions. Agencies also provide opportunities for public review and comment on those evaluations.

40 Code of Federal Regulations (CFR) Parts 1500-1508 contain regulations guiding the implementation of NEPA. The regulations address the procedural provisions of NEPA and the administration of the NEPA process, including the preparation of environmental impact statements. In addition to these NEPA regulations, many federal agencies have also developed their own NEPA procedures that supplement the regulations contained in 40 CFR Parts 1500-1508. These NEPA procedures vary from agency to agency since they are tailored for the specific mission and activities of the agency (United States Environmental Protection Agency [USEPA] 2025a). It is anticipated that a joint CEQA/NEPA document or similar would be prepared, with coordination occurring between the NEPA responsible entity and CEQA lead agency, to streamline the OSW O&M facility environmental review process.

California Environmental Quality Act

CEQA was signed into law in 1970. Similar to NEPA, CEQA requires State and local government agencies to inform decision makers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. CEQA applies to discretionary actions undertaken, funded, or requiring a permit by a State or local public agency.

The laws and rules governing the CEQA process are contained in the CEQA statute (Public Resources Code Section 21000 and following), the CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 and following), published court decisions interpreting CEQA, and locally adopted CEQA procedures (California Governor's Office of Land Use and Climate Innovation [LCI] 2025).

California Coastal Act

The California Coastal Act (Coastal Act) was enacted in 1976. The Coastal Act guides how land along the coast of California is developed or protected from development. It emphasizes the importance of the public being able to access the coast, and the preservation of sensitive coastal and marine habitat and biodiversity. It dictates that development be clustered in areas to preserve open space, and that coastal agricultural lands be preserved. It prioritizes coastal recreation as well as commercial and industrial uses that need a waterfront location. The Coastal Act defines the area of the coast that comes under the jurisdiction of the California Coastal Commission (CCC), which is called the "coastal zone." The Coastal Zone extends seaward to the State's outer limit of jurisdiction (three miles), including offshore islands. The inland boundary varies according to land uses and habitat values. In general, it extends inland 1,000 yards from the mean high tide line of the sea, but is wider in areas with significant estuarine, habitat, and recreational values, and narrower in developed urban areas. Coastal Zone boundary maps are available on the CCC website (CCC 2017). The laws and regulations established by the Coastal Act are contained in Public Resources Code Section 230000 through 30900.

State Tidelands Grant

In 1947, the County of San Luis Obispo was granted sovereign tide and submerged lands in a portion of Morro Bay to hold in trust to operate a harbor and for facilities necessary or convenient to promote commerce and navigation (Chapter 1076, Statutes of 1947; CSLC 2025). In 1960, the grant was amended to provide for additional trust purposes including recreational use, and a public park, parking, highway, playground, and business incidental to these uses. The County transferred the title of the tide and submerged lands to the City of Morro Bay when the City was annexed in 1964. As the trustee and successor in interest to these tidelands, the City must comply with the County's granting statute (CSLC 2025).

California Senate Bill 286

California Senate Bill (SB) 286, the Offshore Wind Expediting Act, was signed into law in October 2023 (Chapter 386, Stats. 2023). It streamlines offshore wind development by enabling a consolidated coastal development permit, allowing CCC to issue one unified coastal development permit for offshore wind infrastructure, including associated in-zone transmission facilities and support facilities, when coordinated with local agencies. Local agencies are invited to review and participate in the consolidated permitting process, but the CCC has ultimate approval rights. Pursuant to Public Resources Code Section 30601.3b, the standard of review for a consolidated coastal development permit application is the California Coastal Act. However, the applicable local

coastal program (LCP) is used as guidance. SB 286, however, does not override local land use or zoning designations, including permitting requirements and voter initiatives per the City of Morro Bay's Zoning Code.

SB 286 also designates the CSLC as the lead agency under CEQA, centralizing environmental review and promoting joint NEPA/CEQA documentation. On CSLC granted lands, such as those granted to the City of Morro Bay, the grantee may take the CEQA lead agency role. To protect ocean ecosystems and fishing communities, SB 286 creates a Fisheries Working Group charged with developing a statewide strategy to minimize impacts on fisheries, design mitigation protocols, and establish an Offshore Wind Energy Resiliency Fund to provide compensation and assistance to affected communities. Finally, it mandates a two-year stakeholder process to build long-term planning standards for permitting, environmental safeguards, and workforce development, helping California meet its offshore wind targets while considering coastal and community interests.

3.2.2 Local Regulations

City of Morro Bay General Plan

The Morro Bay General Plan, titled Plan Morro Bay, was adopted in 2021. Plan Morro Bay is the City of Morro Bay's General Plan and LCP Land Use Plan (LUP). It presents a community vision for Morro Bay through 2040 and contains 10 elements that identify particular resources or issues within the City and provide guidance for future planning decisions. Elements that are particularly relevant to the land use constraints for the potential concept being considered in this report include the Land Use Element, Conservation Element, and Open Space Element, described further below (Morro Bay 2021).

Land Use Element

The Land Use Element outlines a framework for land uses and infrastructure are organized within the City. The Land Use Element also establishes standards for building density and intensity. Additionally, this element addresses development within the coastal zone by identifying and protecting coastal-dependent and coastal-related uses, recreation and visitor-serving uses, energy and industrial development, and archaeological and cultural resources. The Land Use Element contains information, goals, and policies that guide the land use decisions for existing and future development within the City and its sphere of influence.

Conservation Element

The Conservation Element identifies and discusses resources including water, forests, soils, harbors, fisheries, wildlife, minerals, and energy. The Conservation Element also discusses greenhouse gas emissions and air quality impacts, and outlines a strategy to work in coordination with countywide agencies responsible for managing conservation efforts. The Conservation Element seeks to balance the City's development plans with conservation requirements and priorities. It also addresses climate change and emphasizes policies that will avoid problems, mitigate anticipated impacts when possible, and adapt to changes when mitigation is not possible. Goals established by the Conservation Element include preservation of sensitive habitats, promotion of resource conservation, and decreased emissions and waste.

Open Space Element

The Open Space Element establishes goals and policies to protect and conserve Morro Bay's open space resources and addresses opportunities to expand the open space system by assessing park and trail facilities, coastal facilities, and recreation programs. The Open Space Element protects open space for the preservation of natural resources, managed resource production, outdoor recreation, and public health and safety. The Open Space Element also includes goals and policies consistent with the requirements of the Coastal Act related to coastal recreation and coastal access.

Downtown Waterfront Strategic Plan

The Downtown Waterfront Strategic Plan was adopted in 2018. It establishes a vision for revitalizing Morro Bay's Embarcadero and downtown waterfront, emphasizing climate resilience and sea level rise adaptation, protection of environmentally sensitive habitats, improved public access, and support for visitor-serving commercial uses. The plan designates former infrastructure sites, including a decommissioned power plant and wastewater treatment facility, for master planning processes and mixed uses, with zoning aligned to balance public access, commercial and residential uses, and ecological safeguards—consistent with Coastal Commission priorities (Morro Bay 2018).

Waterfront Master Plan

The Waterfront Master Plan was adopted in 1996. The Waterfront Master Plan is a policy-level blueprint guiding land use, circulation, infrastructure, and design along Morro Bay's waterfront, from Tidelands Park and the Embarcadero south to Morro Rock, laying out background context, historic character, public-access improvements, and conceptual frameworks with a traditional "fishing village" aesthetic. It includes development guidelines on building scale, architectural style, and visitor-serving density, along with implementation strategies and future action steps. The plan also addresses vehicular and pedestrian circulation, public access points, and parking configurations (Morry Bay 1996a).With a grant from the California Coastal Commission, the City is currently updating its Waterfront Master Plan to reinforce the waterfront's existing zoning and General Plan designations and to further define its vision for transitioning former industrial and utility sites into visitor serving, recreational, cultural, and commercial fishing uses.

Measure A-24

Measure A-24 was a voter-approved ballot initiative in Morro Bay (November 5, 2024) that amended the City's General Plan to freeze the land use designation of "Visitor-Serving Commercial" or "Commercial/Recreational Fishing" on approximately 103 acres of the city near the waterfront, including the former Morro Bay Power Plant site (Vistra property), parcels along both sides of Embarcadero Road, and near Morro Rock and Coleman Drive (refer to Figure 9 for the boundaries within which Measure A-24 applies). Under this measure, any future changes to the land use designations in this area require approval by a majority vote of city residents (Morro Bay 2024).

Measure D

Measure D was a citizen-initiated local ordinance approved by Morro Bay voters in 1981 to protect the working waterfront character north of Beach Street. It reserves that portion of the harbor exclusively for uses "primarily for the purpose of serving or facilitating licensed commercial fishing activities or noncommercial recreational fishing activities, or clearly incidental thereto." The measure effectively bans new restaurants, gift shops, tour boats, hotels, or other visitor-serving developments within that designated area, preserving berthing and lease sites for commercial

fishing and related support functions unless those uses had been in place prior to Measure D. It can only be amended or repealed via another voter-approved measure (Historical Society of Morro Bay N.d.). Any future change to the land use designation in this area requires approval by a majority vote of city residents.

Morro Bay Zoning Code

Title 17 of the Morro Bay Municipal Code (MBMC) establishes the City's Zoning Code. The zoning code was comprehensively rewritten and adopted in November 2022 and certified by CCC in March 2024 as part of the Plan Morro Bay General Plan and LCP implementation. It establishes the zoning districts, allowable land uses, development standards, overlay zones (including environmentally sensitive habitat areas and coastal overlay zones), and design guidelines for the entire city. It also defines site regulations, such as parking, signage, setbacks, and nonconforming uses, along with administrative processes for permits, appeals, and enforcement, all aligned with State coastal planning requirements and local design objectives (Morro Bay 2025).

4 Biological Resources Setting

4.1 Regulatory Overview

Regulated or sensitive biological resources studied and analyzed herein include special status plant and animal species, nesting birds and raptors, sensitive plant communities, jurisdictional waters and wetlands, wildlife movement, and locally protected resources, such as native oak trees and environmentally sensitive habitat areas (ESHAs). Regulatory authority over sensitive biological resources is shared by federal, State, and local authorities. Primary authority for regulation of general biological resources lies within the land use control and planning authority of local jurisdictions (in this instance, the City of Morro Bay).

4.1.1 Definition of Special Status Species

For the purposes of this report, special status species include:

- Species listed as threatened or endangered under the Federal Endangered Species Act (FESA); species that are under review (i.e., those that are candidates or proposed for listing) may be included if there is a reasonable expectation of listing within the life of the project.
- Species listed as candidate, threatened or endangered under the California Endangered Species Act (CESA).
- Plant species listed as rare under the Native Plant Protection Act (NPPA; i.e., California Fish and Game Code [CFGC] Section 1900 et seq.).
- Species designated as Fully Protected, Species of Special Concern, or Watch List by the California Department of Fish and Wildlife (CDFW).
- Species designated as California Rare Plant Rank (CRPR) 1 or 2 by the California Native Plant Society (CNPS).
- Species managed and regulated under the Marine Mammal Protection Act (MMPA).
- Designated as a species of concern by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) or NOAA Fisheries as Species of Concern.
- Species designated as locally important by the lead local agency and/or otherwise protected through ordinance or local policy.

4.1.2 Environmental Statutes

For the purpose of this report, potential impacts to biological resources were analyzed based on the following statutes:

- CEQA
- NEPA
- FESA
- CESA
- NPPA
- Federal Clean Water Act (CWA)
- CFGC

- Migratory Bird Treaty Act (MBTA)
- The Bald and Golden Eagle Protection Act
- Porter-Cologne Water Quality Control Act
- California Coastal Act
- MMPA
- Magnuson-Steven Fishery Conservation and Management Act
- Rivers and Harbors Act of 1899
- Coastal Zone Management Act
- National Invasive Species Act
- Marine Life Protection Act
- Marine Life Management Act
- Marine Invasive Species Act
- Morro Bay General Plan
- Morro Bay Local Coastal Program

4.2 Literature and Database Review

Rincon conducted a literature review to assess the potential presence of special-status biological resources, including habitat for plant and wildlife species, sensitive plant communities, ESHAs, and suitable habitat for nesting birds, in the broader Study Area and identified APE for the highest ranking concept designs. The review included an evaluation of current and historical aerial photographs of the APE (Google Earth 2025), regional and site-specific topographic maps, and climatic data (Western Regional Climate Center 2025).

Queries of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation system (IPaC; UFWS 2025a), CDFW California Natural Diversity Database (CNDDB; CDFW 2025a), and CNPS Rare Plant Inventory (2025) were conducted to obtain comprehensive information regarding State and federally listed species, and other special-status species, considered to have potential to occur within six USGS quadrangles, including the *Morro Bay North* and *Morro Bay South*, *California* USGS 7.5-minute topographic quadrangles and the surrounding four quadrangles[1] (*Atascadero, San Luis Obispo, Pismo Beach,* and *Port San Luis*). The results of database queries and lists of special-status species were reviewed by Rincon's regional biological experts for accuracy and completeness. The final list of special-status biological resources (species and sensitive natural communities) was evaluated based on documented occurrences within a six-quadrangle radius search area and biologists' expert opinions on species known to occur in the region. Plants with CNPS CRPR 3 and 4 were not considered in the evaluation.

The following resources were reviewed for additional information on existing conditions relating to biological resources within the Study Area:

- Critical Habitat Portal (USFWS 2025b)
- Critical Habitat Mapper (NMFS 2025)
- Biogeographic Information and Observation System (CDFW 2025b)

[1] A six -USGS quadrangle search was conducted instead of a standard nine-quadrangle search due to the coastal location of the project area.

- National Wetlands Inventory (NWI; USFWS 2025c)
- National Hydrography Dataset (NHD; USGS 2025)

The potential for wildlife movement corridors was evaluated based on the California Essential Habitat Connectivity Project commissioned by the California Department of Transportation and CDFW (Spencer et al. 2010).

4.3 Existing Conditions

This section provides an overview of existing conditions within the Study Area, including physical characteristics, soil types, vegetation communities, marine habitat types, and biological resources, including special status plant and wildlife species.

4.3.1 Physical Characteristics

Morro Bay is situated on California's central coast and is defined by a distinctive coastal topography featuring the iconic Morro Rock, a volcanic plug, and an expansive estuary bordered by dynamic sand dunes and a sand spit. This semi-enclosed embayment, part of Estero Bay, is characterized by its protected inner harbor, extensive mudflats, and critical eelgrass beds, which serve as vital habitats for a rich diversity of marine life, including southern sea otter (*Enhydra lutris nereis*). Elevations within the immediate port area range from 0 meters at sea level to the 177 meters (581 feet) of Morro Rock, with higher coastal hills forming part of the Santa Lucia Range extending further inland. The region experiences a Mediterranean climate, marked by mild, wet winters and dry summers, with a consistent marine layer often bringing morning fog. Average annual temperatures typically range from 13 degrees Celsius (°C) to 20°C (55 degrees Fahrenheit [°F] to 68°F), influenced by prevailing northwesterly winds and seasonal upwelling events that enrich the marine environment with cool, nutrient-laden waters, supporting a productive ecosystem.

4.3.2 Watershed and Drainages

The Study Area is located within and adjacent to Morro Bay and the Pacific Ocean. The Study Area occurs within the Morro Bay Watershed (Hydrologic Unit Code [HUC]: 180600060503), Islay Creek – Frontal Pacific Ocean Watershed (HUC: 180600060504), Chorro Creek Watershed (HUC: 180600060502), Morro Creek Watershed (HUC: 180600060412), and Willow Creek – Frontal Pacific Ocean Watershed (HUC: 180600060413) (USEPA 2025b). The NWI maps Estuarine Marine and Deepwater, Estuarine and Marine Wetland, Freshwater Forested/Shrub Wetland, and Riverine habitats within the APE and adjacent Study Area (USFWS 2025). The NHD also maps four drainages, including Morro Creek, Little Morro Creek, and two unnamed drainages, within the Study Area adjacent to the APE (USGS 2025). The Study Area is also located within the Morro Bay State Marine Recreational Management Area (SMRMA) and Morro Bay State Marine Reserve (SMR; CDFW 2025b). Figure 11 depicts watersheds and drainages that overlap with the APE and adjacent Study Area.

