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Chevron Eureka Terminal 2025 Repairs: Eelgrass Mitigation and Monitoring Plan

Draft

Project # 3606-07

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April 18, 2025

Executive Summary

This document has been prepared to provide a means for assessing the impacts on eelgrass habitat of proposed repairs to the Chevron Eureka Terminal (Terminal) and for defining appropriate mitigation measures and monitoring requirements. The Terminal is located in Eureka, California, on the eastern shoreline of the Entrance Bay region of Humboldt Bay, bordering the North Bay Channel. Mudflats north and south of the Terminal's trestle support native eelgrass (*Zostera marina*). Eelgrass provides important ecological and economic benefits and is protected by California and federal regulations. Any loss of eelgrass habitat, including temporal loss (i.e., delays in recovery following construction), attributable to project actions requires compensatory mitigation under these regulations.

Chevron is proposing to perform repairs to the Terminal wharf and trestle, which support a system of fuel pipelines on the south side. In 2017, a retrofit project for the Terminal was completed to bring it into compliance with California Building Code Chapter 31F, Marine Oil Terminals and support the fuel transfer pipeway during a seismic event. In 2025, Chevron is proposing to make additional repairs and upgrades to the Terminal, including replacement of piles and pile bracing, guide piles and guides, and a beam on the working platform. The Terminal repairs will require construction activities that may affect protected eelgrass habitat adjacent to the project site. All in-water work will be conducted during a work window of September 1–October 15. The project will occur in three discrete project areas: replacement of piles and pile bracing on the dock causeway at Bents 8, 20, 21, 22, and 23; replacement of guide piles and guides at the floating dock; and replacement of the beam at the working platform. All piles identified in Bents 8, 20, 21, 22, and 23 are located in eelgrass habitat. Pile installation and removal will be performed from a barge that will access the trestle from the south side. Work in or near eelgrass habitat will take place only when tidal elevations permit the barge to float over the substrate. The barge will be anchored in place by setting two 0.71-meter-diameter spud poles.

Pile installation will result in unavoidable permanent impacts on eelgrass habitat because any eelgrass growing at the locations of pile installation will be displaced, and the cumulative surface area of all piles installed (0.76 square meter) represents an area that will be permanently unavailable for eelgrass growth and that will require compensatory mitigation. Additionally, potential temporary impacts could result from substrate disturbance associated with pile installation and removal or barge maneuvering and anchoring activities. Temporary substrate disturbance is not expected to permanently render the substrate unsuitable for eelgrass growth. If small areas of eelgrass turions are inadvertently uprooted or crushed, it is expected that eelgrass would recover sufficiently through natural vegetative expansion and seedling recruitment; however, it is unknown how much time would be needed to achieve full recovery. Delays in recovery greater than 1 year would constitute a temporal loss of eelgrass habitat requiring compensatory mitigation.

The project site and a nearby reference site will be monitored to determine the level of project impacts. A preconstruction eelgrass field assessment will be conducted between June and August 2025 (within 60 days before construction begins). The project site will be inspected as soon as feasible (depending on tides and other factors) following construction in 2025 to determine the extent of substrate disturbance caused by pile installation, pile removal, and spud pole placement because this disturbance may be difficult to see by the following growing season, when the postconstruction assessment will be conducted (between August and October). During each of the growing season field assessments, eelgrass beds will be mapped, and eelgrass variables will be measured. Survey results will be compared between project and reference sites to help determine whether changes in eelgrass characteristics between preconstruction and postconstruction assessments are attributable to natural variation or whether they were caused by project actions. If there is any detectable decline in eelgrass areal extent, cover, or turion density in areas of substrate disturbance 1 year following construction, and the decline can be attributed to project actions, the area of impact will be calculated and added to the area of permanent impact to determine the total area requiring compensatory mitigation.

The proposed replacement of five 0.36-meter-diameter timber piles (2.54 square meters) with five 0.41-meter-diameter timber coated with polyurea piles (3.30 square meters) will require compensatory mitigation because of the permanent loss of eelgrass habitat (0.76 square meter). Chevron will mitigate permanent losses to eelgrass habitat through the removal of piles in suitable eelgrass habitat at another location in Humboldt Bay as out-of-kind mitigation at a 2:1 ratio, in accordance with the exception for small impact areas in the CEMP (NMFS 2014). The mitigation will be considered successful if the appropriate footprint of piles is removed (i.e., 1.52 square meters), and follow-up monitoring of eelgrass recovery will not be required. If unanticipated impacts occur in excess of this amount, the eelgrass bed will be repaired on-site and monitored for five years to confirm eelgrass recovery.

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Section 1.0 Introduction

The Chevron Eureka Terminal (Terminal) consists of a timber trestle and wharf situated on the tidelands of Humboldt Bay, California, and a bulk fuel storage facility on an adjacent upland parcel in the city of Eureka, Humboldt County (Figure 1). The Terminal is T-shaped with an approximately 182.9-meter-long trestle connected to an approximately 45.7-meter-long wharf. Five mooring dolphins are connected to the wharf by timber catwalks. The overall length of the wharf and the catwalks is approximately 131.1 meters. The Terminal trestle and wharf extend westward from shore through shallow waters to the margin of the North Bay Channel. The trestle is located approximately 365.8 meters north of the present mouth of Elk River. The Terminal serves fuel barges that arrive once every 10–12 days to deliver bulk fuel products. The fuel products are transferred from the barges to the bulk fuel storage facility through the unloading platform on the wharf and the fuel transfer pipeway on the trestle.