Figure 10 Watershed and Drainages within the APE and adjacent Study Area

Imagery provided by Esri and its licensors © 2026.
Hydrology data provided by USGS and USFWS, 2025.

23-14713 BIO_Morro Bay
Fig X NHD_NWI

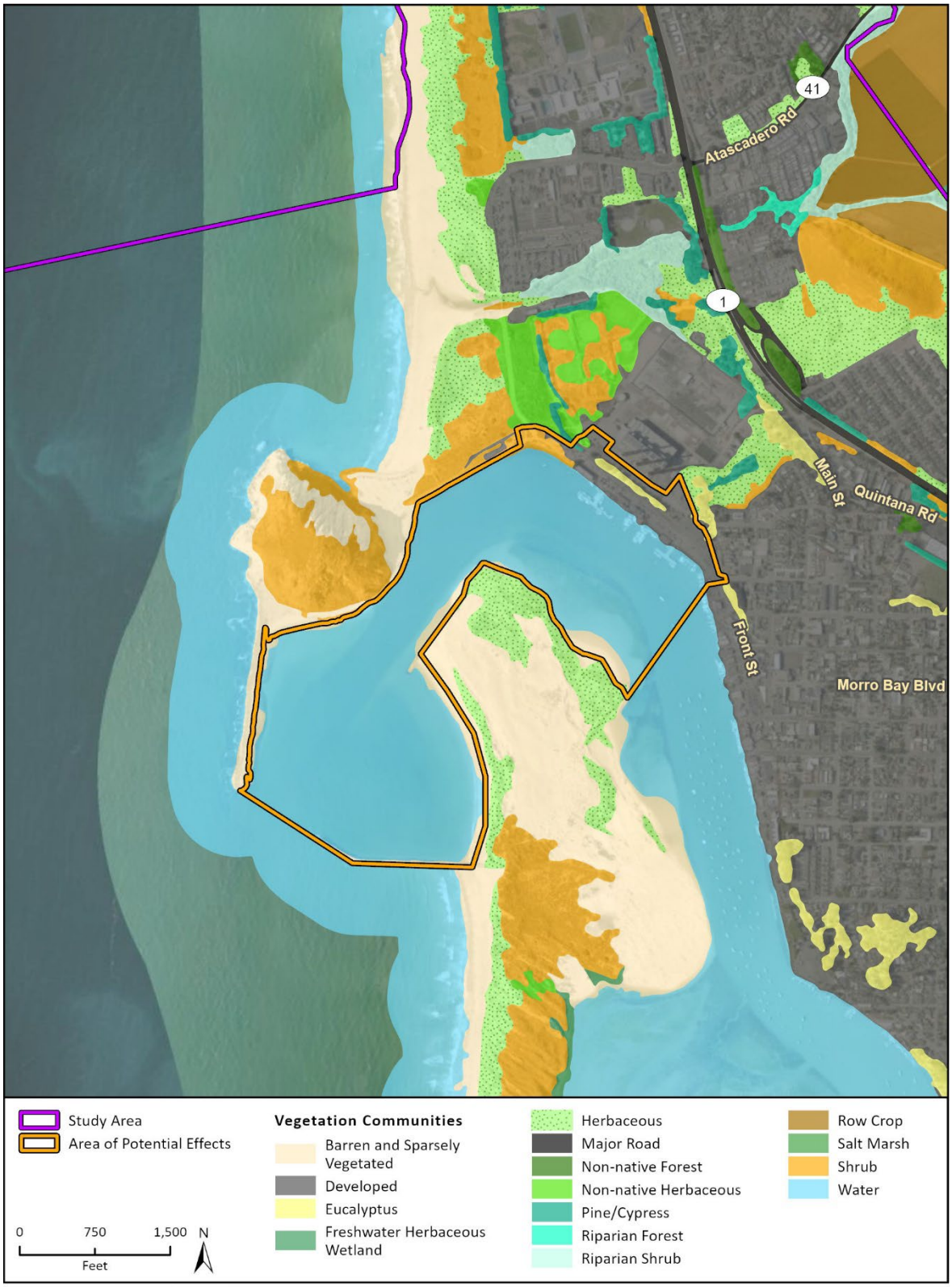
4.3.3 Vegetation Communities and Land Cover

Ten vegetation communities and five land cover types were identified within the APE (Table 1). Descriptions of the vegetation communities and land cover types found within the APE are provided below and locations of vegetation communities and land cover types within the APE are depicted in Figure 12. Vegetation community and land cover data and descriptions were retrieved from the Pacific Veg Map, which includes data from the Coastal San Luis Resource Conservation District and CDFW (Pacific Veg Map 2025).

Table 1 Vegetation Communities and Land Cover Types in the APE

Vegetation Community/Land Cover Type	Acreage
Barren and Sparsely Vegetated	14.38
Developed	15.19
Eucalyptus	1.35
Herbaceous	0.22
Non-native Herbaceous	0.31
Pine/Cypress	0.10
Shrub	2.77
Water	183.61

Figure 11 Vegetation Communities and Land Cover Types within the APE and adjacent Study Area



Imagery provided by Esri and its licensors © 2026.
Vegetation data provided by Coastal San Luis RCD & CDFW 2024 via Pacific Veg Map.

23-14713 BIO_Morro Bay
Fig X Vegetation Communities

Barren and Sparsely Vegetated

Barren and Sparsely Vegetated land cover consists of areas that are generally devoid of vegetation. This land cover type includes areas comprised of 10 percent or less total cover of tree, shrub, and/or herbaceous species. This land cover type can be found across a variety of different habitats and its structure and composition may vary greatly depending on region and surrounding environment. Within the APE, this land cover type is mostly concentrated along coastal dunes, bluffs, and beaches in the western portion of the APE, occupying approximately 14.38 acres.

Developed

Developed land cover consists of areas that have been developed or physically modified to the extent that they no longer contain native soil and habitat conditions and no longer support most vegetation. This land cover type includes developed areas greater than 0.2 acre and includes buildings, paved areas, and landscaped areas. Within the APE, this land cover type includes residential, commercial, and industrial development, occupying approximately 15.19 acres.

Eucalyptus

Eucalyptus is a non-native vegetation community dominated by eucalyptus (*Eucalyptus* spp.) trees. This vegetation community includes areas comprised of at least 10 percent absolute cover of tree species, with eucalyptus occupying at least 50 percent relative cover in the tree layer. This vegetation community occurs in patches throughout the APE, occupying approximately 1.35 acres.

Herbaceous

Herbaceous is an upland vegetation community comprised of native and non-native herbaceous species. This vegetation community includes areas comprised of at least 10 percent absolute cover of herbaceous species, with tree and shrub species occupying less than 10 percent absolute cover. Common upland herbaceous species in the region include native purple needlegrass (*Stipa pulchra*) and California poppy (*Eschscholzia californica*), as well as non-native wild oat (*Avena* spp.) and brome (*Bromus* spp.). This vegetation community occurs in patches throughout the APE, occupying approximately 0.22 acres.

Non-native Herbaceous

Non-native Herbaceous is a non-native vegetation community dominated by non-native herbaceous species. This vegetation community includes areas comprised of at least 10 percent absolute cover of herbaceous species, with non-native herbaceous species as the dominant species within the herbaceous layer. This vegetation community contains less than 10 percent absolute cover of tree and shrub species. Common non-native herbaceous species in the region include iceplant (*Carpobrotus* spp.), Russian thistle (*Salsola tragus*), star thistle (*Centaurea* spp.), black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), and sweet fennel (*Foeniculum vulgare*). This vegetation community occurs in patches throughout the APE, occupying approximately 0.31 acres.

Pine/Cypress

Pine/Cypress is a native vegetation community dominated by native pine (*Pinus* spp.) and cypress (*Hesperocyparis* spp.) species. This vegetation community includes areas comprised of at least 10 percent absolute cover of tree species, with native pine and cypress species occupying at least 60 percent relative cover. Common pine and cypress species within the region include California

foothill pine (*Pinus sabiniana*), knobcone pine (*Pinus attenuata*), Monterey pine (*Pinus radiata*), and Monterey cypress (*Hesperocyparis macrocarpa*). This vegetation community occurs in patches throughout the APE, occupying approximately 0.10 acres.

Shrub

Shrub is a native vegetation community dominated by native upland shrub species. This vegetation community includes at least 10 percent absolute cover of upland shrub species, with no greater than 10 percent cover of tree species. Common shrub species in the region include coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), sticky monkeyflower (*Diplacus aurentiacus*), and buckwheat (*Eriogonum* spp.). This vegetation community occurs in patches throughout the APE, occupying approximately 2.77 acres.

Water

Water consists of areas inundated with salt or fresh water, including ponds, bays, and oceans. Within the Study Area, this land cover type is largely associated with Morro Bay, occupying approximately 183.61 acres.

4.3.4 Marine Habitat Types

Portions of the Study Area and the majority of the APE provide habitat for a variety of marine species. Marine habitat types within the APE include Open Water with Sandy Bottom, Rip Rap/Rocky Reef and Dock/Pier Structures (Figure 13). These marine habitat types were identified using Google Earth and the associated characteristics of each habitat. Each of these habitat types is described in detail below.

Figure 12 Marine Habitat Types within the APE

Open Water with Sandy Bottom

Approximately 182 acres of marine habitat within the APE consists of open water with an unconsolidated sandy or silty bottom. Benthic organisms are associated with soft sediment habitat, primarily invertebrate species. Benthic organisms are an important component of the food web and are indicators of environmental quality. Benthic areas within this habitat type may be occupied by a variety of regionally occurring invertebrates, such as polychaete worms (including *Mediomastus californiensis* and *Polydora kempi*), shrimp (*Neomysis rayii, Bathyleberis* spp., and *Euphilomedes carcharodonta*), crabs (including *Hemigrapsus nudus*), bivalves (including *Macoma secta* and *Transennella tantilla*), seastars (including *Amphiodia* spp.), gammarid amphipods (including *Aoroides columbiae* and *Corophium acherusicum*), and other sessile and suspension feeding organisms.

The water column within the Study Area can provide foraging habitat for juvenile and adult fish species, such as California halibut (*Paralichthys californicus*), starry flounder (*Platichthys stellatus*), barred surfperch (*Amphistichus argenteus*), and rockfish (S*ebastes* spp.). Schools of jacksmelt (*Atherinops affinis*), Pacific sardine (*Sardinops sagax caerulea*), and Pacific mackerel (*Scomber japonicus*) are also known to transit and feed within the Study Area. A variety of seabirds also utilize this habitat, including California brown pelican (*Pelecanus occidentalis californicus*), cormorants (*Phalacroxorax* spp.), and gulls (*Larus* spp.). Multiple species of marine mammals are known to occur in open water within the Study Area, including southern sea otter, harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and common bottlenose dolphin (*Tursiops truncatus*).

Eelgrass (*Zostera marina*) beds have been extensively documented throughout the Study Area. Eelgrass is a marine flowering plant that anchors into the bay floor, forming dense underwater meadows across both subtidal and intertidal zones. These meadows are vital for ecosystem functions such as providing shelter for juvenile fish and invertebrates, spawning surfaces for species like Pacific herring, and foraging grounds for shorebirds and diving birds. The eelgrass coverage peaked in 2023 at 750 acres, driven by natural growth and active restoration projects within Morro Bay (Morro Bay National Estuary Program 2025).

Dock/Pier Structures

There are several public and private docks, wharfs and piers, as well as the North T-Pier and South T-Pier, within the APE, occupying approximately 7.36 acres of marine habitat. Pier piles are driven into the sandy bottom and provide hard substrate for a variety of marine species, such as algae, and sessile and mobile marine invertebrate species. This marine habitat is typically occupied by various invertebrate species including California mussel, anemones *(Anthopleura* spp.), barnacles (*Balanus* spp.), and stalked tunicates (*Styela montereyensis*).

A variety of seabirds and shorebirds use the dock structures for perching and nesting including cormorants and gulls. There is also potential for passerine bird species, including pigeon guillemot (*Cepphus columba*) and black phoebe (*Sayornis nigricans*) to nest beneath the pier structure.

Rip Rap/Rocky Reef Habitat

Rip rap/rocky reef habitat covers approximately 11.92 acres of the APE and includes both intertidal and subtidal rocky habitat that transitions from the high splash zone to shallow rocky reef habitat. Rip rap serves as important intertidal habitat that forms distinct assemblages of invertebrates and algae based on sea level elevation, wave exposure and substrate type. The upper intertidal rip rap

supports assemblages of barnacles and motile mollusks (e.g., limpets [*Patella* spp.], snails [*Littorina* spp.]). The middle and lower intertidal zones support dense assemblages of mussels (Mytilus californianus), gooseneck barnacles (*Pollicipes pollicipes*), striped shore crab (*Pachygrapsus crassipes*) and feather boa kelp (*Egregia menziesii*). As the rip rap extends into deeper depths the rip rap functions as rocky reef with subtidal invertebrate, macroalgae and fishes inhabiting or utilizing the hard substrate. In the APE submerged rip rap/rocky reef supports giant kelp (*Macrocystis pyrifera*) and in some cases bull kelp (*Nereocystis luetkeana*) along a thin margin adjacent to exposed rip rap and mostly along the northern extent of rip rap. Giant kelp forms dense surface canopies and is seasonally abundant and observed to be perennial in various protected areas along the northern extent of Morro Bay. Giant kelp habitat is a Habitat Area of Particular Concern (HAPC) and supports a diversity of fishes and invertebrates. The southern sea otter uses the giant kelp habitat in Morro Bay and extensively for foraging, rafting, and social interaction.

4.4 Sensitive Biological Resources

Local, State, and federal agencies regulate special status species and other sensitive biological resources and require an assessment of their presence or potential presence to be conducted on-site prior to the approval of proposed development on a property. This section discusses sensitive biological resources observed in the Study Area and evaluates the potential for the areas to support additional sensitive biological resources. Assessments for the potential occurrence of special status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDB, species occurrence records from other sites in the vicinity of the Study Area and previous reports for the Study Area.

4.4.1 Potential Special-Status Species

The literature review identified 135 special status plant and wildlife species that are known or have been known to occur in the regional vicinity of the Study Area. Of these 135 species, 98 species (46 plants and 52 animals) were evaluated as being present or having some potential to occur within the Study Area. Special-status species evaluated as being present or having some potential to occur within the Study Area are summarized in Table 2, and a complete list of special-status species evaluated for the project is presented in Appendix D. The intent in assessing the broader Study Area and not just the APE is to provide a comprehensive basis for future evaluation depending on the selected project site(s).

Table 2 Special-Status Species with Potential to Occur within the Study Area

Species Name	Status
Plants	
Hoover's bent grass (*Agrostis hooveri*)	CRPR 1B.2
Morro manzanita (*Arctostaphylos morroensis*)	FT, CRPR 1B.1
Sand mesa manzanita (*Arctostaphylos rudis*)	CRPR 1B.1
Miles' milk-vetch (*Astragalus didymocarpus* var. *milesianus*)	CRPR 1B.2
Coulter's saltbush (*Atriplex coulteri*)	CRPR 1B.2
San Luis Obispo sedge (*Carex obispoensis*)	CRPR 1B.2
San Luis Obispo owl's-clover (*Castilleja densiflora* var. *obispoensis*)	CRPR 1B.2
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	CRPR 1B.1
Coastal goosefoot (*Chenopodium littoreum*)	CRPR 1B.2
Point Reyes salty bird's-beak (*Chloropyron maritimum* ssp. *palustre*)	CRPR 1B.2
Pismo clarkia (*Clarkia speciosa* ssp. *immaculata*)	FE, SR, CRPR 1B.1
Salt marsh bird's beak (*Cordylanthus maritimum* ssp. *maritimum*)	FE, SE, CRPR 1B.2
Dune larkspur (*Delphinium parryi* ssp. *blochmaniae*)	CRPR 1B.2
Beach spectaclepod (*Dithyrea maritima*)	ST, CRPR 1B.1
Betty's dudleya (*Dudleya abramsii* ssp. *bettinae*)	CRPR 1B.2
Blochman's dudleya *(Dudleya blochmaniae* ssp. *blochmaniae*)	CRPR 1B.1
Blochman's leafy daisy *(Erigeron blochmaniae*)	CRPR 1B.2
Hoover's button-celery *(Eryngium aristulatum* var. *hooveri*)	CRPR 1B.1
San Joaquin spearscale (*Etriplex joaquinana*)	CRPR 1B.2
Kellogg's horkelia (*Horkelia cuneata* var. *sericea*)	CRPR 1B.1
Perennial goldfields (*Lasthenia californica* ssp. *macrantha*)	CRPR 1B.2
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	CRPR 1B.1
Blushing layia (*Layia erubescens*)	CRPR 1B.2
Jones' layia (*Layia jonesii*)	CRPR 1B.2
Southern curly-leaved monardella (*Monardella sinuata* ssp. s*inuata*)	CRPR 1B.2
Aparejo grass (*Muhlenbergia utilis*)	CRPR 2B.2
Coast woolly-heads (*Nemacaulis denudata* var. *denudata*)	CRPR 1B.2
Chaparral ragwort (*Senecio aphanactis*)	CRPR 1B.2
California seablite (*Suaeda californica*)	FE, CRPR 1B.1
Splitting yarn lichen (*Sulcaria isidiifera*)	CRPR 1B.1
Twisted horsehair lichen (*Sulcaria spiralifera*)	CRPR 1B.2
Blochman's leafy daisy *(Erigeron blochmaniae*)	CRPR 1B.2
Hoover's button-celery *(Eryngium aristulatum* var. *hooveri*)	CRPR 1B.1
San Joaquin spearscale (*Etriplex joaquinana*)	CRPR 1B.2
Kellogg's horkelia (*Horkelia cuneata* var. *sericea*)	CRPR 1B.1
Perennial goldfields (*Lasthenia californica* ssp. *macrantha*)	CRPR 1B.2
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	CRPR 1B.1
Blushing layia (*Layia erubescens*)	CRPR 1B.2

Species Name	Status
Jones' layia (*Layia jonesii*)	CRPR 1B.2
Southern curly-leaved monardella (*Monardella sinuata* ssp. s*inuata*)	CRPR 1B.2
Aparejo grass (*Muhlenbergia utilis*)	CRPR 2B.2
Coast woolly-heads (*Nemacaulis denudata* var. *denudata*)	CRPR 1B.2
Chaparral ragwort (*Senecio aphanactis*)	CRPR 1B.2
California seablite (*Suaeda californica*)	FE, CRPR 1B.1
Splitting yarn lichen (*Sulcaria isidiifera*)	CRPR 1B.1
Twisted horsehair lichen (*Sulcaria spiralifera*)	CRPR 1B.2
Invertebrates	
Crotch's bumble bee (*Bombus crotchii*)	SCE
Western bumble bee (*Bombus occidentalis*)	SCE
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT
Monarch – California overwintering population (*Danaus plexippus plexippus pop. 1*)	FPT
Black abalone (*Haliotis cracherodii*)	FE
White abalone (*Haliotis sorenseni*)	FE
Morro shoulderband (*Helminthoglypta walkeriana*)	FT
Sunflower sea star (*Pycnopodia helianthoides*)	FPT
Fish	
Northern tidewater goby *(Eucyclogobius newberryi*)	FE, SSC
Garibaldi (*Hypsypops rubicundus*)	SP
Steelhead – south-central California coast DPS (*Oncorhynchus mykiss irideus pop. 9*)	FT, SSC
Giant sea bass (*Stereolepis gigas*)	FP
Amphibians	
California red-legged frog (*Rana draytonii*)	FT, SSC
Western spadefoot (*Spea hammondii*)	FPT, SSC
Coast Range newt (*Taricha torosa*)	SSC
Reptiles	
Southwestern pond turtle (*Actinemys pallida*)	FPT, SSC
Northern California legless lizard (*Anniella pulchra*)	SSC
Loggerhead sea turtle – North Pacific DPS (*Caretta caretta*)	FE
Green sea turtle (*Chelonia mydas*)	FT
Leatherback sea turtle (*Dermochelys coriacea*)	FE,
Olive Ridley sea turtle (*Lepidochelys olivacea*)	FT
Coast horned lizard (*Phrynosoma blainvillii*)	SSC
Birds	
Cooper's hawk (*Accipiter cooperii*)	WL
Tricolored blackbird (*Agelaius tricolor*)	ST, SSC
Burrowing owl (*Athene cunicularia*)	SCE, SSC
Western snowy plover (*Charadrius nivosus nivosus*)	FT, SSC
White-tailed kite (*Elanus leucurus*)	FP

Species Name	Status
California horned lark (*Eremophila alpestris actia*)	WL
Loggerhead shrike (*Lanius ludovicianus*)	SSC
California black rail (*Laterallus jamicensis coturniculus*)	ST, FP
Osprey (*Pandion haliaetus*)	WL
Double-crested cormorant (*Phalacrocorax penicillatus*)	WL
Purple martin (*Progne subis*)	SSC
California Ridgway's rail (*Rallus obsoletus obsoletus*)	FE, SE, FP
California least tern (*Sternula antillarum browni*)	FE, SE, FP
Least Bell's vireo (*Vireo bellii pusillus*)	FE, SE
Mammals	
Pallid bat (*Antrozous pallidus*)	SSC
Townsend's big-eared bat (*Corynorhinus townsendii*)	SSC
Southern sea otter (*Enhydra lutris nereis*)	FT, FP
Gray whale (*Eschrichtius robustus*)	MMPA
Western mastiff bat (*Eumops perotis californicus*)	SSC
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)	MMPA
Humpback whale – Mexico DPS (*Megaptera novaeangliae*)	FT, SS, DEP, MMPA
Northern elephant seal (*Mirounga angustirostris*)	MMPA
San Diego desert woodrat (*Neotoma lepida intermedia*)	SSC
Harbor seal (*Phoca vitulina*)	MMPA
Harbor porpoise (*Phocoena phocoena*)	SS, MMPA
American badger (*Taxidea taxus*)	SSC
Common bottlenose dolphin (*Tursipos truncatus*)	MMPA
California sea lion (*Zalophus californianus*)	MMPA

CRPR – California Rare Plant Rank	SCE – State Candidate Endangered
DEP – Depleted under the MMPA	SE – State Endangered
FE – Federally Endangered	SP – State Protected
FP – CDFW Fully Protected	SR – State Rare
FPT – Federally Proposed Threatened	SS – Strategic Stock
FSC – Federal Species of Concern	SSC – CDFW Species of Special Concern
FT – Federally Threatened	ST – State Threatened
MMPA – Protected under Marine Mammal Protection Act	WL – CDFW Watch List

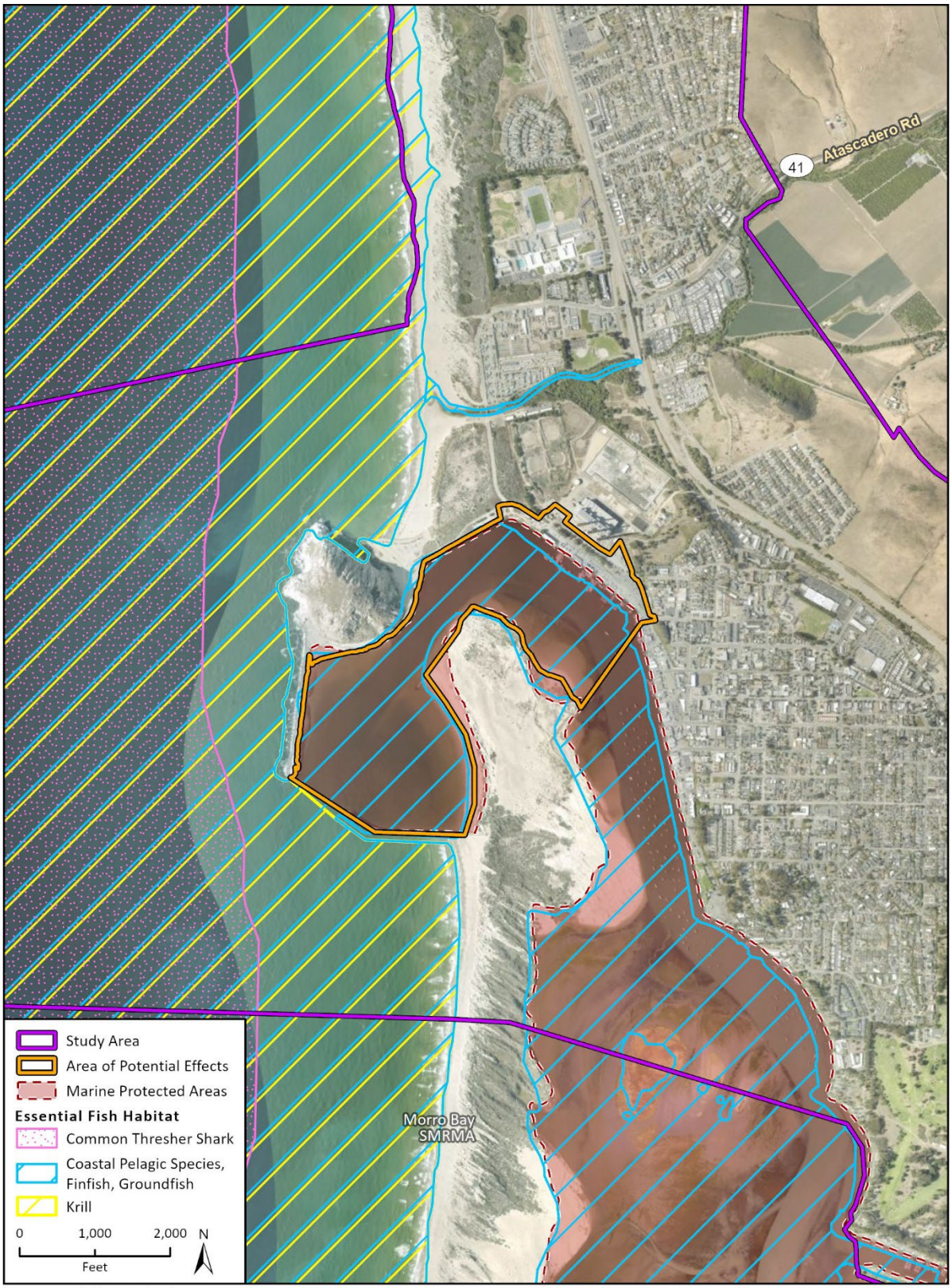
4.4.2 Essential Fish Habitat, Habitat Areas of Particular Concerns, Environmentally Sensitive Habitat Areas, Designated Critical Habitat, and Marine Protected Areas

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growing to maturity. Substrate includes the sediment, hard bottom, structures underlying the waters and the associated biological communities. EFH for common thresher shark, krill, coastal pelagic species, finfish, and groundfish is mapped within the APE and adjacent Study Area, as depicted in Figure 14.

HAPCs are mapped by NOAA Fisheries within EFH and includes estuary, eelgrass, canopy kelp, and rocky reefs. The entirety of Morro Bay within the Study Area is mapped as an estuary, while seagrass in the form of eelgrass beds is mapped in the western portion, and kelp canopy seasonal present in the northern portion of Morro Bay within the Study Area. When a proposed action may adversely affect EFH, such as a direct or indirect physical, chemical, or biological alternation to habitat, consultation with NOAA Fisheries is required.

There are a number of State Marine Protected Areas (MPAs) along the California coastline. State Marine Reserve (SMR) is an MPA designation that prohibits damage or take of all marine resources. A State Marine Recreational Management Area (SMRMA) is an MPA designation that allows recreational activities, with site-specific regulations specifying limitations for each SMRMA. The Morro Bay SMR includes approximately 0.88 square miles of estuarine and coastal marsh habitats within Morro Bay from Morro Bay State Park south to the unincorporated community of Los Osos. The Morro Bay SMRMA includes approximately 3.07 square miles of estuarine, eelgrass, and coastal marsh habitats throughout the rest of Morro Bay from Morro Rock south to Shark Inlet. The Morro Bay SMRMA overlaps with the APE and adjacent Study Area, while the Morro Bay SMR overlaps with the southeastern portion of the Study Area near Morro Bay State Park.

Figure 13 Essential Fish Habitat within the APE and adjacent Study Area

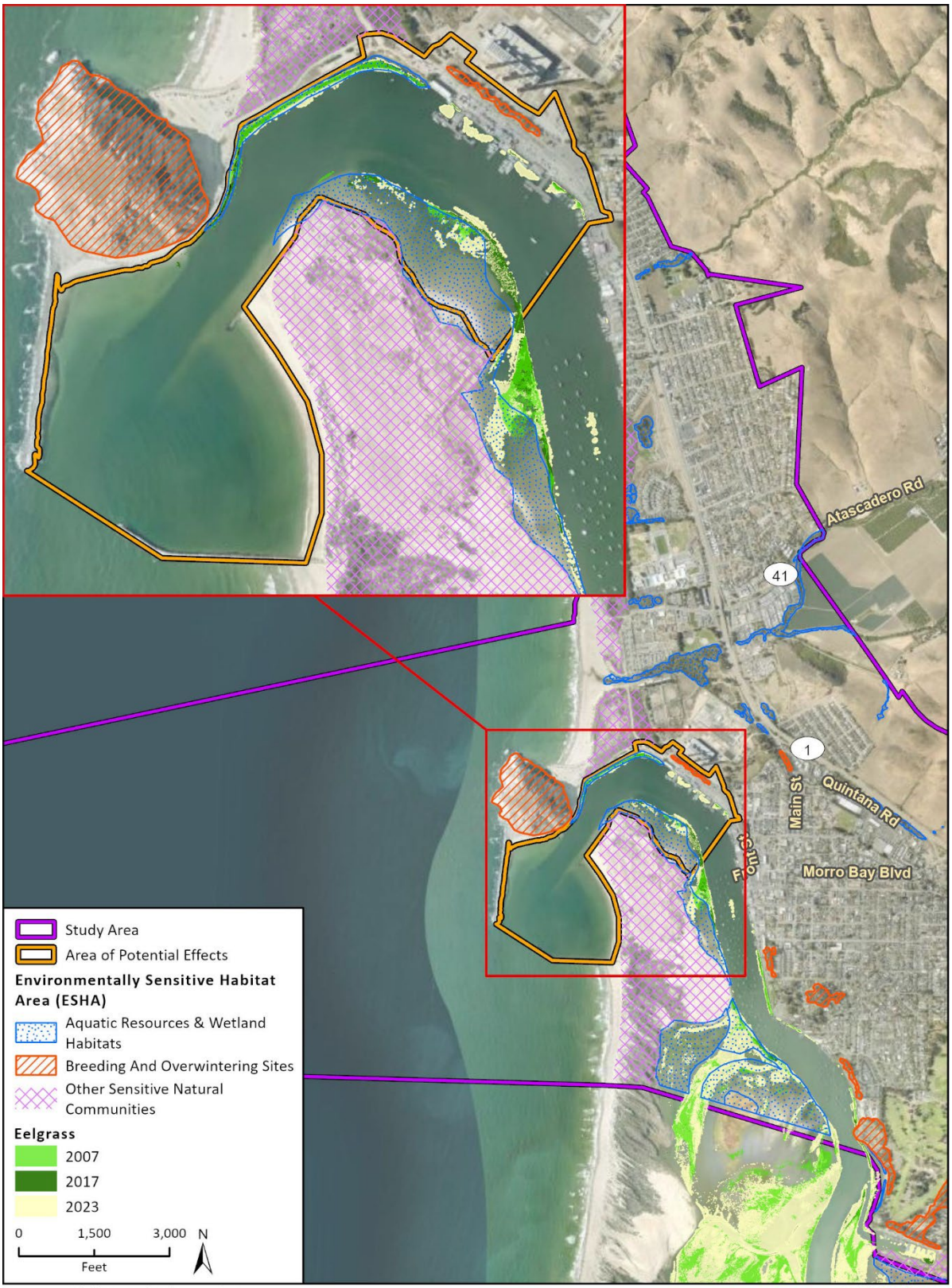


The CCC defines ESHAs as "any area in which plant or animal life or their habitat are either rare or especially valuable because of their nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and development." In areas where the CCC has certified a LCP, ESHA may be further defined by the local jurisdiction (e.g., rocky intertidal, beaches). For instance, the City of Morro Bay's certified LCP defines ESHA as aquatic resources and wetland habitats, breeding and overwintering sites, and other sensitive natural communities, including foredune, backdune/dune scrub, coastal bluff, and coastal scrub habitats. Three types of ESHA as defined by the City of Morro Bay LCP in the form of aquatic resources and wetland habitats, breeding and overwintering sites, and other sensitive natural communities are mapped within the APE and adjacent Study Area (City of Morro Bay 2021). Additionally, the Study Area includes known nesting sites and coastal areas utilized by bird species including double-crested cormorant (*Phalacrocorax penicillatus*) and osprey (*Pandion haliaetus*), for foraging, nesting, and roosting; these areas are also considered ESHA as defined by the City of Morro Bay LCP. One known monarch – California overwintering population (*Danaus plexippus plexippus* pop. 1) overwintering site – Site 3076 – also overlaps with the northeastern portion of the Study Area within the eucalyptus grove near the intersection of Main Street and Surf Street (Xerces Society for Invertebrate Conservation [Xerces] 2025). Figure 15 depicts ESHA within the APE and adjacent Study Area.