In 2017, a retrofit project for the Terminal was completed to bring it into compliance with California Building Code Chapter 31F, Marine Oil Terminals and support the fuel transfer pipeway during a seismic event. In 2025, Chevron is proposing to make additional repairs and upgrades to the Terminal, including replacement of piles and pile bracing, guide piles and guides, and a beam on the working platform. The Terminal repairs will require construction activities that may affect protected eelgrass habitat adjacent to the project site.

Eelgrass provides important ecological and economic benefits, including stabilization of bottom sediments, improvement of water quality, a substrate for epiphytic algae and invertebrates, food for waterfowl, and rearing habitat for many species of fish and shellfish (Phillips 1984, Moore and Short 2006, HBHRCD 2017). To prevent further loss or degradation of this important habitat, eelgrass beds are protected by California and federal regulations. Vegetated shallows that support eelgrass are considered special aquatic sites under the Clean Water Act Section 404(b)(1) guidelines (Title 40, Code of Federal Regulations, Section 230.43). Under the Magnuson-Stevens Fishery Conservation and Management Act, eelgrass is designated as a Habitat Area of Particular Concern (HAPC), which is a discrete subset of Essential Fish Habitat (EFH) (NOAA 2002). HAPCs are rare, are particularly susceptible to human-induced degradation, are especially ecologically important, and may be located in an environmentally stressed area. The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) developed a statewide policy to establish and support a goal of protecting eelgrass and its habitat functions, including the spatial coverage and density of eelgrass habitats (NMFS 2014). The NMFS (2014) policy is congruous with the approach taken in the federal Clean Water Act guidelines and in the State of California Wetland Conservation Policy.

The purpose of this mitigation and monitoring plan is to provide a means for assessing the impacts on eelgrass habitat from the proposed Chevron Eureka Terminal 2025 Repairs and to define appropriate mitigation measures and monitoring requirements. The plan is necessary for Chevron to receive regulatory authorization before performing work in areas supporting eelgrass. The proposed methods are generally consistent with NMFS (2014) guidelines.

N:\Projects3600\3606-01\07\Reports\Fig 1 Project Location.mxd

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Figure 1. Project Location

Chevron Eureka Terminal 2025 Repairs

Eelgrass Mitigation and Monitoring Plan (3606-07)

April 2025

1.1 Report Organization

This plan is organized as follows:

- The remainder of Section 1 describes the proposed project and its environmental setting.
- Section 2, "Impacts," discusses direct and indirect impacts on eelgrass habitat that could result from project actions. Potential impacts associated with three actions (pile installation, pile removal, and barge maneuvering and anchoring) are described in detail.
- Section 3, "Monitoring," describes the monitoring protocol. Survey areas at the project site and a nearby reference site are defined, methods for mapping eelgrass are specified, survey variables are described, and a monitoring schedule is presented.
- Section 4, "Mitigation," describes the avoidance and minimization measures that will be used during project construction to avoid impacts. Also, a mechanism is provided for determining the amount of mitigation required each year; the mitigation ratios are defined, and the type of mitigation to be performed is described.
- Section 5, "References," identifies the sources cited in this plan.
- Appendix A, "100% Design Plans," provides the general project plan.

1.2 Proposed Project

In accordance with Marine Oil Terminal Engineering & Maintenance Standards (MOTEMS), Chevron USA is proposing repairs and upgrades to the Eureka Terminal. The work will be conducted in a single phase with construction repairs scheduled for the work window between July 1 and October 15, 2025. Repairs and methods are described below.

The project will occur in three discrete project areas: replacement of piles and pile bracing on the dock causeway at Bents 8, 20, 21, 22, and 23; replacement of guide piles and guides at the floating dock; and replacement of the beam at the working platform. Work at Bents 8, 20, 21, 22, and 23 includes the removal of six timber piles and two steel piles at the floating dock. All piles identified in Bents 8, 20, 21, 22, and 23 are located in eelgrass habitat (Figure 2). Timber piles will first be cut off 0.3 meters below the mudline, and will then be removed using a crane located on a floating barge; the barge will be anchored in place by setting two 0.71-meter-diameter spud poles. The exact method of removal using the crane will be determined by the contractor. Timber piles (0.36-meter-diameter) will be replaced with 0.41-meter-diameter timber piles coated with polyurea installed to a depth of 40 feet. Piles located at Bents 8, 20, 21, 22, and 23 of the causeway will be installed in eelgrass habitat. Guide float piles will be located outside of eelgrass habitat. Once piles are replaced, new guide systems and bracing systems will be installed on the floats and new piling will be installed on the floating dock and causeway piles.

Construction activities will be performed from a flat-bottomed barge with an approximately 1.5-meter draft when loaded (e.g., the Moondoor II, a 34.7- by 23.8-meter-long barge). The barge will be powered and maneuvered into position by a push boat (e.g., the Joseph George). The barge will approach the trestle from the south side and will be repositioned as needed to access work locations. A crane (e.g., Kobelco CK1000-III Crawler Crane with a 36.7-meter boom) will be positioned on the barge and will be used to install and remove piles and other components. Work in eelgrass habitat will be limited to times of the day when tidal heights are sufficient to allow the barge to float over the substrate.

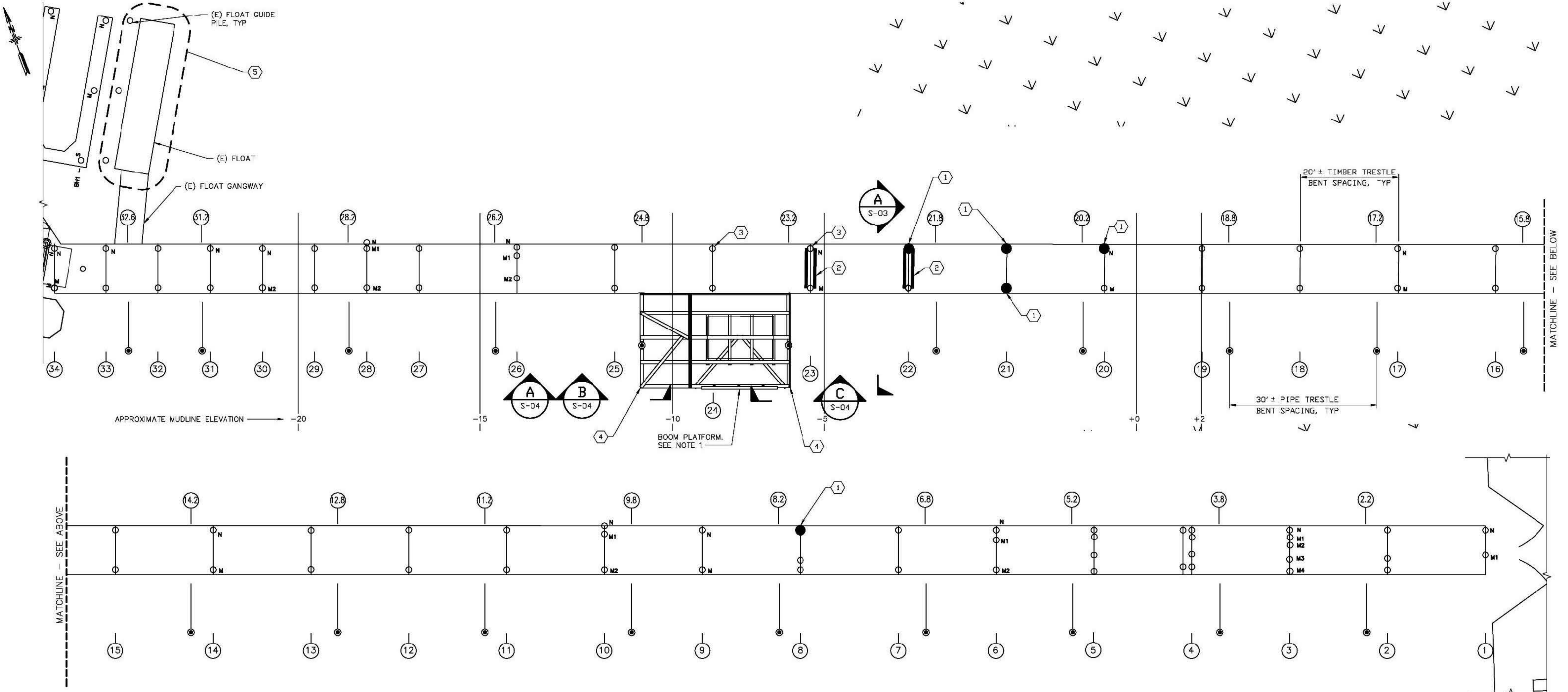
All new piles will be driven to tip elevation or refusal using a crane and a vibratory hammer. If refusal occurs before tip elevation is reached, an impact pile-driving hammer will be used to drive the piles to the required tip elevation, completing the installation. Timber piles will be removed using a crane, with the method to be determined by the contractor. It is not known how long it will take to perform pile installation and removal procedures; however, because the work will occur only during high tides, the barge will not be in any given position long enough to affect eelgrass through shading. After they are removed, piles will be placed on the barge in a containment area.

1.3 Environmental Setting

In Humboldt Bay, eelgrass is found in extensive meadows in the basins of the North and South Bays. The upper and lower limits of eelgrass distribution vary from site to site, with a maximum elevation range during the growing season of -2.1 meter to 1.4 meter mean lower low water (Gilkerson 2008). Eelgrass beds in Humboldt Bay are persistent all year, but they exhibit high variability in distribution and density, both seasonally and from year to year. The fluctuations may be related to seasonal rainfall patterns, currents, frequency of turbidity events, freshwater flows, grazing by black brant (*Branta bernicla nigricans*), and changes in nutrient levels. The eelgrass beds near the mouth of Elk River have been noted as being especially dynamic (Schlosser and Eicher 2012).