NMFS-designated critical habitat for leatherback sea turtle (*Dermochelys coriacea*) is mapped within Morro Bay and marine portions of the APE and adjacent Study Area. Additionally, NMFS-designated critical habitat for steelhead (*Oncorhynchus mykiss irideus pop. 9*) is mapped within coastal streams throughout the Study Area, including Morro Creek and Little Morro Creek. USFWS-designated critical habitat for western snowy plover (*Charadrius nivosus nivosus*) overlaps with the APE and adjacent Study Area along the beaches north and south of Morro Rock. USFWS-designated critical habitat for monarch butterfly is mapped within several eucalyptus groves in the Study Area. USFWS-designated critical habitat for California red-legged frog (*Rana draytonii*) also overlaps with coastal ranges in the eastern portion of the Study Area. Additionally, USFWS-designated critical habitat for Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), Morro shoulderband snail (*Helminthoglypta walkeriana*, and tidewater goby *(Eucyclogobius newberryi*) are mapped between 1 and 3 miles south of the Study Area. Figure 16 depicts NMFS- and USFWS-designated critical habitat mapped within and adjacent to the Study Area.

Direct and indirect impacts to these sensitive habitats or protected areas should be avoided or minimized, as feasible.

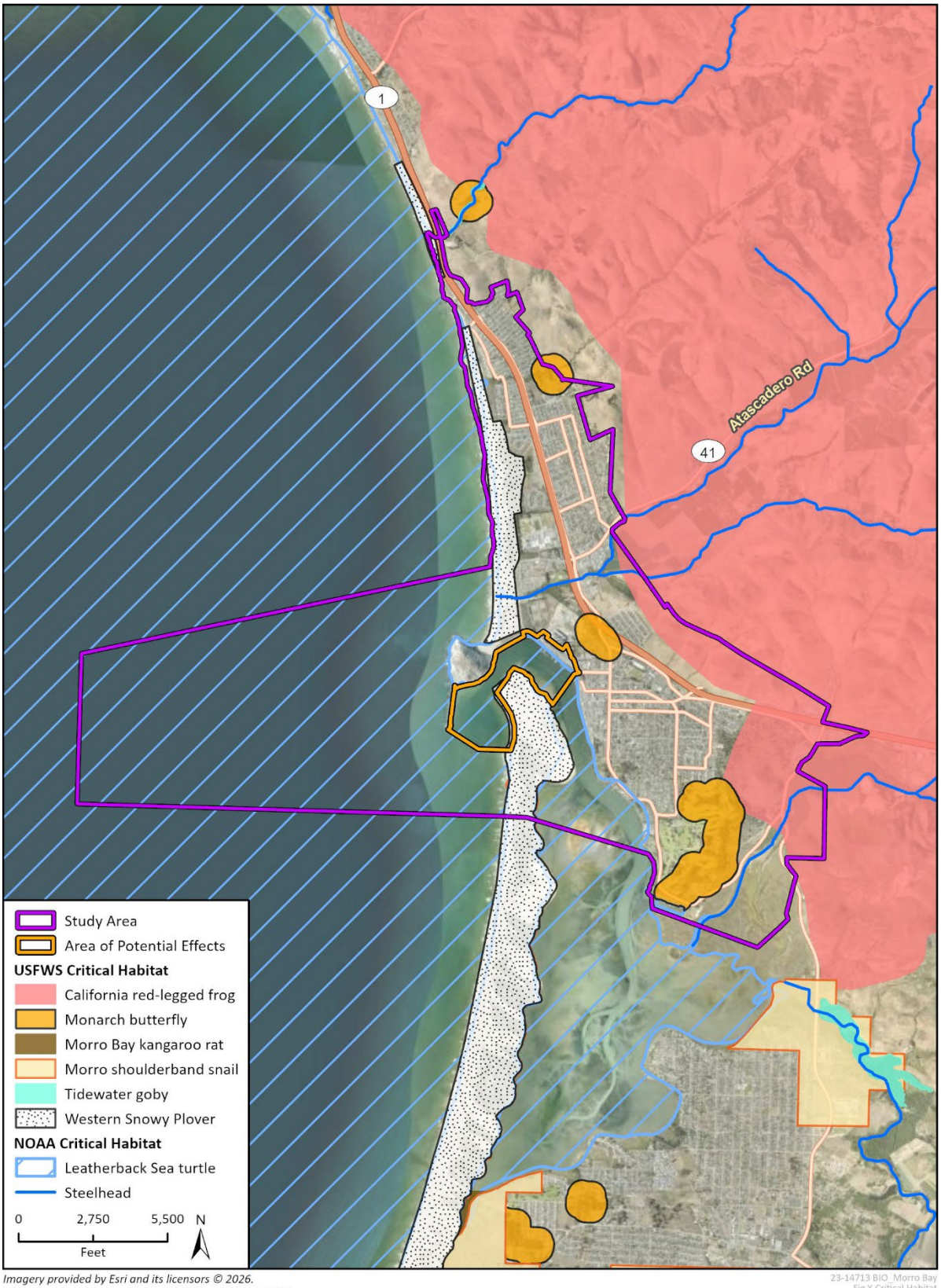
Figure 14 ESHA within the APE and adjacent Study Area



Imagery provided by Esri and its licensors © 2026.
Habitat data provided by City of Morro Bay, 2017 and Morro Bay National Estuary Program, 2024.

23-14713 BIO_Morro Bay
Fig X ESHA_Eelgrass

Figure 15 Critical Habitat within the APE and adjacent Study Area



4.5 Biological Resources Recommendations

Seasonal Restrictions

Migratory birds protected under the MBTA and nesting birds and raptors protected under CFGC Section 3503 have the potential to breed during the nesting season defined as February 1 to September 15. Construction activities should be restricted to the non-breeding season (September 16 to January 31) when feasible. If proposed and depending on the scope, dredging and pile driving may also be subject to seasonal restrictions to avoid special status fish and marine mammals (e.g., humpback whale) migration seasons.

Recommended Surveys and Studies

It is recommended to complete a biological resources assessment (BRA) and a USACE-compliant BA of the Study Area including a marine field reconnaissance survey (marine survey) to assess the intertidal and subtidal portions of the Study Area for the presence, or potential for presence, of special-status species and sensitive habitats. The marine survey would be completed to augment the preparation of the BRA and BA, as well as the cultural resource assessment (CRA), discussed below. The BRA would determine if regulated biological resources (including special status species, critical habitat, and EFH) are present and potentially impacted by the selected alternative(s). The BRA will include a literature/database review, reconnaissance field survey of the Study Area, report of findings, and recommended measures for resource protection. The BRA will analyze potential impacts to sensitive biological resources including, but not limited to, federally designated critical habitats, HAPCs, MPAs, and ESHAs. Optional surveys would include those for eelgrass and black abalone (*Haliotis cracherodii*), if determined to be recommended as part of the BRA. The BA will evaluate the potential effect of the proposed actions on endangered and threatened species and their habitats, including specific species and critical habitats. The BA is required under Section 7 of the FESA. The BA developed by the project proponent will be used by the USACE to consult with USFWS and NMFS. The BRA and BA would be utilized in preparation of the CEQA and NEPA documents, and would support permit acquisition. In addition, an Aquatic Resources Determination (ARD) is recommended to identify, locate, and determine the boundaries and type of aquatic resources (including wetlands) within the Study Area. The ARD will help to determine which State and federal agencies have jurisdiction over the waters within the Study Area and specific permitting needs.

Restoration

All areas subject to temporary disturbance should be restored to pre-existing conditions, as feasible. Marine resources should be maintained, enhanced, and where feasible, restored. Special protection should be given to areas with species and habitats of special biological or economic significance.

Offshore sensitive habitat (also qualifying as ESHA) such as eelgrass, rocky intertidal, or kelp beds affected would be subject to a restoration plan approved by the CCC, CSLC, CDFW (for take or upland), RWQCB, and USACE. These agencies would require that any area directly or indirectly affected by the implemented concept design be restored to pre-project conditions (or better), including at least three years of maintenance, monitoring, and agency reporting.

5 Environmental Compliance Pathways

5.1 Concept design Overview and Considerations

This report recognizes that any potential OSW O&M facility landside development in Morro Bay would need to be assessed on a site-by-site basis. That said, the land use, environmental review, and regulatory permitting requirements and processes are outlined comprehensively in this section and in previous sections to inform a range of potential development options.

Both Option 4A and Option 4B are modified concepts of the least constrained concept design (Option 4) that accommodate the berthing of two SOV's at the North T-Pier and incorporate significant upgrades to the North T-Pier and waterfront commercial fishing and visitor serving facilities. The split location concept designs accommodate only one SOV and involve the co-location of the existing USCG and Morro Bay Harbor Department facilities with the OSW O&M facilities at the North T-Pier. A detailed study would be required to identify how the three facilities could co-locate without interfering with one another and what structural improvements would be required to ensure adequate separation of the three. Option 4A, Option 4B, and Split Location variant concept designs (Variant A, B and C), centered around the North T-Pier, were determined to be the least constrained concept designs because their smaller spatial extent would limit impacts to community and visitor access and use and environmental resources, as well as reduce costs. The primary differences between the Options 4A and 4B are the location of the intermediate staging area. The Split Location variant concept designs reduce the distance of the new North T-Pier from shore and its northern extent, as well as its overall size, when compared to Options 4A and 4B. The Split Location variant concept designs also integrate significant upgrades to the USCG, Morro Bay Harbor Department, and the southern extension of the North T-Pier that would support commercial fishing uses. An overview of the anticipated environmental permitting requirements, constraints, and opportunities for Options 4A and 4B and the Split Location variants is presented in the following sections.

5.2 Environmental Permitting Requirements

The following sections provide an overview of the anticipated State, federal, and local permitting processes and approvals that would be required to construct the least constrained feasible concept designs described in this report. Each of the concept designs include proposed development of submerged lands in the marine environment and within the Coastal Zone. Development below the mean high tide line or mean high water (MHW) mark in waters that connect to the ocean are within USACE jurisdiction and the USACE leads interactions with the other federal agencies (NMFS, USFWS, USEPA, etc.) to address potential impacts to protected species, sensitive habitat and water quality.

The City of Morro Bay has exclusive local land use authority to determine the appropriateness of uses and vision for development on its waterfront. This authority is not preempted by State or Federal regulations. Future OSW O&M facilities would require City of Morro Bay land use permits, rezoning, land use designation changes, and likely changes to the City Waterfront Master Plan, following the process prescribed in the City's Zoning Code, including voter approval for changes to the Land Use Element map designations in the Measure A-24 area. Following City approvals, a developer could submit to the Coastal Commission for a consolidated CDP, in accordance with SB 286 guidance. The CCC, based on SB 286 guidance, would lead a consolidated CDP process and

provide concurrence to the USACE for portions of the development(s) within CCC jurisdiction. Additional permits from the Central Coast Regional Water Quality Control Board (CCRWQB) and potentially CDFW would also need to be acquired depending on the concept design's potential impacts. The project proponent would be responsible for the funding and development of the various permit packages and supporting technical studies for submittal to the USACE, CCC, RWQCB and the City of Morro Bay. The anticipated federal, State, and local permitting requirements are described in further detail below.

5.2.1 Federal Permitting

The USACE is responsible for administering several federal programs related to ensuring the quality and navigability of the nation's waters. Section 404 of the CWA authorizes the Secretary of the Army, acting through the USACE, to issue permits regulating the discharge of dredged or fill materials into the "navigable waters at specified disposal sites." Section 502 of the CWA further defines "navigable waters" as "waters of the United States, including the territorial seas." For the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA.

Section 401 of the CWA requires an applicant requesting a federal license or permit for an activity that may result in any discharge into navigable waters (such as a Section 404 Permit) to provide State certification that the proposed activity will not violate State and federal water quality standards. CWA Sections 404 and 401 are typically consolidated into a CWA 404/401 permitting process and administered by the USACE. Additionally, Sections 9, 10 and 14 of the Rivers and Harbors Act of 1899 requires authorization from the USACE and in some cases the USCG for the construction or alternation of any structure in or over any navigable water or alterations to aids to navigation of the United States.

The USFWS and NMFS share responsibility for implementing several laws protecting the Nation's fish and wildlife resources, including the FESA (16 United States Code [USC] Sections 153 et seq.), MBTA (16 USC Sections 703-711), and the Bald and Golden Eagle Protection Act (16 USC Section 668). Generally, the USFWS implements the FESA for terrestrial and freshwater species, while the NMFS implements the FESA for marine and anadromous species. Projects that would result in "take" of any threatened or endangered animal species, or a threatened or endangered plant species if occurring on federal land, are required to obtain permits from the USFWS or NMFS through either Section 7 (interagency consultation with a federal nexus) or Section 10 (Habitat Conservation Plan) of the FESA, depending on the involvement by the federal government in funding, authorizing, or carrying out the project. Approvals regarding compliance with the MMPA from NMFS would be required when projects could result in unintentional "take" of marine mammals. Proposed or candidate species do not have the full protection of the FESA; however, the USFWS and NMFS advise project applicants that they could be elevated to listed status at any time. The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS.

The MBTA of 1918 implements four international conservation treaties that the U.S. entered into with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The law has been amended with the signing of each treaty, as well as when any of the treaties were amended, such as with Mexico in 1976 and Canada in 1995.

The various concept designs are expected to require most if not all the following federal approvals:

Primary Federal Approvals

- **Clean Water Act Section 404\401 Permit** from the USACE for discharges of dredged or fill material into waters of the United States would be triggered by sediment movement (dredging) and/or installation of permanent structures (e.g., pier pilings) in the marine environment, as well as discharges into freshwater streams, and associated wetlands when present, that have a direct hydrologic surface connection to a Traditional Navigable Water (TNW) such as the Pacific Ocean. Depending on the total area and/or linear feet of impacts to waters of the United States, the concept design would require a Nationwide Permit (NWP), a Letter of Permission (LOP), or an Individual Permit (IP). Section 401 and Section 404 of the Clean Water Act regulate water resources differently. States certify projects based on water quality standards under 401, whereas the Army Corps evaluates ecological impacts under 404.
- **Rivers and Harbors Act Section 9 Permit** from the USCG is required for the construction of bridges, causeways, dams, or dikes within or over navigable waters. The USCG Department of Waterways works collaboratively with the USACE for any changes to navigational structures, channels or moorings as well as installation of any private aids to navigation.
- **Rivers and Harbors Act Section 10 Permit** from the USACE for work in navigable waters. A NWP, LOP, or IP would cover this approval as well, as it is a joint Section 404/Section 10 permit.
- **Rivers and Harbors Act Section 14 Permit** from the USACE for work that makes alterations to any USACE civil works project (navigational channel, levee, etc.). Section 14 of the Rivers and Harbors Act, 33 USC Section 408, authorizes the USACE to grant permission for the alteration, occupation or use of USACE civil works projects if not injurious to the public interest or will not impair the usefulness of the project.

Secondary Federal Approvals and Processes Triggered by Primary Approvals

- **NEPA Review.** Given that each of the concept designs would require a Section 404/401 permit from the USACE, the responsible entity would be the USACE unless the concept design receives federal funding from another federal agency (e.g., Federal Energy Regulatory Commission). Like CEQA, NEPA requires disclosure of the environmental effects of federal actions. If a NWP is used, USACE would not be required to complete a new NEPA review. If a Section 404 LOP or IP is issued and/or an Incidental Harassment Authorization (IHA)/ Letter of Authorization (LOA) is authorized, NEPA review would be triggered. NEPA is discussed further in Section 5.4, *CEQA and NEPA Requirements*.
- **Endangered Species Act Section 7 Consultation(s).** Section 7 of the FESA requires federal agencies to consult with the USFWS (for terrestrial species and tidewater goby) and/or NMFS (for marine and anadromous species) before authorizing projects that would affect threatened or endangered species and/or their critical habitat. The USACE would likely lead this consultation and request that a BA for each applicable agency be prepared by the project proponent to facilitate consultation(s).
- **Marine Mammal Protection Act Authorization.** Authorization from the NMFS is required when projects could result in unintentional "take" of marine mammals, including activities that cause injury or significantly disrupt marine mammal behavior. The USACE consults with NMFS regarding the MMPA as part of the 404/401 process but if take is anticipated, an IHA or LOA would be appropriate to be developed and submitted to NMFS Protected Species division to approve take and avoid potential project delays. The USACE NEPA process would be expected to cover MMPA, but the USACE may request the applicant's IHA or LOA to provide the necessary analysis required under NEPA.

- **National Historic Preservation Act Section 106 Consultation.** Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consult with the State Historic Preservation Officer (SHPO) before authorizing an undertaking that would affect a historic property. A CRA that addresses archaeological and historical resources present within the APE including a marine survey to assess the intertidal and subtidal portions of the APE for the presence of cultural resources would be required. The CRA would be utilized in preparation of the CEQA and NEPA documents and would support the Section 106 consultation. In addition, it is required that a list of Tribes culturally affiliated with the Study Area be obtained from the Native American Heritage Commission, and Tribal outreach is conducted to support the Section 106 consultation, Assembly Bill 52, and CEQA requirements. Section 106 consultation also requires outreach to interested parties, such as local historic groups, and local agencies.
- **Coastal Zone Management Act (CZMA) Consistency Certification from the California Coastal Commission** is required for development in the coastal zone regulated by federal permits (e.g., USACE). This certification is issued by the CCC to confirm that federally permitted actions proposed within or affecting the Coastal Zone are consistent with the State's Coastal Zone Management Plan (e.g., the California Coastal Act). However, once a CCC CDP (discussed below) has been issued, that permit automatically satisfies federal consistency, and no further submittal would be needed.
- **Essential Fish Habitat Consultation.** The Magnuson-Stevens Fisheries Conservation and Management Act requires federal agencies to consult with NMFS prior to taking actions that would affect EFH. The USACE would likely lead this consultation in coordination with other Section 7 consultations and typically prefers the EFH analysis to be included in the projects BA.

5.2.2 State Permitting Overview

The City of Morro Bay's certified LCP gives it the authority to issue CDPs, in accordance with the Coastal Act and the City's LCP. However, the CCC retains CDP jurisdiction in certain areas known as "Coastal Original Jurisdiction", which incude current and former tidelands, submerged lands, and areas of public trust, as shown on the City of Morro Bay's official Post Certification Maps. The City's CDP authority is also appealable to the CCC for development in certain areas, including within 100 feet of an environmentally sensitive habitat areas or within 300 feet of a coastal bluff.

The CCC regulates offshore and coastal zone activities under the auspices of the Coastal Act through the issuance of CDPs. The key goals of the Coastal Act are protecting and enhancing coastal resources, maximizing public access, prioritizing coastal-dependent activities and encouraging sustainability. The CCC has jurisdiction in the coastal zone and within State waters. Jurisdiction for the inland areas of the coastal zone also resides with the CCC, except in jurisdictions, such as Morro Bay, with a certified LCP.

As stated previously, SB 286 streamlines offshore wind development by enabling a consolidated coastal development permit, allowing the CCC to issue one coastal development permit for offshore wind projects. Pursuant to SB 286, local agencies are invited to review and participate in the consolidated permitting process, but the CCC has ultimate CDP approval rights and may override local coastal plan policies, if deemed necessary. However, SB 286 does not enable the CCC to override local land use and zoning designations; nor does it eliminate the need for local land use permits from the City of Morro Bay. Furthermore, the CCC would look to the City's LCP, including the Waterfront Master Plan, as guidance when reviewing a consolidated CDP.

The State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) have jurisdiction over "waters of the State," which are defined as any surface water or groundwater, including saline waters, within the boundaries of the State (California Water Code sec. 13050(e)). These agencies also have responsibilities for administering portions of the CWA.

In Central California, CWA Section 401 Water Quality Certification (Section 401 Certification) is issued by the RWQCB and informs the USACE (or the applicable agency from which a license or permit was requested) that an application has been submitted. Additionally, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne requires any person discharging or proposing to discharge waste that could affect the quality of waters of the State to file a Report of Waste Discharge with the appropriate RWQCB. The RWQCB may then authorize the discharge, subject to conditions, by issuing Waste Discharge Requirements (WDRs). The Procedures state that they are to be used in issuing CWA Section 401 Certifications and WDRs and largely mirror the existing review requirements for CWA Section 404 Permits and Section 401 Certifications, incorporating most elements of the USEPA's Section 404(b)(1) Guidelines.

The CDFW administers several State laws protecting fish and wildlife resources and the habitats upon which they depend. The CESA (Fish and Game Code Section 2050 et. seq.) prohibits take of State listed threatened or endangered. Unlike the FESA, CESA's protections extend to candidate species during the period (typically one year) while the California Fish and Game Commission decides whether the species warrants CESA listing. The CDFW enforces Sections 3511, 4700, 5050, and 5515 of the Fish and Game Code, which prohibit take of species designated as Fully Protected. The CDFW is not allowed to issue an Incidental Take Permit for Fully Protected species; therefore, impacts to these species must be avoided.

The concept designs are expected to require the State of California approvals described in the subsections below. Based on SB 286 guidance, the CCC would utilize a consolidated permit process and lead the engagement with other State resource agencies. The project proponent would be responsible for the funding and development of technical studies or supporting materials requested by the CCC and would be required to pay permitting fees based on the size and type of proposed development. It should be noted that primary State approval would not generally be issued until after CEQA documentation has been certified.

Primary State Approvals

- **Tidelands Lease Agreement** from the CSLC will be required for work seaward of the mean high tide line or review of existing Tidelands Lease Agreements for permissible development or use.
- **Coastal Development Permit** from the CCC for offshore and coastal zone activities would need to be approved and issued by the CCC since "development" would occur. CCC would also address CZMA consistency for federal permits in a separate action.
- **Streambed Alteration Agreement** pursuant to Section 1600 et seq. of the CFGC requires notification to the CDFW for activities that substantially alter stream resources. This requirement does not apply to the marine environment but could be triggered if the concept design may affect stream resources that are not subject to tidal influence.
- **Water Quality Certification and/or Waste Discharge Requirements** issued by the RWQCB are required when a federal permit authorizes discharge into waters of the United States (e.g., NWP) and/or when a proposed activity results in a discharge into waters of the State,

respectively. A Water Quality Certification is required for work within tidelands and subject to CEQA. A pre-filling meeting must be requested 30 days in advance of the application submittal and an alternatives analysis must be submitted with the WQC or WDR application.

- **Incidental Take Permit (ITP)** would be required from CDFW if the concept design would result in take of a State-listed threatened or endangered or candidate species. The ITP would be issued after the CEQA document is certified and application is deemed complete.

Secondary State Approvals and Processes Triggered by Primary Approvals

- **CEQA Review.** Based on conversations with CSLC, CCC, City of Morro Bay, and San Luis Obispo County, the City of Morro Bay would serve as the lead CEQA agency as the area has been granted to the City via a State Tidelands Grant. The CEQA lead agency must complete the appropriate CEQA document to approve the proposed development. As a lead agency, the City of Morro Bay would require that a CEQA document and supporting technical studies be prepared. The State approvals listed above are discretionary and these agencies would be responsible agencies that rely on the certified CEQA document. CEQA is discussed further in Section 4.5, *CEQA and NEPA Requirements*.

5.2.3 Local Permitting Overview

Future proposals for O&M facilities within the coastal zone would require City of Morro Bay land use permits (e.g., Conditional Use Permits) and building permits and would have to be found consistent with all City of Morro Bay land use regulations, including voter approval for any necessary changes to land use designations. The standard of review for the City's land use permits is the City's Municipal Code, General Plan, and required findings contained therein. These requirements are not superseded by the SB 286 consolidated CDP process described above.

The least constrained concept designs (Option 4A, Option 4B, and Split Location variants) identified for Morro Bay involve in-water, overwater, shoreline, and inland construction that would require comprehensive biological and cultural resource assessments, threatened and/or endangered species biological assessment (BA), and an Essential Fish Habitat evaluation to support the USACE 404/401 permitting process. If the final designs involve work in or near freshwater or estuarine water ways of wetlands, then permitting would likely require a wetland delineation and rare plant survey. Technical studies are required by both federal and State agencies as components of their permit applications. Additional technical studies to support CEQA and NEPA review, including cultural resources, air quality, and noise studies, would also be required, as detailed in Section 5.4, *CEQA and NEPA Requirements*. Table 3 presents a matrix identifying the federal, State, and local permits and authorizations anticipated to be required for the least constrained concept designs.

Table 3 Federal, State, and Local Permitting Matrix

	Federal Permits									State Permits			Local Permits
	USACE				USCG	NMFS			USFWS	RWQCB	CCC	CDFW	Morro Bay
Concept designs	CWA Section 404	RHA Section 10	RHA Section 14	NHPA Section 106/SHPO	CWA Section 408*	MSA EFH	MMPA IHA	FESA Section 7	FESA Section 7	CWA Section 401/ Porter-Cologne Act	Coastal Act	CFGC Section 1600 et seq.	Conditional Use Permit
Do Nothing	X	X		X		X	X		X	X	X		X
Do Minimum	X	X	X	X	X	X	X	X	X	X	X		X
Option 1	X	X	X	X	X	X	X	X	X	X	X		X
Option 2	X	X	X	X	X	X	X	X	X	X	X		X
Option 3	X	X	X	X	X	X	X	X	X	X	X		X
Option 4	X	X	X	X	X	X	X	X	X	X	X		X
Option 4A	X	X	X	X	X	X	X	X	X	X	X		X
Option 4B	X	X	X	X	X	X	X	X	X	X	X		X
Split Location Variant A	X	X	X	X	X	X	X	X	X	X	X		X
Split Location Variant B	X	X	X	X	X	X	X	X	X	X	X		X
Split Location Variant C	X	X	X	X	X	X	X		X	X	X		X

CWA = Clean Water Act; RHA = Rivers and Harbors Act; NHPA = National Historic Preservation Act; MSA = Magnuson-Stevens Fishery Conservation and Management Act; EFH = Essential Fish Habitat; MMPA = Marine Mammal Protection Act; IHA = Incidental Harassment Authorization; FESA = Federal Endangered Species Act; CFGC = California Fish and Game Code; CDP = Coastal Development Permit

This page intentionally left blank.

5.3 Land Use and Zoning Considerations

Under SB 286 a consolidated permit would be obtained from the CCC, and a coastal development permit from the City would not be required. However, SB 286 does not permit the CCC to override local land use and zoning designations or permitting requirements. The least constrained concept designs include development at the North T-Pier as well as nearby Intermediate Staging Zone facilities, and constraints on the identified parcels are assessed herein. In addition, the larger Study Area was reviewed for general feasibility of development of OSW O&M facilities based on proximity to Morro Bay Harbor, land use designations, and existing development. Parcels designated for open space were eliminated from consideration, as well as properties containing existing development (such as residences and schools) that would not be compatible with OSW O&M facilities.

Areas considered under this feasibility assessment are designated Coastal Dependent Industrial, Public/Institutional, High Density Residential, Visitor Serving Commercial, Commercial/Recreational Fishing, General (Light) Industrial, Low Density Residential, and District Commercial. In some of the areas designated Visitor Serving Commercial, a Mixed-Use Residential Overlay also exists. In addition to these land use designations, some areas occur within the boundaries of Measure A-24 and Measure D, which provide for additional land use regulations in these areas.

OSW O&M facilities could be categorized by the City as one of a few different land use classifications, depending on the specific facility details. Depending on the ultimate project description, future O&M facilities could potentially fit into the following classifications: Harbor, Port, and Marina Facilities, Construction and Material Yards, Warehousing and Storage, or Industrial use categories depending on project specifics. If the OSW O&M facility was limited to a typical office building, then it could be considered part of the Offices use classification. MBMC Chapter 17.53, Use Classifications, provides the following definitions for these land uses:

- **Harbor, Port, and Marina Facilities.** Facilities that provide a range of services related to the use of boats and other watercraft and commercial and recreational fishing. Services may include, but are not limited to, boating moorings; boat haul out; sales, storage, construction, repair, and maintenance of boats, boat parts, and other marine-related items; marine fueling stations and washing facilities; seafood processing, boat and watercraft charter operations; offices; bait and tackle shops; and hardware sales.
- **Construction and Material Yards.** Storage of construction materials or equipment on a site other than a construction site.
- **Warehousing and Storage.** Storage and distribution facilities without sales to the public on-site or direct public access except for public storage in small individual space exclusively and directly accessible to a specific tenant.
- **Industrial.** Establishments engaged in any of the following types of activities taking place within enclosed buildings: manufacturing finished parts or products primarily from previously prepared materials; providing industrial services; or conducting industrial or scientific research, including product testing.
- **Offices.** Offices of firms, organizations, or public agencies providing professional, executive, management, administrative or design services, such as accounting, architectural, computer software design, engineering, graphic design, interior design, investment, insurance, and legal offices, excluding banks and savings and loan associations with retail banking services (see banks and financial institutions). This classification also includes offices where medical and dental services are provided by physicians, dentists, chiropractors, acupuncturists, optometrists,

and similar medical professionals, including medical/dental laboratories within medical office buildings, but excludes clinics or independent research laboratory facilities (see research and development) and hospitals

Table 4 describes the permitting requirements for development of OSW O&M facilities within the land use designations and use categories listed above, as well as the applicable sections of the MBMC that determine the use standards. However, it should be noted that OSW O&M facilities may not fit neatly into any of the City's existing use classifications. Pursuant to MBMC Section 17.06.020, in cases where a specific land use or activity is not defined, the Director shall assign the land use or activity to a classification that is substantially similar in character or may determine that the use is not allowable, in which case a zoning code amendment would be required to add the appropriate use classification.