Eelgrass beds are found bordering the North Bay Channel, where the Chevron Eureka Terminal is located, approximately 365.8 meters north of the mouth of Elk River. The approximate distribution of dense and patchy eelgrass in the vicinity of the project site is shown in Figure 3, based on field mapping conducted at the site in 2015. We compared the NOAA (June 27, 2009) imagery, in true color and color infrared, with Google Earth imagery from 2003 through 2012, which is available for each growing season except 2007–2008, with the timing of the imagery ranging from May through August (NOAA 2009). Variability in eelgrass distribution at this location is evident from a review of the photographs, although low-imagery resolution and high-tide coverage at the time when the photographs were taken in some years limit the amount of information that can be derived. In general, eelgrass around the project site appears to exhibit greater seasonal variability in cover at higher elevations within the higher intertidal portion of its range closer to shore, with greater levels of cover observed in July and August. Closer to the channel where the shoal transitions from intertidal to shallow subtidal depths, eelgrass cover appears to be greater during the early portion of the growing season (May–June). The deep-water channel margin of the eelgrass bed appears to remain fairly constant. This pattern is consistent with field observations of the area.

Eelgrass is known to occur on mudflats at the project site on the north and south sides of the trestle, in both dense and patchy populations (see H. T. Harvey & Associates 2016, 2017, and 2018). Eelgrass has been observed growing immediately adjacent to piles on the south side of the trestle at suitable elevations, but little eelgrass was present close to piles on the north side of the trestle because of the shade provided by the trestle.



1 REPAIR PLAN
SCALE: 1' = 10'

LEGEND

- ○ (E) TIMBER PILE
- ◉ (E) PIPE PILE
- ● (E) TIMBER PILE TO BE REPLACED
- ═ (E) TIMBER PILE BRACING TO BE RECONSTRUCTED

KEYNOTES:

1. REPLACE PILES. SEE PILE REPLACEMENT SCHEDULE AND A/S-03
2. RECONSTRUCT TIMBER PILE BRACING. SEE B/S-03
3. REPLACE T-STRAPS AND BOLTS. SEE 2/S-03
4. REPAIR BOOM PLATFORM BEAM AND RETROFIT CONNECTIONS. SEE A/S-04 AND C/S-04
5. REMOVE (E) FLOAT GUIDE PILES AND INSTALL NEW. SEE 1/S-05

TIMBER PILE REPLACEMENT SCHEDULE

BENT #	PILE	MIN PILE TIP ELEVATION (FT)
8	N	-30
20	N	-40
21	N	-40
21	M	-40
22	N	-40

NOTES:

1. GRATING NOT SHOWN FOR CLARITY.

SCALE: 1''=10'

Figure 2. General Plan for 2025 Repairs

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Figure 3. Eelgrass Beds in the Vicinity of the Project Site

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Eelgrass Mitigation and Monitoring Plan (3606-07)
April 2025

Section 2.0 Impacts

2.1 Permanent Impacts Requiring Compensatory Mitigation

Permanent impacts result from actions that alter the substrate in such a way that it is no longer suitable to support eelgrass. Even if eelgrass is not present at the time the action occurs, this still represents an impact if the action occurs in an area known to support eelgrass because that area that will be permanently unavailable for eelgrass growth. The replacement of five timber piles that are 0.36 meter diameter (2.54-square-meters total area) with steel timber piles coated with polyuria that are 0.41 meter diameter (3.30-square-meters total area) in eelgrass habitat represents a permanent impact that will require compensatory mitigation. Cumulatively, this will displace eelgrass beds over a 0.76-square-meter area. This is a relatively minor impact due to what is essentially a maintenance project.

2.2 Impacts Requiring Avoidance and Minimization

The following types of impacts could result from implementing the proposed project:

- Substrate disturbance/direct uprooting or crushing of eelgrass turions, which could be caused by:
    - Pile removal
    - Pile installation (i.e., disturbance in excess of the area where eelgrass is permanently displaced)
    - Barge anchoring
    - Propeller action
    - Barge grounding
- Water quality effects, such as:
    - Chemical leaching from new piles
    - Chemical spills (e.g., of fuel or hydraulic fluid)
- Turbidity
- Shading

The project's potential effects on water circulation patterns and nutrient loading also were considered, but it was determined that such impacts would not occur because implementing the project would not change circulation or nutrient loads.

Most of the potential impacts listed above will be avoided through implementation of the project's avoidance and minimization measures (listed in Section 4.0). However, project actions that could cause disturbance of the substrate (pile removal, pile installation, barge anchoring, propeller action, and barge grounding) might result in longer-term impacts on eelgrass and could potentially require additional mitigation. These impacts and their mechanisms are discussed in further detail below.

2.3 Impacts Potentially Requiring Additional Mitigation

Temporary or permanent impacts could result from project actions that uproot, crush, or dislodge eelgrass turions. If the substrate is in suitable condition following the action, eelgrass may revegetate the area naturally; however, if recovery is not achieved by the growing season following construction, the impact constitutes a temporal loss of eelgrass.

In areas that currently support eelgrass, temporary substrate disturbance is not expected to alter the substrate in a way that would create conditions permanently unsuitable for eelgrass growth. In cases where temporary substrate disturbance is unavoidable and results in direct impacts on eelgrass turions, it is expected that the eelgrass will be able to revegetate by natural means; however, it is difficult to predict how rapidly this might occur because growth patterns are naturally variable. Eelgrass can revegetate the disturbed areas either by vegetative expansion through rhizome expansion or by seedling recruitment the following spring. At the project site, rhizome expansion is most likely to occur in the dense eelgrass, whereas recolonization of disturbed areas by seedling recruitment is likely to be more important in the higher intertidal zone where eelgrass is patchy. The potential areas of disturbance associated with project actions are relatively small, and there are abundant eelgrass propagules available at the site. The success of seedling recruitment is unpredictable for any one year. In permanent study plots in Entrance Bay monitored from 2001 through 2008, eelgrass seedling density varied widely from year to year (Schlosser and Eicher 2012).

Areas less than several meters wide have been noted to recolonize by rhizome extension much more rapidly than larger areas (Fonesca et al. 1998, Boese 2002). Postconstruction monitoring of the 2017 retrofit project completed at the Terminal showed a substantial increase in vegetation cover from 2017 to 2018 in both the survey areas and the reference area, while aerial extent of eelgrass and turion density varied between years and sites; notably, patchy habitat turion density (which were conspicuously thin and seemed to represent recent growth) in one of the survey areas increased substantially in the same area where areal coverage decreased, indicating recolonization by seedlings rather than rhizome extension (H. T. Harvey & Associates 2018).

2.3.1 Pile Removal and Installation Impacts

In addition to the permanent impact of eelgrass bed displacement caused by pile installation (see Section 2.1), the removal and installation process could cause substrate disturbance, resulting in additional impacts, although this type of impact was not observed in 2017 postconstruction inspections (H. T. Harvey & Associates 2017) and is not expected in 2025.

2.3.2 Barge Anchoring Impacts

Project activities will require the use of a barge. During an incoming tide, when the water is sufficiently deep to prevent contact with the substrate, the push boat operator will push the barge into position over the eelgrass.

The barge will be positioned adjacent to the trestle and will be temporarily anchored at each work location by setting one to two spud poles at the stern of the barge. The spuds are pointed steel pipes 0.71 meter in diameter that penetrate the bay mud up to 3 meters. Spud poles are set in place using gravity and retrieved using a powered pulley system. The spud poles will be set between 3.0 and 42.7 meters south of the trestle. The maximum time that the barge will be positioned at any one location is less than one tidal cycle. When leaving the work site, the barge must return to the North Bay Channel before the water depth becomes too shallow. Within these localized areas where temporary substrate disturbance will be caused by spud pole sets, eelgrass is expected to reestablish. During postconstruction inspections in 2015 and 2017 surveyors did not identify any evidence of substrate disturbance or disturbance to the eelgrass beds where spud poles were set (H. T. Harvey & Associates 2016, 2017), so impacts are not expected.

2.3.3 Propeller Action Impacts

A tugboat and skiff will be used to position the barge over the eelgrass bed. In shallow depths, the propellers of both the tugboat and the skiff have the potential to create turbulent conditions (prop-wash) that can disturb or damage eelgrass beds, although this kind of impact was not detected during 2017 postconstruction inspections (H. T. Harvey & Associates 2017) and is not expected in 2025.

2.3.4 Barge Grounding Impacts

Grounding of the barge is not expected but could occur. Preconstruction and postconstruction monitoring will provide data on eelgrass variables in the project survey area. These data, compared to data for the reference survey area, will allow for assessment of the level of any impacts and setting of target goals for on-site recovery and off-site mitigation as needed. If the barge is grounded, permitting agencies will be notified immediately. Areas affected will be photodocumented, and the most direct method possible will be used to calculate the area damaged (i.e., the area of substrate disturbed will be measured as soon as possible following the incident). This area will be inspected again during the one-year postconstruction monitoring survey to determine if permanent impacts occurred and the amount of compensatory mitigation required.

Section 3.0 Monitoring

Monitoring of the project site and a nearby reference site will be conducted to determine whether project actions result in impacts requiring compensatory mitigation. Monitoring will include (1) preconstruction and postconstruction eelgrass mapping and surveys, conducted during the active eelgrass growing season; (2) construction monitoring, conducted whenever construction may affect eelgrass habitat; and (3) a postconstruction inspection, conducted soon after construction. These methods are largely the same used for pre- and post-construction monitoring in 2017 and 2018 at the same site (H. T. Harvey & Associates 2017, 2018).

3.1 Survey Areas

3.1.1 Project Site

At the project site, surveys will be conducted in areas where proposed project actions may reasonably be expected to result in direct or indirect impacts on eelgrass. Specifically, these are the areas adjacent to the trestle where piles are proposed for placement and removal and the area south of the trestle where spud poles will be set. All survey areas will extend from the lowest to the highest extent of eelgrass occurrence. The south trestle survey area will be 10 meters wide, and the spud pole survey area will be 35 meters wide to cover the entire area that the barge will be operating in (Table 1, Figure 4).

Table 1. Survey Area Boundaries at Project and Reference Sites

	Boundaries	
Survey Area	**North to South**	**West to East**
Project Site		
South trestle	From trestle midline to 10 meters south	From lowest to highest extent of eelgrass
Spud pole	From 10–45 meters south of trestle	From lowest to highest extent of eelgrass
Reference Site		
	75–85 meters south of trestle	From lowest to highest extent of eelgrass

3.1.2 Reference Site

In addition to project site survey areas, a reference site will be surveyed to help determine whether observed changes are attributable to natural variability or whether they are a response to project actions. Natural spatial and temporal variability in eelgrass is high, and this variability can confound the evaluation of eelgrass response to project actions, necessitating comparison of observed changes between project and reference sites. The reference site will be located 75–85 meters south of the trestle and will extend from the lowest to the highest extent of eelgrass occurrence (Figure 4). This reference site is part of the same eelgrass bed at the project site, but it is located far enough away to be unaffected by the project. The area identified as the reference site has environmental conditions and eelgrass characteristics similar to those present on the project site.

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Figure 4. Eelgrass Survey Area Boundaries at Project and Reference Sites
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Eelgrass Mitigation and Monitoring Plan (3606-07)
April 2025

3.2 Eelgrass Mapping

Low-altitude unmanned aerial vehicle (UAV) flights will capture color aerial imagery for the entirety of the survey and reference areas. Automated flight control software will be used to program UAV flights to ensure consistent flight altitudes (300 feet above ground level), sufficient overlap between individual images (60 percent frontlap and 70 percent sidelap), and seamless coverage of the study area. Aerial imagery will be processed, color-corrected for exposure variation, mosaicked and orthorectified using Agisoft Metashape Professional Photogrammetry software. The resulting orthomosaic will be used to support determination of eelgrass percent vegetated cover, areal extent, and spatial distribution in accordance with the California Eelgrass Mitigation Policy and Implementing Guidelines (NOAA 2014). Ground truthing will be completed in coordination with field-based turion density sampling. A map identifying the locations of eelgrass will be prepared for the survey and reference areas. It will clearly depict eelgrass vegetated areal extent and spatial distribution and will include bathymetric contours at a 1-foot contour interval relative to mean lower low water using available data (NHE 2014, NOAA 2014, NOAA 2025).

3.3 Survey Variables

During each of the preconstruction and postconstruction growing season surveys, we will measure four variables that have been identified for use in eelgrass habitat surveys and assessment of effects of an action on eelgrass (NMFS 2014): (1) spatial distribution, (2) areal extent, (3) percent vegetated cover, and (4) turion (shoot) density.

Fieldwork will be conducted at tides low enough to sufficiently expose the eelgrass beds for traversing by foot. Spatial distribution and areal extent will be based on field mapping and geospatial analysis. Percent cover and turion density will be based on quantitative plot-based field sampling within vegetated eelgrass cover. Sample plots will be spatially stratified, and plot location will be determined by randomly generating points using geospatial software. Strata will be defined both by survey area (Table 1, Figure 4) and by two to three eelgrass density classes along the elevation gradient.

A minimum of 12 plots in each eelgrass density class in the project site and reference survey areas will be surveyed, in accordance with the SeaGrassNet sampling protocol (Short et al. 2015). The number of plots surveyed and sample plot size may vary among eelgrass density classes, with plot size ranging from 0.0625 to 1 square meter. SeaGrassNet sampling protocol uses 0.25-square-meter quadrats to estimate seagrass cover, and 0.0625-square-meter quadrats to measure turion density (Short et al. 2015). The Humboldt Bay Cooperative Eelgrass Project (UCSGE 2001, 2002, 2003) found no statistically significant difference between using 0.1, 0.5, and 1 square meter to measure eelgrass turion density, shoot length, or biomass in across-gradient sampling of eelgrass beds in Humboldt Bay. The use of fewer, smaller plots in dense, relatively homogenous eelgrass zones and more, larger plots in sparse/patchy zones is a sound and efficient method for addressing differences in spatial variability between density classes (Thompson 2002). This sampling strategy also allows for a higher number of replicate measurements to be taken in the regions having the most inherent natural variability. High temporal and spatial variation in eelgrass density can dramatically increase the sample size necessary to reliably detect changes in eelgrass density (Krueger et al. 2007).

In addition to natural variation at the site, recreational clamming activities cause substrate disturbances that could confound assessment of changes in eelgrass density in relation to project actions. Recreational clamming activity has been observed during very low tides at the project site (H. T. Harvey & Associates 2016).

3.3.1 Spatial Distribution

The spatial distribution of eelgrass habitat, as depicted in the eelgrass maps, will extend 5 meters around all vegetated eelgrass cover and therefore can include interior unvegetated gaps in cover of up to 10 meters. The boundary delineating eelgrass habitat will not extend into areas where depth or substrate are unsuitable to support eelgrass or where eelgrass establishment is precluded by the presence of existing structures (NMFS 2014).

3.3.2 Areal Extent

Areal extent will be calculated for eelgrass habitat as defined above and will be broken down to show the extent of both vegetated eelgrass cover and unvegetated gaps. Areal extent will be determined using commercially available geospatial analysis software and will be reported in square meters.

3.3.3 Percent Vegetated Cover

Percent vegetated cover is defined by NMFS (2014) as the amount of vegetated cover relative to the total extent of eelgrass habitat. This calculation will be used to help stratify the survey areas into two to three density classes along the elevation gradient. Vertical zonation is apparent at the project site and reference site, with dense eelgrass at the channel edge transitioning to sparse and very sparse zones higher in the intertidal region. To better enable detection of potentially small, localized impacts, a secondary measure of percent cover will be made based on quantitative plot-based field sampling in vegetated eelgrass cover. Sample plots will be spatially stratified by survey area and density class, and plot location will be determined by randomly generating points using geospatial software, as described above. Within each sample plot, percent cover will be visually estimated to the nearest 5%. Percent cover will be reported as a mean ± the standard deviation of replicate measurements. Vegetated eelgrass cover can include small, unvegetated gaps of less than 1 square meter (NMFS 2014); therefore, values of 0% cover are possible and will be included in the estimation of mean percent cover to better enable the detection of small, localized impacts.

3.3.4 Turion Density

Turion density will be measured using the same plots used for assessing percent cover. The number of eelgrass turions in each sample plot will be counted. Turion density will be reported as a mean ± the standard deviation of replicate measurements. Vegetated eelgrass cover can include small, unvegetated gaps of less than 1 square meter (NMFS 2014); therefore, values of 0% turion density are possible and will be included in the estimation of mean turion density to better enable the detection of small, localized impacts.

3.4 Photodocumentation

Photographs will be used to document site conditions. The photographs will be georeferenced so that they can be taken in the same locations before and after construction. They will be taken at each location where substrate disturbance is likely to occur or has occurred, including the locations of pile installation and spud pole sets. Photographs also will be taken to represent different survey areas and eelgrass density classes.

Preconstruction and postconstruction photographs will be taken during field assessments. During construction, photographs will be taken at the locations where spud pole sets occur and where piles are replaced. Following construction, photographs will be taken as soon as possible to document the location and extent of substrate disturbance associated with construction activities.

3.5 Monitoring Schedule

3.5.1 Eelgrass Mapping and Surveys

The preconstruction eelgrass mapping and surveys will be conducted between June and August 2025, during the active growth period for eelgrass and within 60 days before construction begins. The postconstruction survey will be conducted between June and August 2026, at a time similar to when the preconstruction survey was conducted and near the beginning of the active growth period for eelgrass. This timing is consistent with NMFS (2014) guidelines, which have identified the period of May through September as the active eelgrass growing season in northern California.

3.5.2 Construction Monitoring

A biological monitor will be present on site while work is being performed in areas where eelgrass habitat may be affected. The monitor will be present only when work is being conducted in eelgrass habitat, scheduled to occur between July 1 and October 15, 2025. The biological monitor will document all locations where spud poles are set; where piles are replaced; and where any unexpected actions, such as propeller scarring, negatively affect eelgrass.

3.5.3 Postconstruction Inspections

In addition to the growing season surveys, the project site will be inspected as soon as feasible (depending on tides and other factors) following construction in 2025. The main purpose of the postconstruction inspection will be to help document the extent of substrate disturbance caused by pile replacement and spud pole sets because these disturbances may be difficult to see by the following growing season. Georeferenced photodocumentation will be used to compare visible areas of disturbance with preconstruction and postconstruction conditions. No other data will be collected during the postconstruction inspections because construction will be completed during a time of year when eelgrass is not actively growing.

Section 4.0 Mitigation

4.1 Avoidance and Minimization Measures

Avoidance and minimization measures for potential project impacts are summarized in Table 2. These measures, which will be incorporated into the project, are anticipated to be effective in reducing most impacts to a less-than-significant level.

Table 2. Potential Impacts and Proposed Avoidance and Minimization Measures

Potential Impact and Mechanism	Avoidance and Minimization Measure
Substrate disturbance/uprooting or crushing of eelgrass	
Pile removal and installation	• Old piles will be placed in a containment area on the barge and not allowed to rest on the substrate surface. • A biological monitor will be present on site while construction is being performed in eelgrass habitat to observe pile removal and installation operations and to ensure that the item above is completed.
Barge anchoring	• Only two 0.71-meter-diameter spud poles will be used to anchor the barge; no chains or other materials will be dragged on the substrate surface. • If possible, spud poles will be placed in areas of mudflat devoid of eelgrass. • The maximum duration of spud pole penetration at each work location will be less than one tidal cycle. • A biological monitor will be present on site while work is being performed in eelgrass habitat to document the number and location of spud pole placements.
Barge or propeller scarring	• Work in eelgrass habitat will be conducted during tides high enough to float the barge and prevent contact with the substrate. • Depth-sounding equipment will be used to help alert the barge operator as tide levels recede. • A biological monitor will be present on site while work is being performed in eelgrass habitat to document the timing and location of substrate disturbance if accidental barge grounding or propeller scarring occurs.
Water quality degradation	
Chemical leaching from new piles	• The new piles are timber and will be coated with polyurea, which is marine-grade and designed to prevent preservatives from treated timber migrating into the environment. Chemical leaching from new piles is not expected to occur.
Chemical spills (fuel, hydraulic fluid)	• Spill prevention, control, and countermeasure plans will be developed and implemented. • Only biodiesel and vegetable-based hydraulic oil will be used in equipment that will be used over the water. • Spill kits with contents appropriate for the types of hazardous materials present will be maintained on the barge and the dock. • Booms will be available to contain any materials spilled in the water.

Potential Impact and Mechanism	Avoidance and Minimization Measure
Turbidity	• Work in eelgrass habitat will be conducted as quickly as possible. • Turbidity-generating activities will be limited to small, localized areas associated with pile removal, pile installation, and spud pole placement.
Shading	• The maximum continuous period during which the barge will be located at a single work site will be less than one tidal cycle.

No impacts related to shading are expected to occur because there will be no expansion in surface area of the Terminal in eelgrass habitat. The Terminal is expected to shade eelgrass no more than the existing structure once the timber piles are replaced in eelgrass habitat. Also, no changes to water circulation or nutrient loading are expected to result from implementing the proposed project.

4.2 Additional Mitigation Measures

4.2.1 Compensatory Mitigation Assessment

Compensatory mitigation will be needed for the permanent impacts associated with the replacement of timber piles by slightly larger steel piles. The need for additional compensatory mitigation will be determined in 2026 following the postconstruction field assessment. Mitigation assessments will be based on a combination of direct evidence of visible scarring and an analysis of the survey variables measured during the growing season. If visible scarring is evident as a result of project actions, then the extent of this area will be measured directly in the field and considered in determining the area needed for mitigation. For the purposes of this plan, an area with a visible scar has all the following elements:

- It is located where a project action is known to have occurred during the previous growing season.
- There is evidence that eelgrass was present at the location during the previous growing season.
- It is devoid of eelgrass cover.

Preconstruction and postconstruction photographs will be used to help detect and document the presence of scarring. Because the piles are located or will be located at fixed locations, the preconstruction and postconstruction photographs can be taken at the same georeferenced location. In addition, because the precise locations of spud pole placement cannot be determined before construction, georeferenced preconstruction photographs will be taken of the general area where spud pole sets are expected. These photographs will help document whether any eelgrass was present in the general area during the previous growing season and, if so, whether it was dense, sparse, or patchy. The photographs can then be compared with photographs taken soon after construction and the following growing season at the locations where spud poles are placed to help detect scarring.

The survey variables measured during the growing season will be analyzed to detect changes between preconstruction and postconstruction conditions in eelgrass areal extent, percent cover, and turion density. The results will be compared between project site and reference site survey areas to assess whether the changes are a result of natural variability or whether they can be attributed to project actions. Declines in eelgrass that can be attributed to project actions will require compensatory mitigation.

Impacts will be quantified as follows:

- **Decrease in vegetated eelgrass cover.** If a decrease in areal extent is detected through calculations based on mapping, the amount of decreased area will require compensatory mitigation. If the direct measurement of visible scarring is higher than the area detected by mapping, then the higher value will be used as a basis for mitigation.
- **Declines in eelgrass cover or density.** Within vegetated areas, if a decrease (defined as greater than 25% reduction) in either mean percent cover or mean turion density is detected relative to the reference site, the decline will require compensatory mitigation. The 25% density reduction threshold was suggested by NMFS (2014) as reasonable based on supporting information (Fonseca et al. 1998, WDFW 2008). If a decline in both percent cover and turion density can be detected, then the higher value will be used as a basis for mitigation. The magnitude of the impact will be equivalent to the proportion of the decrease. For example, a 25% reduction in eelgrass cover within a 10-square-meter area would require 2.5 square meters of mitigation.

4.2.2 Compensatory Mitigation Measures

The proposed replacement of five 0.36-meter-diamter timber piles with five 0.41-meter-diameter steel piles will require compensatory mitigation because of the permanent loss of eelgrass habitat (a 0.76 square meter area in total). The CEMP (NMFS 2014) includes an exception for out-of-kind mitigation for impacts that are less than 10 square meters. Because the project is essentially a maintenance project that will have relatively minor impacts, Chevron will mitigate permanent losses to eelgrass habitat through the removal of piles in suitable eelgrass habitat at another location in Humboldt Bay as out-of-kind mitigation. The area of piles removed compared to impact area at the project site will be done at a 2:1 ratio, therefore 1.52 square meters of piles will be removed at the mitigation site.

The mitigation area will be located within approximately 2 miles of the Chevron pier, at a similar elevation and in similar substrate, and within Eureka city limits. Monitoring will be conducted prior to pile removal at the mitigation site to confirm the size of the piles to be removed, and after the piles have been removed to confirm that the appropriate total area of piles have been removed. Because the expected impact is very small, the mitigation will be considered successful if the appropriate total area of piles is removed (i.e., follow-up monitoring of eelgrass recovery will not be required).

If unanticipated impacts occur in excess of this amount (i.e., due to disturbance around the piles removed at the project site, barge anchoring, propeller action, or barge grounding), the damage will be repaired on-site and the impacted areas will be monitored for five years post restoration to confirm eelgrass recovery.

Section 5.0 References

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Appendix A. 100% Design Plans