Table 4 Allowable Land Uses and Permit Requirements

Land Use Designation	Permit Requirement	Specific Development Standards	Permit Requirements
Coastal Dependent Industrial[1]	**Harbor, Port, and Marina Facilities:** Permitted (P) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Permitted (P1) **Outdoor Storage:** Conditionally Permitted (C1) **Light Industrial:** Permitted (P1) **General Industrial:** Permitted (M1) **Offices:** Permitted (P1)	MBMC Section 17.09.030	**Harbor, Port, and Marina Facilities:** Zoning clearance, Coastal Development Permit **Indoor Warehousing and Storage:** Zoning clearance, Coastal Development Permit **Outdoor Storage:** Conditional Use Permit, Coastal Development Permit **Light Industrial:** Zoning clearance, Coastal Development Permit **General Industrial:** Minor Use Permit, Coastal Development Permit **Offices:** Zoning clearance, Coastal Development Permit
Public/Institutional (Public Facilities)	**Harbor, Port, and Marina Facilities:** Conditionally Permitted (C) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Section 17.09.030	**Harbor, Port, and Marina Facilities:** Conditional Use Permit, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required.
General (Light) Industrial	**Harbor, Port, and Marina Facilities:** Not permitted **Construction and Material Yards:** Permitted (P) **Indoor Warehousing and Storage:** Permitted (P) **Outdoor Storage:** Conditionally Permitted (C) **Light Industrial:** Permitted (P) **General Industrial:** Permitted (M) **Offices:** Permitted (P)	MBMC Section 17.09.030	**Construction and Material Yards:** Zoning clearance, Coastal Development Permit **Indoor Warehousing and Storage:** Zoning clearance, Coastal Development Permit **Outdoor Storage:** Conditional Use Permit, Coastal Development Permit **Light Industrial:** Zoning clearance, Coastal Development Permit **General Industrial:** Minor Use Permit, Coastal Development Permit **Offices:** Zoning clearance, Coastal Development Permit

Land Use Designation	Permit Requirement	Specific Development Standards	Permit Requirements
District Commercial	**Harbor, Port, and Marina Facilities:** Not permitted **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Permitted (P)	MBMC Sections 17.08.030 and 17.08.040	**Offices:** Zoning clearance, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required.
Visitor Serving Commercial	**Harbor, Port, and Marina Facilities:** Conditionally Permitted (C) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Sections 17.08.030 and 17.08.040	**Harbor, Port, and Marina Facilities:** Conditional Use Permit, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required.
Visitor Serving Commercial with Mixed-use Residential Overlay	**Harbor, Port, and Marina Facilities:** Conditionally Permitted (C) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Sections 17.08.030, 17.08.040, and 17.16	**Harbor, Port, and Marina Facilities:** Conditional Use Permit, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required.
Visitor Serving Commercial within Measure A-24 area	**Harbor, Port, and Marina Facilities:** Conditionally Permitted (C) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Sections 17.08.030 and 17.08.040	**Harbor, Port, and Marina Facilities:** Conditional Use Permit, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required. Approval by a voter ballot initiative would be required to make these alterations.

Land Use Designation	Permit Requirement	Specific Development Standards	Permit Requirements
Commercial/ Recreational Fishing within Measure D area	**Harbor, Port, and Marina Facilities:** Conditionally Permitted (C) **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Sections 17.11.040 and 17.11.050	**Harbor, Port, and Marina Facilities:** Conditional Use Permit, Coastal Development Permit. Use must be found to be supportive of fishing activities. For all other uses, a General Plan land use designation and zoning amendment would be required. Approval by a voter ballot initiative would be required to make these alterations.
High Density Residential	**Harbor, Port, and Marina Facilities:** Not permitted **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Conditionally permitted (C)	MBMC Sections 17.07.030 and 17.07.040	**Offices:** Conditional Use Permit, Coastal Development Permit For all other uses, a General Plan land use designation and zoning amendment would be required.
Low Density Residential	**Harbor, Port, and Marina Facilities:** Not permitted **Construction and Material Yards:** Not permitted **Indoor Warehousing and Storage:** Not permitted **Outdoor Storage:** Not permitted **Light Industrial:** Not permitted **General Industrial:** Not permitted **Offices:** Not permitted	MBMC Sections 17.07.030 and 17.07.040	A General Plan land use designation and zoning amendment would be required.

sf = square feet, MBMC = Morro Bay Municipal Code

[1] Limited to coastal-dependent and coastal-related uses. Development priority shall be given to coastal-dependent uses.

Source: City of Morro Bay Municipal Code

As described in Section 3, *Land Use and Zoning Setting*, the least constrained concept designs include development at the North T-Pier, which is within the boundaries of Measures A-24 and D. The City would need to find that OSW O&M facilities at the North T-Pier are supportive of fishing activities, pursuant to Measure D and MBMC Chapter 17.11, in order for the facilities to be permitted. If the City finds that OSW O&M facilities at the North T-Pier do not meet the requirements of the Commercial Fishing zone, a General Plan land use designation would need to be approved via majority vote on a voter initiative ballot.

Additionally, the following land use considerations apply to the Intermediate Staging Zones identified in the least constrained concept designs:

- **Option 4A:** The Intermediate Staging Zone is located on a parcel with a land use designation of Commercial/Recreational Fishing and zoning designation of Commercial Fishing. Measures A-24 and D apply to this site. The concept design would need to create an Intermediate Staging Zone facility that integrates significant components that are supportive of fishing activities, pursuant to Measure D and MBMC Chapter 17.11, in order for the facility to be permitted. If the City finds the Intermediate Staging Zone facility does not meet the requirements of the Commercial Fishing zone, a General Plan land use designation and zoning change would need to be approved. The land use designation change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24.
- **Option 4B:** Based on the City's land use and zoning GIS maps and concept design figures, the Intermediate Staging Zone appears to be located within City property (a parking area) within the public right-of-way (no zoning or land use designation is established for this location). Measure A-24 and Measure D do not apply to this site. Provided the maps and concept design figures are accurate, there would not be major land use and zoning constraints to developing an Intermediate Staging Zone facility in this location, but City encroachment permits and other requirements would be anticipated to apply.
- **Split Location Variant A:** The Intermediate Staging Zone is located on a parcel with a land use designation of Public/Institutional and zoning designation of Public Facility. Measures A-24 and D do not apply to this site. An Intermediate Staging Zone facility could be conditionally permitted in this location if it was considered to be part of the Harbor, Port, and Marina Facilities use classification. For all other use categories, a General Plan land use amendment and zone change would be required, but a voter ballot initiative would not be necessary as part of the approvals process.
- **Split Location Variant B:** The Intermediate Staging Zone is located on a parcel with a land use designation of Commercial/Recreational Fishing and zoning designation of Commercial Fishing. Measures A-24 and D apply to this site. The concept design would need to create an the Intermediate Staging Zone facility that integrates significant components that are supportive of fishing activities, pursuant to Measures A-24 and D and MBMC Chapter 17.11, in order for the facility to be permitted. If the City finds the Intermediate Staging Zone facility does not meet the requirements the Commercial Fishing zone, a General Plan land use designation and zoning change would need to be approved. The land use designation change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24.
- **Split Location Variant C:** The Intermediate Staging Zone is located on a parcel with land use and zoning designations of Visitor Serving Commercial. Measure A-24 applies to this site, but Measure D does not apply. An Intermediate Staging Zone facility could be conditionally

permitted in this location if it was considered to be part of the Harbor, Port, and Marina Facilities use classification. If the City finds the Intermediate Staging Zone facility is not a permitted use in the Visitor Serving Commercial zone, a General Plan land use designation and zoning change would need to be approved. The land use designation change would be subject to voter approval, in addition to Planning Commission, City Council, and Coastal Commission approval, in accordance with Measure A-24.

The areas where OSW O&M facilities can be developed under City authority would be dependent upon the land use classification that the City considers the facilities to fall under. Pursuant to MBMC Section 17.06.020, if the City determines that OSW O&M facilities do not fit into the City's existing land use classifications, a zoning code amendment would be required to add the appropriate use classification. Nonetheless, as illustrated in Table 4, the Coastal Dependent Industrial and General (Light) Industrial land use districts appear to present the greatest flexibility for development of OSW O&M facilities. OSW O&M facilities would require a CDP issued by the CCC, with City of Morro Bay CUP requirements depending on the land use classification for the OSW O&M facility and the land use designation of the parcel. For sites where OSW O&M facilities would not fall within one of the permitted uses (including conditionally permitted), an amendment to the General Plan land use and/or zoning designations would be required.

As described above, OSW O&M facilities utilizing the North T-Pier and Intermediate Staging Zone locations within the boundaries of Measures A-24 and D would face major hurdles if the uses were not found to support commercial fishing and visitor serving uses. In these locations, any land use changes would require a majority vote of city residents through a ballot measure. This would present a major constraint to the feasibility of developing OSW O&M infrastructure given community opposition to new, industrial-type development in the waterfront area. City approval of a General Plan land use and zoning amendment, including the accompanying CEQA documentation, would be required prior to the CCC processing a CDP.

5.4 CEQA and NEPA Requirements

5.4.1 California Environmental Quality Act

OSW O&M facilities would require discretionary approvals by the CCC, CSLC, and/or City depending on the locations of proposed facilities and details of the project description. Preparation of an Environmental Impact Report (EIR) would likely be required. The CSLC or the City would serve as the lead agency for CEQA, pursuant to SB 286. CSLC and the City would coordinate to determine which agency would take the CEQA lead agency role for any OSW O&M facilities occurring within City jurisdiction. Based on initial conversations with the CSLC, CCC, San Luis Obispo County, and City, the City would likely take the lead agency role for CEQA.

CEQA Appendix G topics of particular concern for these facilities would include the following: Aesthetics, Air Quality, Biological Resources, Cultural Resources, Hydrology and Water Quality, Hazards and Hazardous Materials, Noise, Public Services and Recreation, Transportation, and Tribal Cultural Resources.

Technical studies that may be required to support the CEQA analysis include the following:

- Visual simulations/viewshed analysis
- Air Quality/Greenhouse Gas Emissions Study
- Noise Study

- Cultural Resources Analysis (CRA)
- Biological Resources Analysis (BRA)
- Marine Biological Resources Assessment (MBRA)
- Protocol Surveys for special status species (if determined or required by the BRA/MBRA)
- Traffic Study
- Phase I/II Environmental Site Assessment
- Geotechnical Study
- Hydrology Study

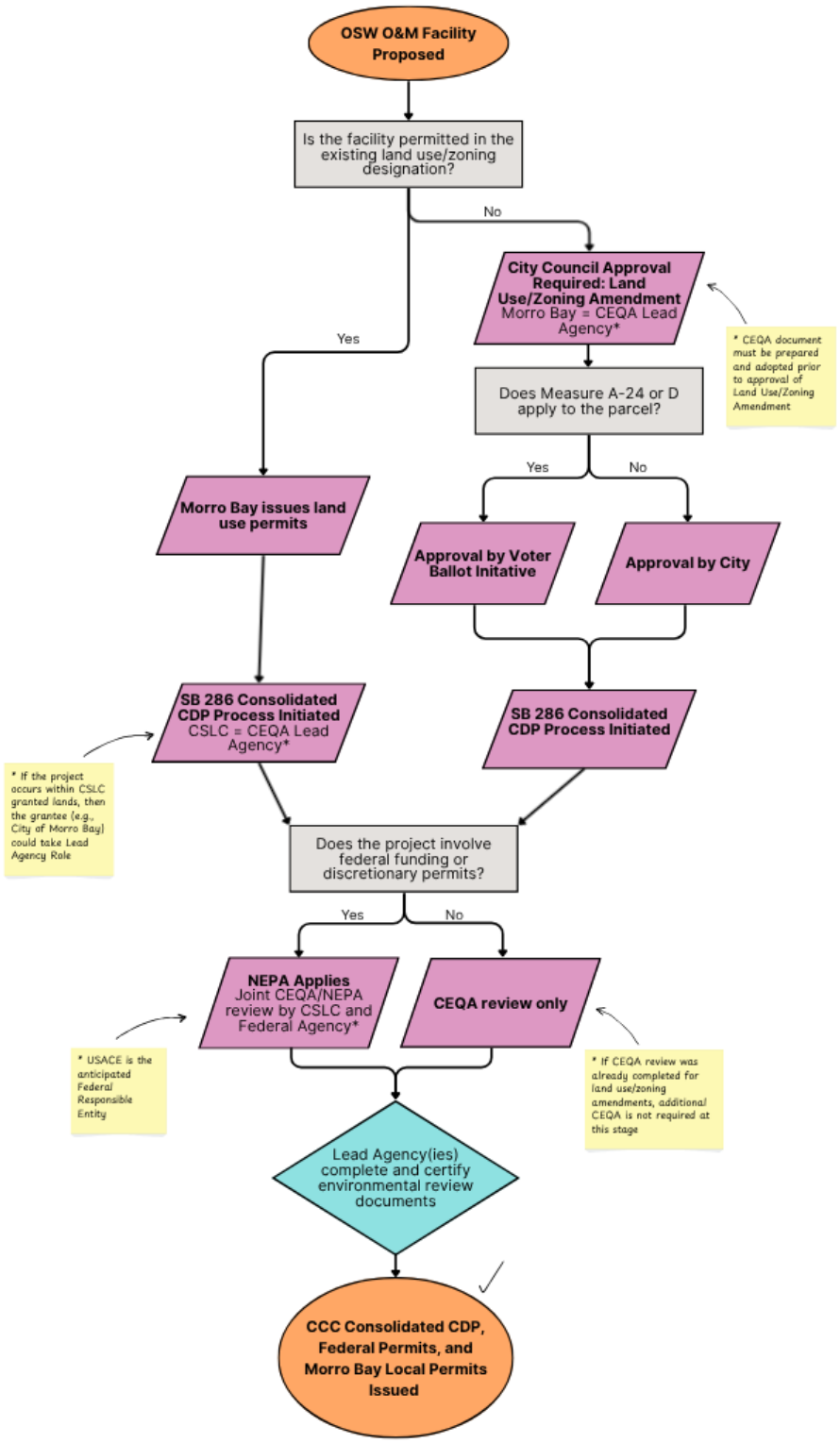
The typical timeframe for completion of each technical study is two to three months. The typical timeframe for completion of an EIR (inclusive of technical study preparation) is a minimum of one year, with more time required for complex or controversial projects. For a potential OSW O&M Facilities project, a timeframe of approximately 1.5-2 years is anticipated.

5.4.2 National Environmental Policy Act

If an OSW O&M facility includes federal funding sources or requires permit approvals by a federal agency such as the USACE (as would likely be required for any facilities occurring within Morro Bay Harbor), NEPA may be triggered depending on the specific permits required and funding received. If NEPA compliance is required, the responsible entity is anticipated to be USACE. Pursuant to SB 286, coordination between the CCC, CSLC, City of Morro Bay, and USACE would occur to avoid duplication of efforts under CEQA and NEPA. As such, there is the potential to prepare a Joint EIR/Environmental Impact Statement (EIS) or EIR/Environmental Assessment (EA) document. Another potential route would be to prepare a CEQA Plus document, which would take the form of the EIR discussed above, with additional federal checklist items added. Per discussions with the CCC and CSLC, a memorandum of understanding with USACE may be an additional option for fulfilling NEPA requirements. Finally, there is the potential for a standalone NEPA document to be developed by the project proponent to address multiple NEPA drivers (including USACE Section 404 permits and USFWS and NMFS authorization for incidental take of protected species). This document could be utilized by multiple federal agencies, if needed, to support their individual NEPA requirements.

Technical studies and analysis completed to support CEQA compliance would be utilized in the preparation of NEPA documentation. Timeframes for the NEPA process can vary substantially. If a Joint EIR/EIS is required, a timeframe of approximately 2.5-3 years is anticipated. If a CEQA Plus document is required, a timeframe of approximately 2 years is anticipated. The NEPA pathway would be determined by the permit requirements and funding source details, and in consultation with the responsible entity. Figure 17 provides a simplified flowchart illustrating the potential environmental review and permitting pathways for OSW O&M Facilities in Morro Bay.

Figure 16 Environmental Review and Land Use Permitting Flowchart



This page intentionally left blank.

6 Environmental Planning and Regulatory Permitting – Timelines and Costs

The least constrained concept design concepts for Morro Bay create multiple environmental planning and permitting scenarios dependent on the location of the primary facility and land ownership. For each of the concept designs the developments are within the Morro Bay CSLC grant deeded lands and within the coastal zone and CCC retained jurisdiction. The individual concept designs ultimately determine the complexity of the environmental planning and permitting processes. The development of a related but separate land-based OSW O&M facility (office space, maintenance yards, etc.) in or outside of the coastal zone may justify a separate environmental analysis and approval process depending on timing and its association with the proposed concept design. Each of the concept designs incorporates significant changs to the Morro Bay Harbor Federal Navigation Channel that would require early coordination with the USACE and support from the USCG prior to the development of preliminary design plans or start of any concept-specific planning or permitting efforts. Proposed changes to the Federal Navigation Channel could be led and funded by the USACE or the project proponent that would precipitate drastically different regulatory processes, timelines and cost considerations.

6.1 Environmental Planning

Environmental planning for concept designs that involve a consolidated and comprehensive in-water and landside coastal development design within Morro Bay's jurisdiction would be anticipated to be led by the City in coordination with the project proponent. As described above in Section 5.4, *CEQA and NEPA Review*, environmental review under CEQA and NEPA would be required. It is anticipated that the City would be the CEQA lead agency and USACE would be the NEPA responsible entity. Pursuant to SB 286, CEQA and NEPA review would be undertaken concurrently, utilizing the same technical studies. There is the potential for preparation of some form of a joint document (to be determined through consultation between the City and USACE). It is anticipated that a Joint EIR/EIS or EIR/EA would be prepared for OSW O&M facilities. Preparation of a Joint EIR/EIS or EIR/EA is expected to take two to three years, with an estimated cost of around $1.5-2 million for preparation of the EIR/EIS or EIR/EA and associated technical studies.

6.2 Regulatory Permitting

Section 5.2, *Environmental Permitting Requirements*, provides an overview of the federal, State and local permitting agencies, statutes and authorizations under which biological, cultural, and water resources are managed at the federal, state, and local levels. The permitting process and approvals for each of the concept designs for Morro Bay would follow similar pathways and would need to be supported by various technical studies that would, in most cases, support both the environmental planning and permitting processes. The permitting timelines and estimates costs for federal, State, and local permits is provided in the following subsections.

6.2.1 Federal Permitting

Prior to the start of any permitting or planning actions, the proposed concept design and changes to the Federal Navigation Channel should be discussed informally with the USACE and USCG. Changes to the Federal Navigation Channel depth, extent, or alignment can be led by the project proponent, or be investigated through a local and federal cost shared study between a non-federal sponsor and the USACE, but follow very different processes, timelines, and cost considerations. In order for USACE to cost share on an investigation or eventual implementation, federal interest would need to be demonstrated. If the project proponent intends for USACE to support the project or to cost share on modifications to the Federal Navigation Channel, for either initial deepening or future channel maintenance to an increased depth, the USACE must first conduct a Federal Interest Determination (FID), and validate the feasibility and justification of the project through the civil works feasibility process. For small navigation projects that are not complex, the Continuing Authorities Program, Section 107 is a program that can support a cost shared (50/50) feasibility study looking at changes to the small boat harbor and navigation in Morro Bay. The Continuing Authorities Program is subject to available funding nationally and new starts compete with requests enterprise wide. Section 107 projects must not exceed $15 million in federal costs, including both the feasibility study, and design and implementation of the project (including maintenance costs over 50 years). For navigation projects exceeding this cost or complexity, a General Investigation feasibility study would need to be authorized by Congress and funded in order to proceed with a cost shared study. Should the study recommend an alternative for authorization, Congress would then need to authorize the design and construction, which would also be cost shared.

The FID involves verifying that the proposed project meets the requirements of federal interest and USACE responsibilities under the Continuing Authorities Program. The proposed action would need to align with federal interests as outlined in various legislative authorities and feasibility studies would need to be conducted to evaluate alternatives and recommend a plan for implementation. Partnering with non-federal sponsors could be formed to improve environmental quality and ensure alignment with federal processes but would require specific agreements and cost-sharing arrangements. If the USACE leads the effort, it would need to obtain funds from the federal government to perform the design study and prepare a memorandum of approval based on the study results and existing data. Once the design study is completed, the USACE would then have to request funding from U.S. Congress for the project; it could take years to obtain the funding and then more years to contract and execute the proposed project (3-7 years is an approximate estimate).

If the USACE completed a FID that was favorable for the concept design, the design study could be developed by the project proponent in collaboration with USACE to expedite the process and timeline to obtain an approved concept design for altering the Federal Navigational Channel. At this stage, the project proponent could continue to work with the USACE to pursue federal funding or choose an alternative pathway by funding the deepening and realignment of the Federal Navigation Channel themselves to expedite the timeline for initial dredging and construction. This would need to be coordinated formally with USACE. This would still require that the USACE and USCG support the proposed changes to the Federal Navigation Channel and that the concept design aligns with federal interests. To modify the proscribed depths of the Federal Navigation Channel and thus for the USACE to assume maintenance dredging responsibility of the deepened Federal Navigation Channel, an approved, detailed project report or feasibility report would be required to document feasibility, environmental acceptability, and economic justification, including NEPA compliance. If

the study was conducted under General Investigations, Congressional approval of the modifications to the Federal Navigation Channel would also be required. Construction would need to be approved by and formalized through agreements with the USACE.

Should the local proponent decide to undertake the work independently, federal permits would be required. In the case of a joint effort with USACE, federal permitting process would start with an informal initial engagement with the USACE engineering and regulatory entities to discuss the proposed action and scope of construction to confirm the scope and content of the design study, technical studies, consultations, and environmental analysis the USACE would require for both the 408 and 404/401 permitting processes. The USCG should be briefed and included as part of the initial outreach and engagement with the USACE. This assumes that the project proponent and concept design align with City land use policies and that the concept design contributes significant benefits to the community. Following informal engagement with the USACE and USCG that establishes mutually agreeable responsibilities, the project proponent would develop the necessary documents and studies to inform an acceptable design of the new Federal Navigation Channel.

Once the USACE has determined the necessary studies and information are in place, the formal permitting process can proceed through a pre-application meeting. The USACE would determine whether the 408 or 404 permit would serve as the NEPA responsible entity and a pre-application meeting would be scheduled that would include both divisions of the USACE. The pre-application meeting would also identify any of the other federal agencies that have not been previously informally engaged but warrant involvement. The complexity and siting of the individual concept design would influence the number of consultations and duration of the CWA 404/401 permitting process with streamlined permitting taking about nine to twelve months and protracted timelines between 16 to 24 months for concept designs that require comprehensive mitigation planning for dredging or extensive pile driving. The cost of the permitting process would be dependent on the concept design and the level of detail the engineering design drawings and alternatives analysis requires. Costs assume that the 408 permit and CWA Section 404/401 permitting processes would require a comprehensive BA and NHPA Section 106 compliance. Costs do not include technical studies (biological and cultural) outside of those developed as part of the CEQA/NEPA process nor do they include costs for mitigation for dredging impacts to submerged habitats, studies needed to permit take of marine mammals (IHA or LOA), or specific dredge characterization studies or approvals. The estimated cost is between $350,000 and $500,000. The cost to develop an IHA or LOA ranges from $80,000 to $150,000 and the development of a sediment sampling analysis plan, sediment characterization, and approvals would range from approximately $150,000 to $300,000 depending on the complexity of the field sediment characterization methods and sediment testing regime. Mitigation for impacts to habitats from dredging are likely to be significant but dredge material from the deepening of the Federal Navigation Channel is likely to be primarily sand and suitable for beneficial reuse in the form of beach nourishment. The use of the dredge material on the beach could partially offset impacts and reduce compensatory mitigation costs through the creation of out-of-kind habitat that supports coastal resiliency. Additional permit compliance monitoring costs ranging from $200,000 to several hundred thousand dollars should be anticipated to address mitigation monitoring requirements associated with both landside and in-water construction.

6.2.2 State Permitting

The state permitting process would start with an informal initial engagement similar to the federal permitting process and the two could be combined for efficiency and consistency if scheduling

constraints can be overcome. The timeline for review and approval of CCC CDP's is approximately 6.12 months and would include a CCC hearing to ratify approval. The RWQCB WQC Individual Permit (IP) application requires a pre-application meeting a minimum of 30 days before application submittal and will require a certified CEQA document. The RWQCB WQC application and approval process timeline is similar to the CCC CDP of approximately 6-12 months. For potential take of California protected species under CESA, the project proponent would need to engage the CDFW and submit an ITP application. If all the species are also protected under FESA, then the determinations and mitigation measures provided by USFWS and NMFS through the CWA Section 404/401 Section 7 consultations can be presented for consideration and approval. The CDFW ITP approval process requires a 12- to 18-month timeframe. The cost of obtaining CDP, WQC and ITP approvals would be dependent on the concept design and would be anticipated to range from $100,000 to $250,000, assuming the CEQA document, technical studies, engineering design drawings, and alternatives analysis have already been prepared and are sufficient to support each of the state permits. The cost of preparing the CEQA document, technical studies, engineering design drawings, and alternative analysis are not included here.

6.2.3 Local Permitting

The vetting of a proposed concept design should first be reviewed by the City and Harbor District, to ensure that the design and extent of the proposed development aligns with City codes, approval criteria and existing waterfront masterplan visioning. In all cases, the preliminary concept design plans should be sufficient to show the spatial extent and details of the submerged, shoreline and land side development areas. Review timelines of the various City departments vary based on the complexity of the concept design and workload for the responsible departments. The City and Harbor District reviews are generally less than 60 days. As of the FY 25-26 fee schedule, the City's Conditional Use Permit fee is $17,572. However, the City would likely require a reimbursement agreement from an OSW developer to recover the City's actual time and material costs to process a CUP application. The building permit fees would be determined based on the project valuation.

7 References

California Coastal Commission. 2017. Introduction to the Coastal Act. https://www.coastal.ca.gov/coastalvoices/IntroductionToCoastalAct.pdf. Accessed April 2025.

Calflora. 2025. Information on Wild California Plants for Conservation, Education, and Appreciation. Available at: www.calflora.org. Accessed July 2025.

California Department of Fish and Wildlife (CDFW). 2025a. California Natural Diversity Database, Rarefind V. Accessed February 2025.

_____. 2025b. Biogeographic Information and Observation System (BIOS). Retrieved February 2025 from www.wildlife.ca.gov/data/BIOS

California Governor's Office of Land Use and Climate Innovation. 2025. CEQA: The California Environmental Quality Act. https://lci.ca.gov/ceqa/#:~:text=CEQA%20is%20intended%20to%20inform,visit%20our%20Getting%20Started%20page. Accessed April 2025.

California Native Plant Society. 2025. Inventory of Rare and Endangered Plants. Updated online and accessed via: www.rareplants.cnps.org.

Cornell Lab of Ornithology. 2025a. All About Birds. Available at: https://www.allaboutbirds.org/. Accessed February 2025.

_____. 2025b. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available at: http://www.ebird.org. Accessed February 2025.

California State Lands Commission (CSLC). 2025. City of Morro Bay. https://www.slc.ca.gov/granted-public-trust-lands/grantees/morro-bay/. Accessed November 2025.

Google Earth Pro. 2025. Version 7.3.6.10201.

Historical Society of Morro Bay. N.d. Measure D and Its Impact on Commercial Fishing in Morro Bay. https://historicalmorrobay.org/wp-content/uploads/2019/06/Measure-D-and-Its-Impact-on-Commercial-Fishing-in-Morro-Bay.pdf. Accessed July 2025.

Morro Bay. 1996a. Waterfront Master Plan. https://www.morrobayca.gov/DocumentCenter/View/1061/Waterfront-Master-Plan?bidId=. Accessed July 2025.

_____. 2018. Downtown Waterfront Strategic Plan. https://www.morrobayca.gov/DocumentCenter/View/11592/City-Council-Adopted-DWSP-2018. Accessed July 2025.

_____. 2021. Plan Morro Bay. https://www.morrobayca.gov/DocumentCenter/View/15424/Plan-Morro-Bay-GP-LCP-Final. Accessed July 2025.

_____. 2024. Resolution No. 61-23. https://www.slocounty.ca.gov/departments/clerk-recorder/forms-documents/elections-and-voting/current-elections/2024-11-05-presidential-general/documents/city-of-morro-bay-resolution-61-23. Accessed July 2025.

_____. 2025. Morro Bay Municipal Code Title 17- Zoning. https://library.municode.com/ca/morro_bay/codes/code_of_ordinances?nodeId=TIT17ZO. Accessed July 2025.

Morro Bay National Estuary Program. 2025. Eelgrass Monitoring and Restoration. Available at: https://www.mbnep.org/eelgrass/. Accessed January 2026.

National Marine Fisheries Service (NMFS). 2025. Critical Habitat Mapper. Available at: https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper. Accessed February 2025.

San Luis Obispo County. 1988. Coastal Plan Policies. Available at: https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/elements/coastal-plan-policy. Accessed March 2025.

_____. 2007. Coastal Plan Policies. https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/elements/coastal-plan-policy. Accessed April 2025.

_____. 2010. General Plan Conservation and Open Space Element. https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/elements/conservation-and-open-space-element/conservation-and-open-space-element. Accessed April 2025.

_____. 2014. Land Use and Circulation Elements (Part II): The Area Plans. https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/area-plans/inland-area-plans. Accessed July 2025.

_____. 2015. Land Use and Circulation Element, Framework for Planning (Inland). https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/elements/framework-for-planning-inland. Accessed April 2025.

_____. 2018. Land Use and Circulation Element, Framework for Planning (Coastal Zone). https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/elements/framework-for-planning-inland. Accessed April 2025.

_____. 2024. Estero Area Plan. https://www.slocounty.ca.gov/departments/planning-building/forms-documents/plans-and-elements/area-plans/estero-area-plan-932f746405ada2b0660ab72d88a6afc7. Accessed July 2025.

_____. 2025a. County Code Title 22. https://library.municode.com/ca/san_luis_obispo_county/codes/county_code?nodeId=TIT22LAUSOR. Accessed April 2025.

_____. 2025b. County Code Title 23. https://library.municode.com/ca/san_luis_obispo_county/codes/county_code?nodeId=TIT23COZOLAUS. Accessed April 2025.

Pacific Veg Map. 2025. Available at: https://pacificvegmap.org/. Accessed July 2025.

United States Department of Agriculture, Natural Resources Conservation Service. 2025a. Web Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed July 2025.

_____. 2025b. Lists of Hydric Soils. National Cooperative Soil Survey, U.S. Department of Agriculture. Available at: https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/. Accessed July 2025.

United States Environmental Protection Agency (USEPA). 2025a. What is the National Environmental Policy Act? https://www.epa.gov/nepa/what-national-environmental-policy-act#:~:text=The%20National%20Environmental%20Policy%20Act%20(NEPA)%20was%20signed%20into%20law,actions%20prior%20to%20making%20decisions. Accessed April 2025.

_____. 2025b. How's My Waterway?. Available at: https://mywaterway.epa.gov/. Accessed March 2025.

United States Fish and Wildlife Service (USFWS). 1973. The Endangered Species Act of 1973, as amended (16 U.S.C 1531 et seq.).

_____. 2025a. Information for Planning and Consultation online project planning tool. Available at: https://ecos.fws.gov/ipac/

_____. 2025b. Critical Habitat Portal. Available at: https://ecos.fws.gov/ecp/report/table/critical-habitat.html

_____. 2025c. National Wetlands Inventory. Available at: https://www.fws.gov/program/national-wetlands-inventory

United States Geological Survey (USGS). 2025. National Hydrography Dataset. Accessed via the national map. Accessed July 2025.

Western Regional Climate Center. 2025. Climate of California. Available at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6569. Accessed July 2025.

This page intentionally left blank.

C. Preliminary geotechnical desk study

MOTT MACDONALD

CA Central Coast OSW - Phase II

Preliminary Geotechnical Desk Study - Morro Bay

Project:	CA Central Coast OSW – Phase II		
Our reference:	504101628-002	**Your reference:**	
Prepared by:	M Yazdi	**Date:**	November 21, 2024
Approved by:	O Pengilly	**Checked by:**	T Sheridan
Subject:	Morro Bay OSW O&M Geotechnical Desk Study		

1 Introduction 2

2 Morro Bay 2

2.1 Site Location 2
2.2 Geological Hazards 2
2.2.1 Preliminary Subsurface Conditions 2
2.2.2 Indicative Engineering Soil Properties 3
2.2.3 Indicative Seismic and Liquefaction Considerations 4
2.2.4 Faults and Historical Earthquakes 4
2.2.5 Lateral Spreading and Landslide Susceptibility 5

3 Summary 6

4 References 7

1 Introduction

Morro Bay has been identified as one of two potential sites for developing an offshore wind operations and maintenance (O&M) port, together with a second potential site at San Luis Obispo, which is reported separately. The O&M facility would support offshore wind farms by serving as a base of operations for offshore wind farm and for support vessels to travel to offshore wind farms and provide the needed maintenance and repairs.

Building on efforts in 2022 to assess port infrastructure opportunities to support offshore wind in Central California, the County of San Luis Obispo is seeking to further assess this area for feasibility to host an O&M facility. This report provides the geotechnical desk study of the Morro Bay site, using currently available data. The scope of this desk study includes:

1. Review of available geological maps, reports and other relevant data sources to identify potential geotechnical constraints such as groundwater, loose/soft surface soil, existing fill, compressible soil, expansive soil, liquefiable soil and lateral spreading.
2. Desktop review mapped of geological and seismic hazards in the general project area including the potential for liquefaction, lateral spreading, and qualitative estimated seismically induced settlement.
3. Develop initial conceptual model of geotechnical constraints geological hazards and approximate depth to groundwater.

2 Morro Bay

2.1 Site Location

The project is located at Morro Bay in San Luis Obispo County, CA. The approximate coordinates of the site are presented below, and these coordinates were used for the desk study in this report.

- Latitude: 35.37134°
- Longitude: -120.85802°

2.2 Geological Hazards

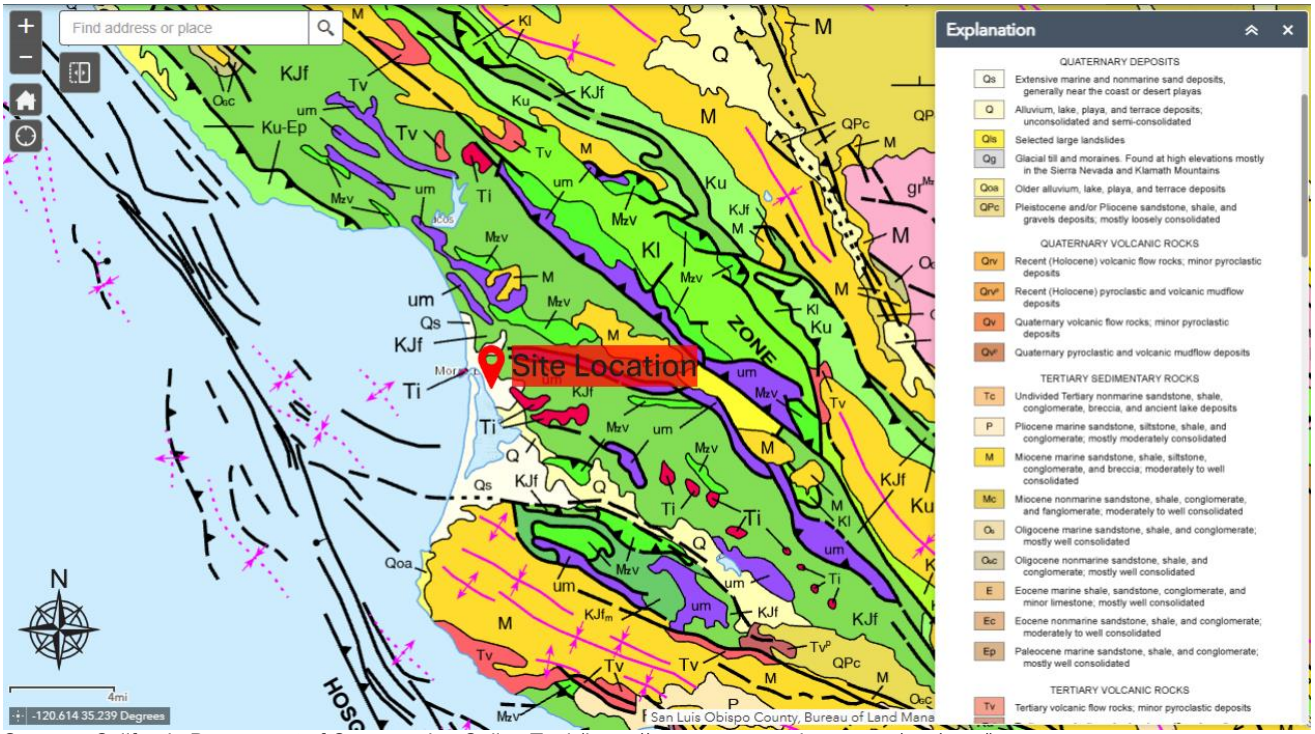
2.2.1 Preliminary Subsurface Conditions

The Morro Bay site has Quaternary deposits Qs as shown in Figure 2.1. The geological unit Qs indicates extensive marine and nonmarine sand deposits generally near the coast or desert playas. This is consistent with the coastal and marine environment. Quaternary deposits are anticipated to be underlain by tertiary aged intrusive igneous rocks that outcrop near to the site.

According to Geo Hazard and Resources report by City of Morro Bay, depth to bedrock (geologic unit Kf – interbedded sandstone and shale) is approximately 70 ft below ground surface which was observed from multiple boreholes in the vicinity of the site. Although the placement of dredge material in the nearshore of Morro Bay can create local turbidity impacts during discharge operations, the material placed would consist of

beach-compatible sand, which is expected to be free of contaminants and settle out of the water quickly (USACE, 2013). According to USACE (2013) no sources with high-level of contaminants were found around the site.

Figure 2.1: Geologic Map of Morro Bay Site



Source: California Department of Conservation Online Tool (https://maps.conservation.ca.gov/cgs/gmc/)

2.2.2 Indicative Engineering Soil Properties

To obtain preliminary indications of the potential engineering soil properties at the desk study phase, an online tool (Web Soil Survey, United States Department of Agriculture, Natural Resources Conservation Service) was utilized. Table 2.1 summarizes soil properties and classifications indicated by this tool. This suggests the majority of site comprises sandy material which is likely to be saturated due to the proximity of the site to the coast. Properties such as liquid limit and plasticity index are not available for this area. However, the surrounding area in the vicinity of the site generally has non-plastic soil due to the coastal marine environment.

These values should be taken as indicative only, and field investigations would be required to confirm site conditions, materials and properties, and support future assessment.

Table 2.1: Indicative Engineering Soil Properties

Parameter	Percent Clay	Percent Silt	Percent Sand	Water Content (%)	Unified Soil Classification
Estimated value	2.5	1.5	96	2.2	SM

2.2.3 Indicative Seismic and Liquefaction Considerations

Assuming Site Class D and Risk Category III, the ASCE Hazard Tool was used to estimate preliminary seismic design parameters for the site (Table 2.2). Site Class D is usually considered as default site class when no geotechnical data is available at the site. Risk Category III is referring to the buildings and other structures, the failure of which could pose a substantial risk to human life. Site class and risk category should be revisited and reevaluated if this site progresses for further consideration.

Table 2.2: Indicative Seismic Design Parameters (Morro Bay)

Parameter	S_s (g)	S_1 (g)	S_{MS} (g)	S_{M1} (g)	S_{DS} (g)	S_{D1} (g)	T_L (s)	PGA_M (g)	V_{S30} (m/s)	Seismic Design Category
Estimated value	1.09	0.36	1.36	0.91	0.9	0.6	8	0.52	260	D

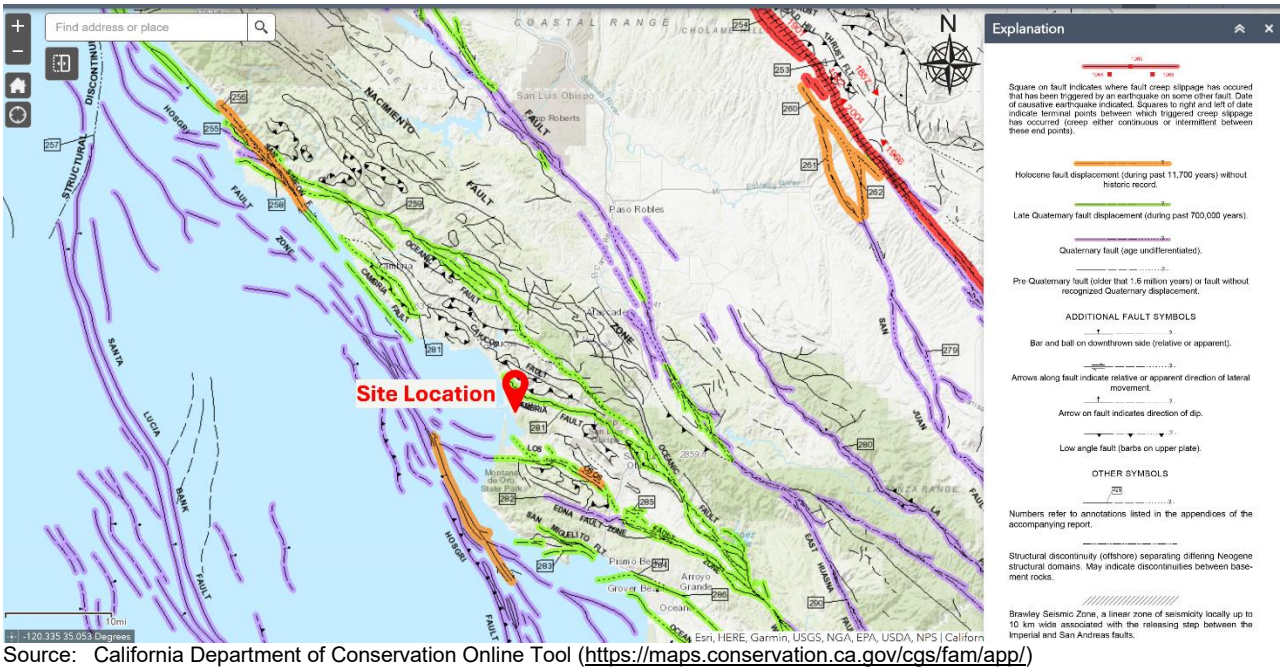
Note: Where values of the multi-period 5%-damped MCE_R response spectrum are not available from the USGS Seismic Design Geodatabase, the design response spectrum shall be permitted to be determined in accordance with Section 11.4.5.2 of ASCE 7-22 per the ASCE Hazard Tool.

Considering the high seismicity level and the sandy nature of the site, it is important to conduct a liquefaction assessment for the site. Liquefaction can potentially cause foundation settlement and lateral spreading which affects the performance of the structures and port facility. Additional site-specific geotechnical data such as obtaining shear wave velocity of top 100 ft or 30 m (V_{S30}) and standard penetration testing can provide more information about the liquefaction potential and the potential associated risks.

2.2.4 Faults and Historical Earthquakes

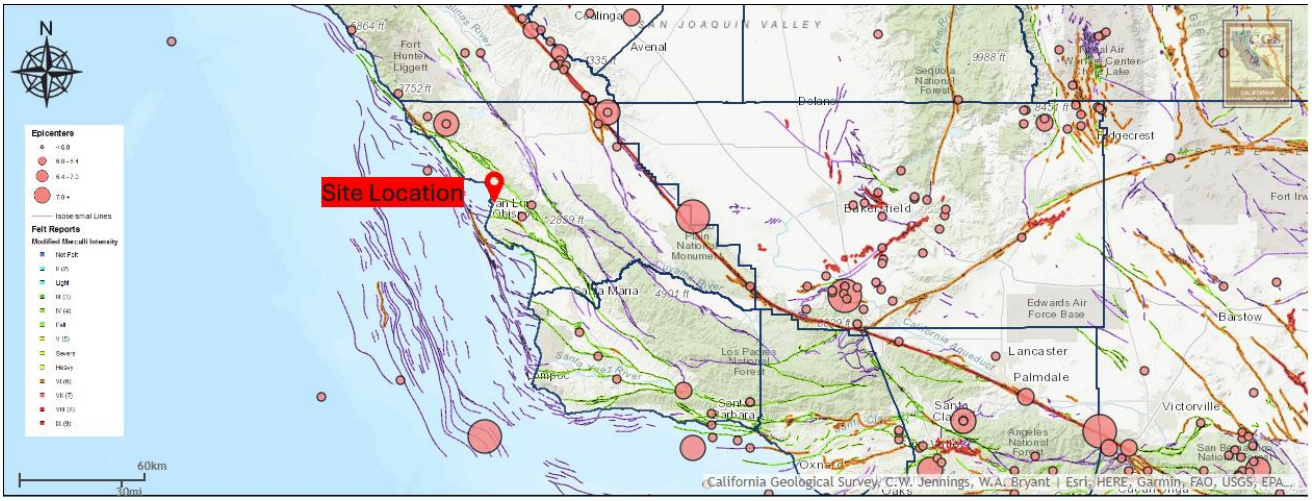
According to US Geological Survey Quaternary Faults online tool, the site is in a seismically active region with multiple faults present in the region (Figure 2.2). As a result, many earthquakes have been recorded in the region (Figure 2.3). It is therefore important that for future design stages the seismic hazard is considered and probabilistic and deterministic seismic hazard analyses are undertaken to quantify the risk.

Figure 2.2: Fault Map (Morro Bay)



Source: California Department of Conservation Online Tool (https://maps.conservation.ca.gov/cgs/fam/app/)

Figure 2.3: Historical Earthquakes Around Central Coast, CA



Source: California Department of Conservation Online Tool (https://maps.conservation.ca.gov/cgs/historicearthquakes/)

2.2.5 Lateral Spreading and Landslide Susceptibility

Based on the available LiDAR mapping (Figure 2.4) of the site, the ground surface is relatively flat indicating low probability of lanslide risks at the proposed site location. However, considering the findings of Sections 2.2.2 and 2.2.3, there is a potential for liquefaction-induced lateral spreading which can potentially result in damage to any future port facilities.

Figure 2.4: LiDAR Map (Morro Bay)

Source: USGS Lidar Explorer Map (https://apps.nationalmap.gov/lidar-explorer/#/)

3 Summary

This report presents a preliminary geotechnical desk study of the Morro Bay site as one of two potential locations for developing an offshore wind operations and maintenance (O&M) facility. This initial review of publicly available data includes preliminary subsurface condition and geological setting, indicative engineering soil properties, and seismic and liquefaction considerations, along with records of faults and historical earthquakes and lateral spreading and landslide susceptibility.

Based on the available data reviewed in the preceding sections, no significant/unusual geotechnical risk has been identified beyond those typical of any coastal zone in the region. It is anticipated that any port/pier/jetty would require piled foundations into underlying competent material below the seabed. Supporting facilities on the coast are likely to comprise a combination of piled and shallow foundations, pending the outcome of investigations and seismic studies, and confirmation of anticipated structural loadings.

Should the Morro Bay site be selected for further study, further geotechnical investigations will be required to assess the site condition and the potential geotechnical risks.

4 References

- California Department of Conservation online tools (Geology Division) [Accessed: November 13, 2024] (https://www.conservation.ca.gov/cgs)
- Geo Hazard and Resources report by City of Morro Bay (https://www.morrobayca.gov/DocumentCenter/View/15266/Geo-Hazards-and-Resources)
- US Army Corps of Engineers (USACE). 2013. Draft Environmental Assessment Morro Bay Six Year Federal Maintenance Dredging Program San Luis Obispo County, California. (https://www.spl.usace.army.mil/Portals/17/docs/publicnotices/morro_bay_draft_ea.pdf)
- U.S. Geological Survey Lidar Explorer Map [Accessed: November 13, 2024] (https://apps.nationalmap.gov/lidar-explorer/#/)
- U.S. Geological Survey Online Hazard Tool, US Quaternary Faults [Accessed: November 13, 2024] (https://usgs.maps.arcgis.com/apps/webappviewer/)
- Web soil survey; Natural Resources Conservation Service. U.S. Department of Agriculture [Accessed: November 13, 2024] (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx).