4.3 WATER QUALITY

Section 4.3 describes the existing environment and provides an impacts analysis of water quality issues associated with any action by the California State Lands Commission (CSLC) to grant a new offshore lease to Tesoro Refining and Marketing Company, LLC (Tesoro) for continued operation of the Tesoro Avon Marine Oil Terminal (Avon Terminal) in the lower Suisun Bay and the Marine Oil Terminal Engineering Maintenance Standards (MOTEMS) compliance-related renovation. The environmental setting provides information on existing water and sediment quality in the San Francisco Bay Estuary (SFBE) and, in more detail, for the local area (Suisun Bay and Carquinez Strait) and immediate vicinity of the Avon Terminal. Also included is a summary of water quality laws and regulations and an analysis of potential environmental impacts associated with the Avon Marine Oil Terminal Lease Consideration Project (Project).

Water quality issues associated with renewing the Avon Terminal lease include chronic impacts of continuing operations and those related to an oil spill. Operational impacts on water quality could result from the release of segregated ballast water, runoff of contaminants on the pier, leaching of contaminants from anti-fouling paints or sacrificial anodes from ships visiting the Avon Terminal, re-suspension of sediments by ship propellers and bow thrusters or by maintenance dredging, and disposal of dredged sediments. An oil spill could have wide-ranging effects on water quality in the SFBE. In addition to operational impacts, MOTEMS renovation activities could have potential temporary water quality impacts, including re-suspension of sediments during pile removal and installation and spills of renovation-related chemicals.

4.3.1 ENVIRONMENTAL SETTING

4.3.1.1 San Francisco Bay Estuary

The SFBE, which covers an area of 450 square miles (1,166 square kilometers), is the largest estuary on the west coast of the contiguous United States. The majority of the SFBE is roughly parallel to, and 5 miles inland from, the coastline in a north-south orientation. The SFBE is typically divided into five segments: Sacramento-San Joaquin River Delta (Delta), Suisun Bay, San Pablo Bay, Central Bay, and South Bay. The bridges that span the SFBE serve as dividing lines for the sub-regions of the SFBE. The South Bay is the large body south of the San Francisco-Oakland Bay Bridge, and the Central Bay is a relatively smaller body between the San Francisco-Oakland Bay Bridge and the Richmond-San Rafael Bridge. San Pablo Bay is the large body north of the Richmond-San Rafael Bridge. From San Pablo Bay, the SFBE extends eastward, through the Carquinez Strait and Suisun Bay, to the Delta. The South Bay is a semi-enclosed embayment with numerous small, local freshwater inflows. The Central Bay is strongly influenced by the ocean, and San Pablo Bay and Suisun Bay are strongly influenced by freshwater flows from the Sacramento and San Joaquin Rivers, through the Delta, which drains approximately 40 percent of California's rainwater (Thompson and Kellogg 2000). Figure 4.3-1 shows the surface water features of the SFBE.

The SFBE is a highly industrialized and urbanized estuary with a long history of human impacts. Many contaminants in the water, sediments, and biota in various parts of the estuary have been detected at concentrations exceeding guidelines. Water quality in the SFBE is affected by many factors, including (San Francisco Bay Regional Water Quality Control Board [SFBRWQCB] 2013):

- geographic configuration of the SFBE;
- tidal exchange with the ocean;
- freshwater inflows;
- industrial and municipal wastewater discharges;
- dredging and dredge material disposal;
- runoff from highly urbanized areas;
- agricultural and pasture land drainage from much of central California;
- marine vessel discharges (ballast water; vessel biofouling, etc.);
- historic mining activities;
- leaks and spills; and
- atmospheric deposition.

Regulatory objectives and criteria to evaluate water and sediment quality in the SFBE are discussed below. Bathymetry, tidal flows, and circulation within the SFBE are discussed in the physical processes section, followed by a discussion of contaminant sources. Finally, general information on contaminant levels in the water and sediments of the SFBE are presented.

Regulatory Objectives and Criteria for San Francisco Bay Estuary

To protect beneficial uses, the SFBRWQCB (2013) has established water quality objectives (WQOs) for waters covered by the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). Basin Plans are implemented primarily within the National Pollutant Discharge Elimination System (NPDES) to regulate waste discharges. The 2013 version of the Basin Plan and associated amendments, which cover the San Francisco Bay region and portions of the Delta, were approved by the State Water Resources Control Board (SWRCB), Office of Administrative Law, and U.S. Environmental Protection Agency (USEPA) on June 29, 2013. Resolution R2-2007-0042 amended the Basin Plan to adopt a site-specific objective for copper; this amendment contained non-regulatory provisions for control of copper-based marine anti-fouling coatings. Table 4.3-1 lists the WQOs for SFBE waters. Water quality criteria for priority toxic pollutants for California inland surface waters, enclosed bays, and estuaries were established by the California Toxics Rule (USEPA 2000). Table 4.3-2 shows the California Toxics Rule criteria for saltwater (applicable to Suisun Bay).

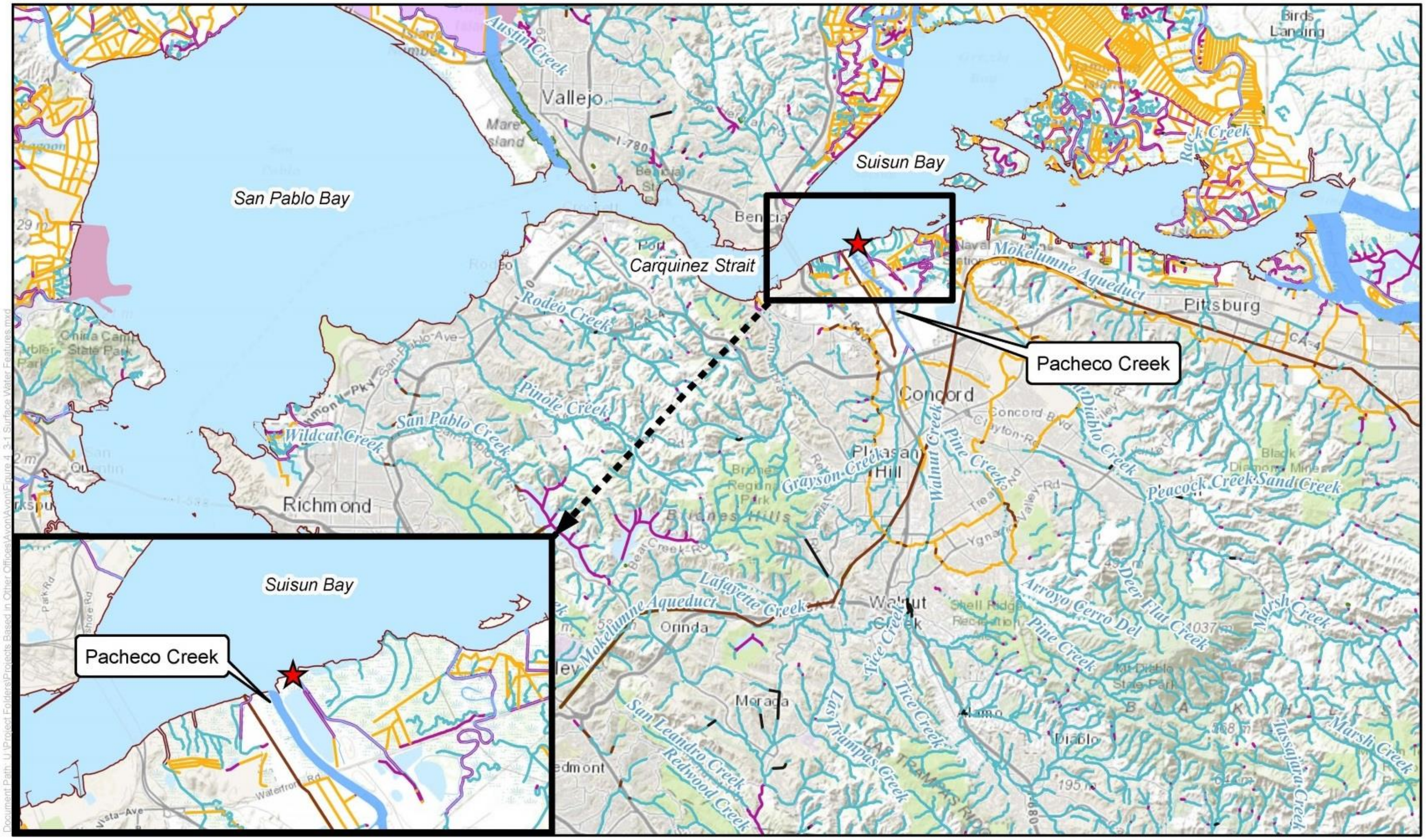

Figure 4.3-1
Surface Water Features
California State Lands Commission
Avon Marine Oil Terminal Lease Consideration Project

TRC Results you can rely on

8/13/2014

Approximate Terminal Location

Waters: Area of Complex Channels, Area to be Submerged, BayInlet, Bridge, CanalDitch, DamWeir, Flume, Foreshore, Hazard Zone, Inundation Area, Lock Chamber, Rapids, SeaOcean, Special Use Zone, Spillway, StreamRiver, Submerged Stream, Wash, Water IntakeOutflow

N

0 2 4 Miles

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Table 4.3-1: Selected Water Quality Objectives from the Basin Plan

Parameter	Basin Plan Water Quality Objective
Bioaccumulation	Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life.
Biostimulatory substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Dissolved oxygen	For all tidal waters, a minimum of 5.0 milligrams per liter (mg/L) objective is applied for waters downstream of the Carquinez Bridge and 7.0 mg/L for waters upstream of the Carquinez Bridge.
Floating material	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil and grease	Water shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Population and community ecology	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving-water biota.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5.
Salinity	Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the State so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. Controllable water quality factors shall not cause a detrimental increase in the concentration of toxic pollutants in sediments or aquatic life.
Settleable material	Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Suspended materials	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Sulfide	All water shall be free from dissolved sulfide concentrations above natural backgrounds levels.
Taste and odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.
Temperature	Temperature objectives for enclosed bays and estuaries are as specified in the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California.* The temperature of any cold or warm freshwater habitat shall not be increased by more than 5 degrees Fahrenheit (ºF) above natural receiving-water temperature.

Parameter	Basin Plan Water Quality Objective
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 Nephelometric Turbidity Units.

Source: SFBRWQCB 2013

Table 4.3-2: California Toxics Rule Toxic Materials Concentrations for Saltwater

Constituent	Criterion Maximum Concentration (µg/L[1])	Criterion Continuous Concentration (µg/L)
Arsenic	69	36
Cadmium	42	9.3
Chromium (Hexavalent)	1,100	50
Copper	4.8	3.1
Lead	210	8.1
Mercury[2]	2.1	0.025
Nickel	74	8.2
Selenium	290	71
Silver	1.9	--[3]
Zinc	90	81
Cyanide	1	1
Pentachlorophenol	13	7.9
Aldrin	1.3	--
gamma-BHC	0.16	--
Chlordane	0.09	0.004
4,4-DDT	0.13	0.001
Dieldrin	0.71	0.0019
alpha-Endosulfan	0.034	0.0087
beta-Endosulfan	0.034	0.0087
Endrin	0.037	0.0023
Heptachlor	0.053	0.0036
Heptachlor Epoxide	0.053	0.0036
PCB-1242, -1254, -1221, -1232, -1248, -1260, -1016	--	0.03
Toxaphene	0.21	0.0002

Source: USEPA 2000

[1] µg/L = micrograms per liter

[2] National Toxics Rule 1997

[3] Not available

Currently, no quantitative sediment objectives are established for the Project area. SWRCB (2009) Narrative Sediment Quality Objectives for the SFBE state “Pollutants in sediments shall not be present: (1) in quantities that are toxic to benthic communities in bays and estuaries; (2) at levels that will bioaccumulate in aquatic life to levels that are harmful to human health; and (3) at levels that alone or in combination are toxic to wildlife and resident finfish by direct exposure or bioaccumulate in aquatic life at levels that are harmful to wildlife or resident finfish by indirect exposure.”

The National Oceanic and Atmospheric Administration (NOAA) has published effects-based sediment quality values for evaluating the potential for contaminants in sediment to cause adverse biological effects (Long and Morgan 1990, Long et al. 1995). These values are commonly used as guidelines to evaluate sediment contaminant concentrations. These values are referred to as Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) (Long and Morgan 1990, Long et al. 1995). This tool for comparing sediment quality was developed for NOAA based on tests of toxicity of sediments to benthic organisms. In these tests, toxicity effects were rarely seen below the ER-L. Therefore, at chemical concentrations below the ER-L, effects are unlikely. Effects were usually seen above the ER-M. Thus, the ER-M is the concentration at and above which effects are probable. Table 4.3-3 presents these sediment toxicity criteria.

Table 4.3-3: Sediment Effects Guideline Values

Parameter		Effects Range-Low (ER-L)	Effects Range-Median (ER-M)
Metals (mg/kg)	Antimony	2.0	2.5
	Arsenic	8.2	70
	Cadmium	1.2	9.6
	Chromium	81	370
	Copper	34	270
	Lead	46.7	218
	Mercury	0.15	0.71
	Nickel	20.9	51.6
	Silver	1	3.7
	Zinc	150	410
Organics (µg/Kg)	Total PAH	4,022	44,792
	Total DDT	1.58	46.1
	Total PCB	22.7	180

Source: Long and Morgan 1990, Long et al. 1995

Abbreviations: mg/kg=milligrams per kilogram; µg/kg=micrograms per kilogram; DDT=dichlorodiphenyltrichloroethane; ER-L=Concentration at lower 10th percentile at which adverse biological effects were observed or predicted; ER-M=Concentration at which adverse biological effects were observed or predicted in 50 percent of test organisms; PAH=polycyclic aromatic hydrocarbons; PCB=polychlorinated biphenyls

Physical Processes in San Francisco Bay Estuary

The SFBE is characterized by complex bathymetry, with broad, shallow embayments that are incised by deeper channels; channel constrictions between the embayments; and connection to the Pacific Ocean through a deep, narrow entrance at the Golden Gate. Water depths in the SFBE range from 0 feet in the shallowest areas to greater than 330 feet (100 meters) at the Golden Gate. The deeper portions of the SFBE are along the west side of the Central Bay. The strong tidal currents in the Central Bay create significant sand dunes that have heights of 7 to 10 feet along the bottom. Much of the SFBE is relatively shallow, with an average depth of 10 feet below mean lower low water (MLLW) at low tide (Werme et al. 2010). There are some sandy areas, primarily in the maintained channels, and a few rocky outcrops, but the sediments of the SFBE are predominantly composed of fined-grained silts and clays.

SFBE water quality is greatly affected by tidal exchange with the Pacific Ocean through the Golden Gate. The average tide range for the San Francisco Bay Area is approximately 5 feet of elevation change. Given the large surface area of the SFBE, this results in extremely large volumes (50 by 10^9 cubic feet, or 1 million acre-feet) of water flowing into and out of the SFBE every 6 hours with the change of tides (CSLC 2011). The bathymetry of the SFBE directs the flow of the flooding tide into the South Bay and San Pablo Bay, and large eddies are created in the Central Bay by the tidal exchange. Waters from the Pacific Ocean are generally saltier and cooler than waters in SFBE, and the higher relative density of the ocean waters directs the tidal exchange to primarily the deeper waters of the SFBE.

The SFBE, especially the northern reach of San Pablo Bay, Carquinez Strait, Suisun Bay, and the Delta, is also strongly influenced by freshwater flows. The Sacramento and San Joaquin Rivers are the largest sources of fresh water, contributing on average 19.3 and 3.4 million acre-feet per year, respectively (CSLC 2011). The volume and timing of these freshwater inflows vary dramatically from year to year, depending on the amount of rain and snowfall. The highest inflows usually occur between November and May. This fresh water is generally warmer, and with its low salinity, is less dense than seawater. Summers are generally dry with little rain or runoff.

Circulation and mixing are relatively complicated in the SFBE because of the complex geometry and variable amount of freshwater flow during the year. The circulation of water in the SBFE is driven primarily by tides, and to a lesser extent, by wind-induced currents and estuarine circulation. Although tides contribute greatly to the dispersion of material in the SFBE, tidal motion is oscillatory, and therefore, does not contribute significantly to the net transport of material out of the bay (CSLC 2011). Freshwater flows into the bay from the Delta result in estuarine circulation that is driven by the density difference between freshwater and saline ocean water. Vertical stratification of water-quality parameters, such as temperature and salinity, also varies substantially depending on the location and the volume of freshwater flows.

Net volume transport out of the SFBE is equivalent to the freshwater flows in (including publicly owned treatment works and industrial discharges), plus ocean water introduced by tides. During the winter, the water residence time is approximately 2 weeks for the northern reaches of the SFBE and approximately 2 months in southern portions of the bay. During the summer, residence time is 2 months for the northern reaches and 5 months in southern portions (Conomos 1979).

Sources of Pollutants to San Francisco Bay Estuary

The largest sources of pollutant input to the SFBE are nonpoint discharges, including urban and non-urban runoff, and inputs from rivers. Point discharges from industrial and municipal facilities also contribute, as well as impacts from sediment dredging, marinas and marine vessels, and atmospheric deposition of particulates.

Urban runoff is the water from urban areas that flows into the SFBE from local streams and storm drains. It includes stormwater, excess irrigation flows, and wash water for multiple activities (e.g., car washing). Sources of pollutants in urban runoff are extremely varied and include commercial, industrial, and residential land uses, as well as pollutants from managed open space areas such as parks, cemeteries, planted road dividers, and construction sites. Human activities in these areas—such as the application of pesticides and fertilizers to gardens and landscaping, operation of motor vehicles, and construction of roads and buildings—all contribute pollutants to urban runoff. A study of contaminant loads from stormwater to the SFBE indicated that residential areas appeared to be a large contributor to the metals found to be contaminating water quality (Davis et al. 2000). Commercial and industrial areas also generate substantial loads of phosphate, cadmium, lead, zinc, and other contaminants.

Non-urban sources of nonpoint pollution include agricultural lands, forests, pastures, and natural ranges, from which contaminants are transported to the SFBE by rainfall runoff, excess irrigation return flows, and subsurface agricultural drainage. Pollutants of concern in non-urban runoff include dissolved and suspended solids/salts/metals, nitrogen/ sulfur/phosphorous compounds, and synthetic organic pollutants (particularly pesticides).

The Sacramento and San Joaquin Rivers are the major rivers that discharge into the SFBE. These rivers receive drainage from almost 40 percent of the land area of California, draining California's major agricultural region, the Central Valley. Contaminant loading from rivers is considered to be significant for mercury, polychlorinated biphenyls (PCBs), dioxins, polycyclic aromatic hydrocarbons (PAHs), and commercial pesticides, and possibly may be significant for copper, selenium, and nickel (Davis et al. 2007).

In addition to nonpoint discharges, the SFBE receives point discharges from industrial and municipal facilities. Municipal discharges are the largest, with total permitted dry-weather flow of 565 million gallons per day (MGD) (SFBRWQCB 2013). The average dry-weather flow is less than this maximum permitted amount. The major industrial dischargers are oil refineries.

Every year, an average of 6 million cubic yards (cy) of sediments are dredged from shipping channels and related navigation facilities throughout the SFBE. Historically, the majority (80 percent) of dredged material was disposed at three designated sites in the SFBE, including the Alcatraz Island site (which historically received up to 4 million cy of sediment per year from Central Bay and South Bay dredging projects); Carquinez Strait site (1 to 2 million cy); and San Pablo Bay site (up to 0.5 million cy).

The Long-term Management Strategy (LTMS) for the Placement of Dredged Materials in the San Francisco Bay region was adopted in 2000 to reduce in-bay disposal of dredged material and to maximize the beneficial reuse of dredged material. The LTMS Management Plan aimed to reduce in-bay disposal using four 3-year “step-down” periods, by the end of which in-bay disposal of dredged material would be reduced to approximately 1.25 million cy per year.

Marinas and marine vessels are also sources of pollutants in the SFBE. Discharge of untreated sewage and greywater (wastewater generated from domestic activities such as laundry, dishwashing, and bathing) from commercial and recreational vessels is prohibited within the SFBE. This type of effluent contributes to coliform bacteria, biochemical oxygen-demanding substances, nutrients, oil and grease, and suspended solids. Other common pollutants from marinas and marine vessels include lead from fuel and ballast material, arsenic in paint pigment, pesticides and wood preservatives, zinc from anodes, and copper and zinc biocides in anti-fouling paint. Additionally, discharge of ballast water from large commercial vessels is a well-known vector for introduction of nonindigenous aquatic species (NAS) and has been described as the likely mechanism responsible for up to 53 percent of the established nonindigenous species in California (Ruiz et al 2011; refer to Section 4.2, Biological Resources). Accidental spills of petroleum products from ships are generally small and result from operator errors, handling accidents at terminals, and damage to ships. Tanker accidents have resulted in major oil spills in the SFBE.

Contaminants in the atmosphere deposit traces on land and water surfaces. Deposits to the water are a direct source, while deposits to the land result in discharges to the SFBE in stormwater runoff. Major sources of atmospheric contamination include fuels and particulates from vehicles and other sources; building materials and products; windblown dust; and construction, manufacturing, and industrial facilities (San Francisco Bay Conservation and Development Commission [BCDC] 2003). Direct atmospheric deposition may be a significant pathway for loading of dioxins, PAHs, PCBs, and mercury (Davis et al. 2000).

Water and Sediment Quality in San Francisco Bay Estuary

The San Francisco Estuary Institute Regional Monitoring Program for Trace Substances (RMP) began in 1993 and is sponsored by multiple local, State, and federal agencies and companies through their discharge or SFBE use permits. The RMP monitors water and sediment quality at 25 sites located throughout the SFBE (Thompson and Kellogg 2000). Water and sediment samples are collected from five hydrogeographic regions of the SFBE: Suisun Bay, San Pablo Bay, Central Bay, South Bay, and Lower South Bay. Typically, in any given year, a substantial number of sampled locations will have water and/or sediments that exceed regulatory objectives or criteria for one or more metals. Organic contaminants that frequently exceed criteria in the SFBE in RMP samples include dichlorodiphenyltrichloroethane (DDT) in water samples and PAHs and PCBs in sediment samples. RMP data for the Project vicinity are presented in Section 4.3.1.2.

Sea-level Rise

The impacts of climate change are expected to alter the SFBE ecosystem by inundating or eroding shoreline areas. Long-duration tide gauges indicate that sea level in the SFBE has risen at a rate of approximately 7 inches over a century (California Climate Change Center 2006). Projections by Rahmstorf (2007) and Chao et al*.* (2008) indicate that sea level could rise quickly. By 2050, sea level could be between 11 and 18 inches higher than in 2000, and by 2100, sea level could be between 23 and 55 inches higher than in 2000. The BCDC’s estimate of long-term global sea-level rise is 16 inches over 50 years (BCDC 2009). Average global sea level has risen between 5 and 9 inches during the 20th century—nearly one-tenth of an inch each year (Intergovernmental Panel on Climate Change 2007). Sea level measured at the Golden Gate tide gauge in the SFBE rose 8 inches from 1855 to 2000 (Office of Environmental Health Hazard Assessment 2013). Sea-level rise in California could lead to flooding of low-lying areas; loss of coastal wetlands, such as portions of the San Francisco Bay Delta system; erosion of cliffs and beaches; saltwater contamination of drinking water; impacts on roads and bridges; and harmful ecological effects along the coastline.

4.3.1.2 Offshore Project Area

Carquinez Strait and Suisun Bay

Waters within lower Suisun Bay are influenced by flows from the Sacramento and San Joaquin Rivers. The response to high river discharge is nearly instantaneous in the Project area, and includes rapid dilution of surface salinity and a large increase in total suspended solids (turbidity), especially during the first large pulse of river flow each year (Cloern et al*.* 1999).

The Carquinez Strait is a deep (mean depth 29 feet), narrow, 12-mile-long waterbody that joins San Pablo Bay with Suisun Bay. The narrow restriction results in strong currents, and most of the bottom is sandy and relatively smooth. Carquinez Strait waters are generally turbid from high suspended sediment loads, which are estimated to range from 0.26 to 26 million metric tons per year (McKee et al. 2002). The Carquinez Strait is also characterized by a variable salinity regime resulting from fluctuations in freshwater flow from the Sacramento-San Joaquin River system (United States Army Corps of Engineers [USACE] et al. 1998). Water in the Carquinez Strait is stratified into a two-layer flow, known as gravitational circulation, with lighter fresh water moving seaward in the top layer and heavier salt water moving upstream on the bottom (San Francisco Estuary Partnership [SFEP] 2011). During extremely high outflows, however, waters in the Carquinez Strait are completely fresh (SFEP 2011; Schoellhamer and Burau 1998).

Suisun Bay is a shallow embayment between Chipps Island, at the western boundary of the Delta, and the Benicia-Martinez Bridge. Suisun Bay covers approximately 36 square miles, and has a mean depth of 14 feet and highly variable salinity levels (USACE et al*.* 1998). Fresh water from the Sacramento and San Joaquin Rivers usually meets salt water from the ocean in the vicinity of Suisun Bay. The amount of Delta runoff significantly affects water column characteristics in the Project area and results in a significant variance in water quality conditions from year to year.

The bottom of Suisun Bay is predominantly fine silt and clay, crossed by channels scoured by tidal and riverine (river-related) flows. The surficial sediments around these channels change according to season (USACE et al*.* 1998). High riverine flows winnow the fine sediment of Suisun Bay and transport it downstream through Carquinez Strait and into San Pablo Bay. As riverine flows decrease, fine sediment again settles in Suisun Bay.

A biologically significant area of high particle concentration, known as the entrapment zone, is located in Suisun Bay. Increasing river flows push the entrapment zone seaward, and decreasing river flows allow the entrapment zone to move landward (Schoellhamer and Burau 1998). The entrapment zone is an area of high productivity where nutrients and organisms accumulate, and is considered to be important to many aquatic species in Suisun Bay. The entrapment zone tends to exist where the surface salinity is between 1 part per thousand (ppt) and 6 ppt (Schoellhamer and Burau 1998).

The Basin Plan designates beneficial uses for waterbodies covered by the plan (SFBRWQCB 2013). Designated beneficial uses for waters in the Project area (Carquinez Strait and Suisun Bay) include: industrial service supply, industrial process supply, commercial and sport fishing, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, and non-water-contact recreation (SFBRWQCB 2013).

The offshore Project area, including both Carquinez Strait and Suisun Bay, is identified as impaired, pursuant to Clean Water Act (CWA) Section 303(d), for chlordane, DDT, diazinon, dieldrin, dioxins, exotic species, furan compounds, mercury, PCBs, and selenium (SWRCB 2006). Suisun Bay is also on the 303(d) list for nickel. RMP station locations for water quality and sediment quality are represented on Figure 4.3-2. Concentrations of contaminants at sampling station SU037W (the nearest water quality sampling point relative to the Project site) in Suisun Bay were reported below the applicable Marine WQOs. Table 4.3-4 shows the most recent RMP water quality sampling results available for constituents that have a WQO identified in the Basin Plan.

Table 4.3-4: Water Sampling Results from Suisun Bay

Constituent	2010 RMP Data[1]		Marine Water Quality Objectives[2]	
	Result (Total)	Result (Dissolved)	4-day Average	1-hour Average
Concentration in Micrograms per Liter				
Arsenic	1.84	2.57	36	69
Cadmium	0.278	0.282	9.3	42
Copper	2.935	2.365	6.0[3]	9.4[3]
Lead	0.136	0.009	8.1	210
Mercury	0.002	0.001	0.03[4]	2.1
Nickel	1.49[5]	1.65	8.2	74
Selenium	0.078	0.063	5	20
Silver	0.003	0.001	--[6]	1.9
Zinc	3.01	0.24	81	90

[1] Source: RMP data from Sampling Station SU037W in Suisun Bay (SFEI 2010)
[2] Source: Water Quality Control Plan (SFBRWQCB 2013). WQOs are dissolved concentrations for waters with salinity between 1 ppt and 10 ppt
[3] Copper objectives are applicable specifically to Suisun Bay and Carquinez Strait
[4] Marine WQOs for mercury in San Francisco Bay apply. The WQO for the protection of aquatic organisms and wildlife is shown
[5] Estimated value; percent recovery exceeds laboratory control limit
[6] Not available

Sediment Quality in Suisun Bay

SFBE sediments have been influenced by natural and anthropogenic influxes of toxic chemicals over time. Sediments in the SFBE are both sources and sinks of pollutants. The overall influx of pollutants can cause increases in sediment pollutant levels. These pollutants are not distributed evenly in the SFBE, and localized areas are highly contaminated. Under the Bay Protection and Toxic Cleanup Program (BPTCP) in 1999, the SFBRWQCB assessed the levels of pollutants in sediment throughout the SFBE, and the risks and benefits of cleaning or otherwise managing existing toxic “hot spots” including areas where sediment dredging could result in the degradation of water quality in the SFBE. The Project is not within any known toxic hot spots identified by the SFBRWQCB (1999) in its Final Regional Toxic Hot Spot Cleanup Plan.

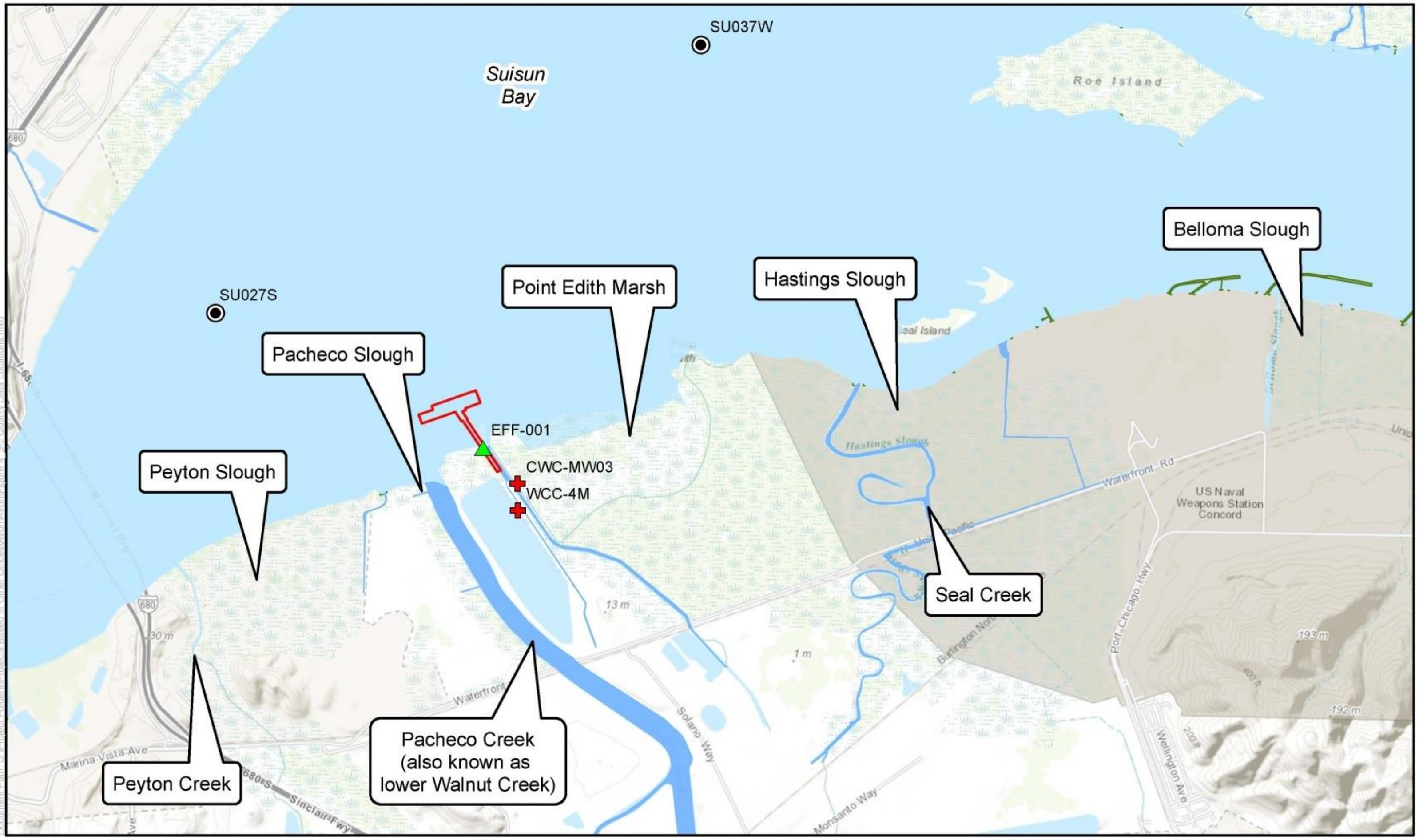

Figure 4.3-2
Quality Data Locations
California State Lands Commission
Avon Marine Oil Terminal Lease Consideration Project

Proposed CSLC Lease Boundary
Water and Sediment Quality Data Locations
Groundwater Monitoring Well
NPDES Discharge Monitoring Location

N

0 2,000 4,000 Feet

TRC Results you can rely on

8/27/2014

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

The SFBRWQCB developed the San Francisco Bay ambient values (Gandesbery and Hetzel 1998, Gandesbery et al. 1999) to represent the typical range of concentrations currently found in bay sediments located away from sources of contamination. The objective of the study was to determine what the SFBRWQCB should consider as ambient levels of PAHs, PCBs, metals, and pesticides in the SFBE. These ambient concentrations provide a relative measure of comparing sediment contaminant concentrations within the SFBE. Ambient sediment concentration values were derived from samples collected from the cleanest areas of the estuary by the RMP (1991–1996) and by the BPTCP, and are used to distinguish “ambient” from “contaminated” conditions. Because the sediment samples were collected from deep portions of the SFBE, away from BPTCP known hot spots, their data are widely used as “clean” background standards in place of other nationally based criteria, such as ER-Ls. Table 4.3-5 shows the most recent RMP sediment quality results collected from sampling in Suisun Bay compared to San Francisco Bay ambient sediment concentrations from Gandesbery et al. (1999) and ER-L and ER-M toxicity thresholds (Long and Morgan 1990, Long et al. 1995) (data are from sampling station SU027S, the closest sediment sampling point in relation to the Project site [refer to Figure 4.3-2], in 2012).

Table 4.3-5: Sediment Sampling Results from Suisun Bay

Constituent*	2012 RMP[1] Data (total)	San Francisco Bay Ambient Sediment Concentrations[2]		Environmental Toxicology Thresholds[3]	
		<40% Fines	<100% Fines	ER-L	ER-M
Arsenic	13.8	13.5	15.3	8.2	70
Cadmium	0.186 [4]	0.25	0.33	1.2	9.60
Copper	54.154	31.7	68.1	34	270
Lead	20.081	20.3	43.2	46.7	218
Mercury	0.228	0.25	0.43	0.15	0.71
Nickel	93.772	92.9	112	20.9	51.6
Selenium	0.296	0.59	0.64	--[5]	--
Silver	0.169	0.31	0.58	1	3.7
Zinc	116.906 [6]	97.8	158	150	410
Total PCBs	0.00561	0.00059	0.0148	0.0227	0.18
Total DDTs	0.00308	0.0028	0.007	0.0058	0.0461
Total PAHs	0.8282	0.211	3.39	4.022	44.792

* All concentrations in milligrams per kilogram
[1] Source: Sampling Station SU027S in Suisun Bay (SFEI 2012)
[2] Source: Gandesbery et al. 1999
[3] Source: Long and Morgan 1990, Long et al. 1995
[4] Percent Recovery exceeds laboratory control limit
[5] Not available
[6] Analyte detected in method, trip, or equipment blank
Abbreviations: ER-L=Effects Range Low; ER-M=Effects Range Median; PCBs= Polychlorinated biphenyls; DDT=Dichlorodiphenyltrichloroethane; PAHs=Polycyclic aromatic hydrocarbons

Concentrations of contaminants at sampling station SU027S in Suisun Bay were below San Francisco Bay ambient concentrations (<100 percent fines) for all contaminants reviewed. A comparison of environmental toxicity thresholds ER-L and ER-M shows that ambient metal and organic compound concentrations in sediment exceed the ER-L concentrations for arsenic and mercury. Ambient sediment concentrations exceed the ER-L and ER-M thresholds for nickel; similarly, the 2012 RMP sample concentration for nickel exceeds the ER-L and ER-M values. Additionally, the 2012 RMP concentrations for arsenic, copper, and mercury exceeded their respective ER-L values.

In 2012, sediment samples were collected at the Avon Terminal to determine disposal sites for material generated during maintenance dredging (Pacific EcoRisk 2012). The sediments were subjected to full Inland Testing Manual testing (per Dredged Material Management Office [DMMO] guidance, PN 01-01) to determine the suitability of the proposed dredged materials for unconfined aquatic disposal at SF-9 (Carquinez Strait), or placement at an upland wetland restoration project (e.g., Cullinan Ranch or Winter Island). To meet permit requirements, the area to be dredged was sampled to a total depth of -42 feet MLLW. Four sediment cores were collected from the Avon Terminal berth area. Samples were combined and homogenized, according to DMMO guidance, into a composite sample. Analytical results are summarized in Table 4.3-6.

Table 4.3-6: Avon Marine Terminal Sediment Metal, Pesticide, PAH, and PCB Concentrations (milligrams per kilogram, dry weight)

Constituent[1]		**Avon Terminal-Comp[2]**	**Bay Ambient Sediment Concentrations <100% Fines[3]**
Metals	Arsenic	8.73	15.3
	Cadmium	0.256	0.33
	Chromium	57.7	112
	Copper	43.5	68.1
	Lead	14.0	43.2
	Mercury	0.200	0.43
	Nickel	74.9	112
	Selenium	<0.0915	0.64
	Silver	0.163 J[4]	0.58
	Zinc	98.7	158
Pesticide, PAHs and PCBs	Butyltin	<1.2	--[5]
	Dibutyltin	<1.2	--
	Tributylin	<1.0	--
	Aldrin	<0.57	1.1
	Total Detected BHCs	0.0	0.78
	Chlordane	<5.9	1.1
	Dieldrin	<0.60	0.44
	Endosulfan I	<0.47	--

Constituent[1]		Avon Terminal-Comp[2]	Bay Ambient Sediment Concentrations <100% Fines[3]
	Endosulfan II	<0.51	--
	Endosulfan Sulfate	<0.61	--
	Endrin	<0.65	0.78
	Endrin Aldhyde	<0.44	--
	Heptachlor	<0.58	--
	Heptachlor Epoxide	<0.64	--
	Toxaphene	<11	--
	Total DDT	4.2	7.0
	Total PCBs	1,43 J[4]	22.7 (26.0[6])
	Total PAHs	752	3,390

1 All results below laboratory method detection limit (MDL) are reported as < the MDL
2 Source: Pacific EcoRisk 2012
3 Source: Gandesbery et al. 1999
4 J = analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is, therefore, an estimate
5 Not available
6 San Francisco 99th percentile PCB concentration (SFBRWQCB 2013)
Abbreviations: ER-L=Effects Range Low; ER-M=Effects Range Median; PCBs= Polychlorinated biphenyls; DDT=Dichlorodiphenyltrichloroethane; PAHs=Polycyclic aromatic hydrocarbons

Per DMMO guidance (USACE et al. 1998, USACE 2001), the results of the physical and chemical analyses of the sediments from the proposed dredging area were compared to bay ambient sediment concentrations (SFBRWQCB 1998). None of the analytical chemistry concentrations exceeded San Francisco Bay ambient levels, and toxicity test results indicated that the sediments were not toxic. Based on these results, the Avon Marine Terminal sediments are considered suitable for in-bay placement at SF-9 or placement at an upland wetland restoration project.

All sediment analytical chemistry results from the 2012 sampling event were similar to or below bay ambient concentrations (Gandesbery and Hetzel 1998). Toxicity test results indicated that the sediments were not toxic to aquatic life.

4.3.1.3 Onshore Project Area

Surface Water Features

Several inland surface water features are located near the Project area. Details of adjacent and surrounding water features are described in the following paragraphs. Table 4.3-7 lists the beneficial uses identified in the Basin Plan for waterbodies within and around the Project area.

Table 4.3-7: Beneficial Uses of Surface Waterbodies near the Project

Waterbody	Existing or Potential Beneficial Uses											
	Industrial service supply	Industrial process supply	Ocean commercial and sport finishing	Estuarine habitat	Fish migration	Preservation of rare and endangered species	Warm freshwater habitat	Fish spawning	Wildlife habitat	Water-contact recreation	Non-water-contact recreation	Navigation
Carquinez Strait	x		x	x	x	x		x	x	x	x	x
Suisun Bay	x	x	x	x	x	x		x	x	x	x	x
Pacheco Creek							x	x	x	x	x	
Hastings Slough				x		x			x	x	x	
Peyton Slough	x		x	x	x	x			x	x	x	

Mount Diablo Watershed

The onshore Project area is located within the Mount Diablo Creek Watershed, which covers an area of 23,800 acres (about 37 square miles) (Contra Costa County 2003) in the north-central portion of Contra Costa County. The watershed consists of all land drained by Mount Diablo Creek and its tributaries. Impervious surface in the Mount Diablo Creek Watershed is estimated at 20 percent, based on Contra Costa County records of land use (Contra Costa Clean Water Program [CWP] 2004).

Pacheco Creek

Pacheco Creek is located just west of and adjacent to the Project area (refer to Figure 4.3-2). Pacheco Creek, which drains a total of 146 square miles, is a 3.4-mile-long waterway on the western edge of the Mount Diablo Creek Watershed that also borders the Peyton Slough Watershed (Contra Costa Resource Conservation District 2006). At its mouth, the creek name changes to Pacheco Slough.

Pacheco Creek is also referred to as lower Walnut Creek, which is currently jointly managed by the USACE and Contra Costa Flood Control and Water Conservation District (FCD). The USACE constructed the earth-lined lower Walnut Creek Channel in 1965 to accommodate flood flows resulting from a 100-year storm event (estimated at 25,000 cubic feet per second [cfs]) with 3 feet of freeboard (FCD 2007). The channel is heavily impacted by sediment, which has silted up the channel and reduced its capacity to 20,000 cfs (Restoration Design Group [RDG] 2013). Dredging has not occurred in the tidal reach of the channel since 1973 because the only feasible method of sediment removal, suction dredging, would be detrimental to the wildlife and habitat in the tidal reach of the channel. In 2007, the FCD de-silted the portion of the channel between Highway 4 and the Burlington Northern Santa Fe Railroad (BNSF) railroad, removing over 200,000 cy of sediment from the channel and adjacent flood plain (Contra Costa County 2014). No sediment was removed downstream (north) of the BNSF Railroad.

Point Edith Marsh

The Point Edith Marsh, a 760-acre wildlife and recreational area managed by the California Department of Fish and Wildlife (CDFW), is located east of and adjacent to the Project area. Point Edith Marsh is part of the Concord Marsh Complex, which is a 5,600-acre patchwork of tidal mudflats, tidal marshes, freshwater marshes, and sloughs lying along Suisun Bay and extending from Martinez to Port Chicago (RDG 2013). Peyton Creek (to the west, in Martinez), Walnut Creek, and Mount Diablo Creek Watersheds all drain into and through Concord Marsh. Historically contiguous, the marsh complex is now diked and channelized. Dredge spoils, roads, railroads, culverts, levees, oil refineries, and other industries have limited tidal inundation and changed the character of the marsh (RDG 2013). These barriers allow some connectivity for Hastings Slough and Seal Creek, but cut off many smaller systems that used to connect sections of the marsh. On the Point Edith portion of the marsh complex, the Contra Costa Mosquito and Vector Control District has initiated restoration activities, such as removing culverts and improving tidal flow through the marsh channels.

Hastings Slough

Hastings Slough is located east of Point Edith Marsh, approximately 1 mile from the Project area. Mount Diablo Creek drains into Hastings Slough (at the confluence with the slough, Mount Diablo Creek is known by its historical name, Seal Creek), and the slough empties into the Suisun Bay. The most significant barriers in the slough are Waterfront Road and the Union Pacific and BNSF Railroads. These roads and railroads are built on elevated levees that transect the marsh from southwest to northeast.

Peyton Slough Watershed

The Peyton Slough Watershed is located west of and adjacent to Pacheco Creek. The Peyton Slough Watershed occupies an area of 3,914 acres. Peyton Creek, the just over 1-mile-long main waterway, is culverted underground for over one-third of its length, primarily through upland residential and industrial areas. The lower watershed retains some of its historical marshland east of the Benicia-Martinez Bridge. Mean daily flow for Peyton Creek is approximately 3.7 cfs (CWP 2004).

Mallard Reservoir

Mallard Reservoir is a manmade, bermed containment located approximately 2 miles south of the Avon Terminal (refer to Figure 4.3-2). The U.S. Bureau of Reclamation owns Mallard Reservoir; however, the Contra Costa Water District (CCWD) is responsible for operation and maintenance. The reservoir was designed and constructed to serve solely as the forebay to the CCWD's Ralph D. Bollman Water Treatment Plant (FCD 2007). The reservoir does not impound natural drainage, but receives water through a pipeline from Suisun Bay (SFBRWQCB 2013). The Mallard Reservoir storage capacity is 3,000 acre-feet (CCWD 2011), which serves as storage for flow regulation and emergency use.

Groundwater

The onshore Project area is located within the Ygnacio Valley Groundwater Basin (California Department of Water Resources [DWR] 2004). The Ygnacio Valley Groundwater Basin is bounded by Suisun Bay on the north; Highway 680 on the west; the Concord Fault, which separates this basin from the Clayton Valley Groundwater Basin, on the east; and the city of Walnut Creek on the south. Walnut and Grayson Creeks flow through the basin before draining into Pacheco Creek and then into the Suisun Bay. The Ygnacio Valley Groundwater Basin is underlain by thick, water-bearing alluvial deposits (material deposited by rivers or streams) that cover a faulted and folded complex of consolidated Cretaceous and Tertiary rocks (DWR 2004). Aquifers in the basin area are typically hydrologically connected to Suisun Bay (DWR 2004).

No existing beneficial uses for groundwater in the Ygnacio Valley Groundwater Basin have been established; however, potential beneficial uses include (SFBRWQCB 2013): municipal and domestic water supply; industrial process water supply; industrial service water supply; and agricultural water supply.

According to the SWRCB (2014) Geotracker Groundwater Ambient Monitoring and Assessment online database, the Project area is approximately 1.75 miles northwest of the nearest cluster of water supply wells located in the Mallard Reservoir area.

<u>Local Groundwater</u>

In the Project area, shallow groundwater occurs predominantly within the Quaternary fill and bay mud deposits (see Figure 4.6-2 in Section 4.6, Geology, Sediments, and Seismicity). Groundwater flow direction is generally north, from the topographic highs in the south toward Pacheco Slough. The horizontal hydraulic gradient within the Project area ranges from 0.02 to 0.03 vertical foot per horizontal foot. Bay mud generally restricts groundwater movement due to its low hydraulic conductivity (MWH Americas, Inc. 2014). The Golden Eagle Refinery (Refinery) participates in a Self-Monitoring and Reporting Program (SMP), of which the Avon Terminal is a part, and prepares a Semi-annual and Annual Groundwater Monitoring Report in accordance with SMP requirements, as described by SFBRWQCB Waste Discharge Requirements (WDR), Order R2-20040056. During the summer/fall 2013 groundwater monitoring event, 231 groundwater monitoring wells were sampled. The closest monitoring wells to the Project area were WCC-4M and CWC-MW03 (refer to Figure 4.3-2). Analytical results from samples from these wells are tabulated in Table 4.3-8, with their corresponding California maximum contaminant levels (MCLs). MCLs are standards established by the USEPA and states and serve as the threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act.

Table 4.3-8: Groundwater Monitoring Results and Water Quality Parameters for Golden Eagle Refinery

Constituent *		Monitoring Well[1]		California MCLs
		WCC-4M	CWC-MW03	
Groundwater Monitoring Results	TPH-g	ND	ND	NE
	TPH-d	76	57	NE
	Benzene	ND	ND	1
	Toluene	ND	ND	150
	Ethyl-Benzene	ND	ND	300
	Xylenes	ND	ND	1,750
	Tert-butyl alcohol	ND	7.9 J	NE
	Naphthalene	NA	ND	NE
	Arsenic	8.4	12	10
	Chromium	<10	4.45	50
	Hexavalent Chromium	ND	ND	10
	Lead	ND	--	15
	Nickel	ND	ND	100
	Selenium	ND	ND	50
	Vanadium	--	2.4 J	NE
	Zinc	ND	ND	5,000[2]
Groundwater Water Quality Parameters	pH	6.91	6.57	
	Conductivity (µS/cm)	26,189	15,752	
	Specific Conductivity (µS/cm)	28,758	16,959	
	Total Dissolved Solids (mg/L)	18,710	11,020	
	Temperature (°C)	20.33	21.26	
	Dissolved Oxygen (mg/L)	0.1	1.3	
	Oxidation Reduction Potential (mV)	-209.1	-200.7	
	Turbidity (NTU)	7.04	3.78	

* All concentrations in milligrams per liter, unless otherwise noted

[1] Source: MWH Americas, Inc. 2014

[2] Secondary MCL

Abbreviations: NA = Not available; ND = Not detected (laboratory reporting limit not available); NE = Not established; J= Analyte detected below lab reporting limit and above method detection limit; MCL = Maximum contaminant level (California Department of Public Health, 2014); TPH-d = Total petroleum hydrocarbons as diesel; TPH-g = total petroleum hydrocarbons as gasoline; µS/cm = micro siemens per centimeter; mg/L = milligrams per liter; °C = degrees Celsius; mV = millivolts; NTU = nephelometric Turbidity Units

4.3.1.4 Site-specific Conditions

The Avon Terminal is owned and operated by the Refinery, and is primarily a finished product shipment facility. The Refinery currently processes an average crude oil volume of approximately 157,300 barrels per day. The Refinery receives crude oil by tanker or pipeline for the production of gasoline and diesel fuels.

Slops System for Avon Terminal

The Avon Terminal has drip collection equipment that includes basins, funnels, manifold drains, and sample sinks that drain by gravity to the berth slop tanks. The slops (recovered oil) system is used to transfer residual oily waste (primarily from cargo hose draining) and wastewater (wash water and rainwater runoff) from the Avon Terminal to a shore-side receiving tank, where it is then directed to shore facilities for further processing. The slops system consists of holding tanks, pumps, manifolds, pipelines, and a shore-side slops tank.

There are two 1,125-gallon slops tanks on the Avon Terminal. One is located behind the Berth 1 manifold and collects oily hydrocarbons and wastewater from hose drains and containment pans at Berth 1. The second is located near Berth 1 and collects oily hydrocarbons and wastewater from hose drains and containment pans at Berth 5. The slops tank associated with Berth 5 would be removed during the demolition of Berth 5. A new, similar slops tank and system would be installed for Berth 1A, as described in Section 2.0, Project Description. The tanks are equipped with radar instruments to monitor tank levels and provide alarms. The hydrocarbons and wastewater collected in the slops tanks are pumped to shore via a 6-inch-diameter pipeline to a 15,000-barrel (472,500 gallons) shore-side slops tank that is used to receive and store slops materials for subsequent processing and treatment, as described below. The pipeline and shore-side tank would not be modified during the Avon Terminal MOTEMS renovation.

Wastewater Treatment

The Refinery has a wastewater treatment plant (WWTP) that treats wastewater and stormwater from the Avon Terminal, among other Refinery waste. The WWTP consists of an oil-water separator, a dissolved nitrogen flotation (DNF) unit, an air stripper, surge ponds, a bio-oxidation pond (Ox Pond), clarifiers, sand filters, granular activated carbon (GAC) vessels, the coke pond system, and the Clean Water Canal.

The Refinery routes process wastewater to a central pump station. From this pump station, process wastewater flows to the oil-water separator, which consists of a head channel that feeds four concrete channels. The oil-water separator uses a chain-driven system to remove oil and solids. After the oil-water separator, wastewater flows by gravity to four DNF units, where additional oil and solids are removed. The DNF process floats solids, oils, and other contaminants to the surface of liquids. Once on the surface, these contaminants are skimmed off and removed from the liquids. From the DNF units, wastewater is routed through an air stripper, where a blower forces air through a grid of perforated tubes. The vapors from the air stripper, DNF units, and oil-water separator are incinerated in a thermal oxidizer. Wastewater from the air stripper is pumped into a 14-acre rectangular basin (Surge Pond No. 1) for biotreatment. From there, wastewater flows via gravity into an 8-acre rectangular basin (Surge Pond No. 2) for further aerobic treatment. From there, some of the wastewater may be returned to the Refinery for industrial use or it may be pumped into the 108-acre Ox Pond, which has an estimated capacity of 216 million gallons (but a typical operating volume of approximately 150 million gallons). The Ox Pond provides passive treatment of wastewater by aeration, with a retention time of about 30 days.

From the Ox Pond, the Refinery routes wastewater to two clarifiers that operate in parallel, adding coagulants (substances that thicken liquids) and flocculants (substances that promote the clumping of particles) to enhance settling of wastewater solids. Clarifier solids are centrifuged (spun to separate fluids of different densities) and disposed of off site. The supernatant (separated liquid) from the centrifuge is routed to Surge Pond No. 1. From the clarifiers, wastewater flows to two sand filters that operate in parallel. Both of these filters contain automatic backwash functions that allow them to maintain continuous operation. Backwash water from the filters is routed to Surge Pond No. 1 for treatment, and treated wastewater is routed to 12 GAC columns that operate in pairs. The Refinery uses the GAC columns to remove contaminants that may be toxic to aquatic life. Backwash water from the GAC columns is also discharged to Surge Pond No. 1 for further treatment.

After the GAC columns, wastewater is normally routed to a 26-acre coke pond to provide additional polishing of treated effluent. Effluent pumped to the coke pond is commingled with coke sluice water and is used in the coke pile misting system to prevent particulate emissions. This water is retained in the coke ponds as another equalization step prior to discharge. From there, the Refinery sends the wastewater into the Clean Water Canal, which also receives stormwater runoff and neutralized demineralized reject water from the WWTP. The Clean Water Canal conveys treated wastewater and other streams to a sump containing three pumps that discharge into Suisun Bay through a 27-inch-diameter outfall. This outfall, 001 (denoted on Figure 4.3-2 by its monitoring location, EFF-001), terminates with a multi-port diffuser located under the Avon Terminal, 45 feet below MLLW (Tesoro 2013b).

Effluent Discharge

The Refinery maintains a NPDES permit, CA0004961, Order number R2-2010-0084, through the SFBRWQCB to discharge Refinery process wastewater and stormwater to adjacent receiving waters. Twelve discharge points are outlined in the NPDES permit; however, only discharge point 001, due to its proximity to the Project area, is discussed in this Environmental Impact Report. Discharge point 001 is where treated Refinery process wastewater and stormwater are discharged into Suisun Bay. As illustrated in Tables 4.3-9 and 4.3-10, average monthly effluent concentrations and maximum daily effluent concentrations remained below their respective effluent concentration limitations in 2013. In 2013, the average daily flow rate from this outfall was 4.35 million MGD (Tesoro 2014).

Table 4.3-9: Production-based Mass Emission Limits and Technology-based Concentration Limits for Avon Terminal (EFF-001)

Parameter	Units	Effluent Concentrations Based on NDPES Permit Reporting[1]		Effluent Limitations[2]	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Biological Oxygen Demand	lbs/day	438	2,025	2,300	4,200
Chemical Oxygen Demand	lbs/day	4,050	8,302	16,000	31,000
Total Suspended Solids	lbs/day	240	1,413	1,800	2,900
Oil and Grease	lbs/day	ND	ND	670	1,300
	mg/L	ND	ND	8	15
Phenolic Compounds	lbs/day	0.72	2.78	13	31
Ammonia (N)	lbs/day	177	696	1,300	2,800
Sulfide	lbs/day	ND	ND	12	27
Total Chromium	lbs/day	0.05	0.06	15	42
Hexavalent Chromium	lbs/day	ND	ND	1.2	2.7

[1] Source: (Tesoro 2014)

[2] Source: SFBRWQCB 2010

Abbreviations: lbs/day = pounds per day; mg/L = milligrams per liter; ND = Not detected (laboratory reporting limit not available)

Table 4.3-10: Effluent Limitations for Toxic Substances for Avon Terminal

Parameter	Units	Effluent Concentrations Based on NDPES Permit Reporting[1]		Final Effluent Limitations[2]	
		Average Monthly (2013)	Maximum Daily (2013)	Average Monthly	Maximum Daily
Copper	µg/L	0.76	1.3	13	24
Selenium	µg/L	11.35	49	41	50
Lead	µg/L	0.76	1.1	3.7	7.8
Cyanide	µg/L	4	12	21	42
Ammonia Nitrogen	mg/L	4.5	13	26	67

[1] Source: Tesoro 2014

[2] Source: SFBRWQCB 2010

Abbreviations: mg/L = milligrams per liter; µg/L = micrograms per liter

4.3.2 REGULATORY SETTING

Federal and State laws that may be relevant to the Project are identified in Table 4-1 and are discussed in more detail below, along with regional and local laws, regulations, and policies.

4.3.2.1 San Francisco Bay Basin Water Quality Control Plan 2013

The Basin Plan (2013) is the primary policy document that guides the SFBRWQCB. The Porter-Cologne Water Quality Act (refer to Table 4-1) requires the development and periodic review of Water Quality Control Plans (Basin Plans) that designate beneficial uses of California's major rivers and groundwater basins and establish numerical WQOs for those waters. The SFBRWQCB is actively working toward numerical sediment objectives that will ensure the protection of all current and potential beneficial uses. In January 2004, amendments to the Basin Plan were adopted, including the application of California Toxics Rule water quality criteria and definitions in lieu of Basin Plan WQOs, update of Basin Plan provisions relating to implementation of water quality standards, and several non-regulatory updates. The Basin Plan applies to point and nonpoint sources of waste discharge to the San Francisco Bay, but not to vessel wastes or the control of dredge material disposal or discharge. The Basin Plan includes the San Francisco Bay region and portions of the Delta. The 2013 version of the Basin Plan and associated amendments were approved on June 29, 2013.

4.3.2.2 NPDES Construction and Industrial Storm Water Permitting

Projects that disturb 1 or more acre of soil, or projects that disturb less than 1 acre but that are part of a larger common plan of development that in total disturbs 1 or more acre, are required to obtain coverage under the Construction Storm Water General Permit (NPDES General Permit No. CAS000002, Order No. 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities such as maintaining original line and grade, hydraulic capacity, or the original purpose of the facility. The Construction Storm Water General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which must list best management practices (BMPs) that the discharger would use to control stormwater runoff, and outline placement of those BMPs. SWPPP monitoring and reporting requirements are based on a site-specific calculated risk level based on soil erodability potential, beneficial uses of the receiving water, and whether the receiving water is on the CWA 303(d) list of impaired waters.

There are two types of industrial NPDES permits: individual and general. A general permit is developed to cover multiple facilities with specific categories. The general NPDES permit regulates certain classes of activities under the Industrial Activities General Permit adopted by the SWRCB on April 17, 1997 (Water Quality Order 97-03-

DWQ NPDES Permit No. CAS000001). SWRCB Order No. 97-03-DWQ is expired, and its replacement was adopted on April 1, 2014. The new Industrial General Permit will become effective on July 1, 2015.

An individual permit is unique to each facility. The limitations and requirements in an individual permit are based on the facility's operations, type and amount of discharge, and receiving stream. The Refinery, which includes the Avon Terminal, is subject to site-specific WDRs under NPDES individual permit No. CA0004961, Order No. R2-2010-0084. To comply with a NPDES permit, facility operators are required to submit a Notice of Intent, develop a SWPPP, conduct stormwater monitoring, and submit annual stormwater reports by July 1 of each year.

As described above, stormwater from the Avon Terminal is discharged at location 001, with compliance measured at monitoring location EFF-001. Discharge from the Refinery is also currently covered under Order No. R2-2007-0077 (NPDES Permit CA0038849), which regulates mercury discharges and implements the adopted mercury Total Maximum Daily Load. CWA section 301(b) and 40 Code of Federal Regulations (CFR) 122.44 require NPDES permits, at a minimum, to include conditions meeting applicable technology-based requirements and any more stringent effluent limitations necessary to meet appropriate water quality standards. Table 4.3-9 and Table 4.3-10 show the specific discharge limits that are applicable to the Refinery.

4.3.2.3 LTMS for Dredging 2001

The San Francisco Bay LTMS is a cooperative effort of the USEPA, USACE, SFBRWQCB, and BCDC to develop an economically and environmentally sound approach to dredging and dredged material disposal in the San Francisco Bay Area. The LTMS established an interagency DMMO, which serves as a central regulatory location for dredging permit applications. The purpose of the DMMO is to review sediment quality sampling plans, analyze the results of sediment quality sampling, and make suitability determinations for material proposed for disposal in the San Francisco Bay Area. The major goals of the LTMS are to: (1) maintain, in an economically and environmentally sound manner, those channels necessary for navigation in the SFBE while eliminating unnecessary dredging activities; (2) conduct dredged material disposal in the most environmentally sound manner; (3) maximize the re-use of dredged material as a resource; and (4) establish a cooperative permitting framework for dredging and disposal of dredged materials.

4.3.2.4 San Francisco Bay Plan 2008

The San Francisco Bay Plan (Plan) (BCDC 2009) addresses the expected impacts of climate change in San Francisco Bay. Sea-level rise risk assessments are required when planning shoreline areas or designing larger shoreline projects. If sea-level rises and storms that are expected to occur during the life of the Project would result in public safety risks, the project must be designed to address the flood levels expected by mid-century. If it is likely that the Project would remain in place longer than mid-century, Tesoro must have a plan to address the flood risks expected at the end of the century. Risk assessments are not required for repairs of existing facilities, interim projects, small projects that do not increase risks to public safety, and infill projects within existing urbanized areas. Risk assessments are only required within the BCDC's jurisdiction, which includes the SFBE, the 100-foot shoreline band, salt ponds, managed wetlands, and certain other waterways and marshes. The Plan specifies that "pipelines and piers may be built over marshes." Policies within the Plan indicate that "pipeline terminal and distribution facilities near the SFBE should generally be located in industrial areas" and that "marine terminals should also be shared as much as possible among industries and port uses."

4.3.2.5 Contra Costa County General Plan

Contra Costa County General Plan (2005) policies relevant to the proposed Project include the following:

- Water Resources Goal 8-T: To conserve, enhance, and manage water resources, protect their quality, and assure an adequate long-term supply of water for domestic, fishing, industrial, and agricultural use.
- Water Resources Goal 8-V*:* To preserve and restore remaining natural waterways in the county which have been identified as important and irreplaceable natural resources.
- General Water Resources Policy 8-74: Preserve watersheds and groundwater recharge areas by avoiding the placement of potential pollution sources in areas with high percolation rates
- General Water Resources Policy 8-75: Preserve and enhance the quality of surface and groundwater resources.
- General Water Resources Policy 8-91: Grading, filling, and construction activity near watercourses shall be conducted in such a manner as to minimize impacts from increased runoff, erosion, sedimentation, biochemical degradation, or thermal pollution.

4.3.3 SIGNIFICANCE CRITERIA

For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would degrade water quality in any of the following ways:

- Violate water quality standards, objectives, or criteria
- Violate waste discharge requirements

- Increase contaminant levels in the water column or sediment so as to potentially cause harm to marine organisms
- Create long-term chemical or physical changes in the receiving environment of the site, area, or region so as to impair beneficial uses of the receiving water
- Create or contribute to runoff that would increase contamination or cause physical or chemical changes in receiving waters so as to impair beneficial uses or potentially cause harm to marine organisms

Impacts of the Project on the SFBE were assessed by comparing existing conditions to potential changes from continued Project operations and from MOTEMS renovation activities. Where existing site-specific or nearby water quality data were available or modeled, and where published WQOs or effluent limitations were available, impacts were quantified to the extent feasible.

4.3.4 IMPACT ANALYSIS AND MITIGATION

The following subsections describe the Project's potential impacts on water quality. Where impacts are determined to be significant, feasible mitigation measures (MMs) are described that would reduce or avoid the impact.

4.3.4.1 Proposed Project

Operation

Impact Water Quality (WQ)-1: Degrade water quality as a result of maintenance dredging. (Less than significant.)

The Berth 1 area north of the Avon Terminal is dredged periodically on an as-needed basis to maintain a depth of approximately 44 feet below MLLW. Bathymetric surveys are performed quarterly to determine when maintenance dredging is required. As discussed in Section 2.4.15, the last Avon Terminal dredging event was conducted in 2012, and involved the removal of 3,827 cy of dredged material. Materials removed in 2012 were disposed at the Winter Island facility, which is located approximately 15 miles east of the Avon Terminal. Maintenance dredging is scheduled sufficiently in advance to ensure compliance with applicable permits and to conduct appropriate assessments prior to execution. A dredge event at Berth 1, which is not part of the MOTEMS-related renovations, will be conducted during 2014 and is anticipated to entail approximately 6,000 cy of dredged material.

Water quality impacts from dredging activities are two-fold: (1) suspension of bottom sediments and associated water quality changes in the water column (LFR 2004), and (2) associated release of contaminants deposited within disturbed sediments (Eggleton and Thomas 2004). Water quality effects of dredging activities include increases in turbidity and suspended solids; changes in salinity, temperature, and pH; reduced dissolved oxygen (DO); and releases of heavy metals and organic contaminants sorbed to the sediment matrix (Connor et al. 2004).

Suspension of Bottom Sediments

During dredging activities, bottom sediments are temporarily suspended in the water column, potentially causing increases in turbidity. Turbidity and suspended sediment concentration (SSC) can be much greater than ambient conditions in the immediate vicinity of dredging activities. However, natural physical processes alone can cause the SSC to vary over the course of a day by over 100 milligrams per liter. Additionally, estimates of the amount of material that is re-suspended during dredging range from 0 to 5 percent (Suedel et al. 2008), and the majority of sediment re-suspended during dredging activities resettles within 164 feet (50 meters) of the dredge site within 1 hour (Anchor Environmental 2003). Turbidity changes induced by dredging would only result in adverse environmental effects when the turbidity generated is significantly greater than the natural variation of turbidity and sedimentation rates in the area (Anchor Environmental 2003). For construction dredging, the extent of these environmental effects is local and temporary, generally only lasting as long as dredging operations are taking place (Suedel et al. 2008).

High turbidity results in low levels of transmitted light and can negatively affect functioning of light-dependent organisms such as phytoplankton. In the SFBE, tidal currents, wind-waves, circulation, and weather activities re-suspend sediments in shallow areas and transport suspended particles to other locations (Schoellhamer 2002). As discussed in Section 4.3.1.2, the Carquinez Strait is a narrow, tidally influenced body with high average current velocities throughout the year, and is turbid from high suspended sediment loads. Studies of SSCs within San Pablo Bay indicate that natural processes have a substantially greater influence on turbidity than observed dredging operations (Schoellhamer 2002). The Basin Plan WQOs specify that bay waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses (SFBRWQCB 2013). The occasional and temporary increased levels of turbidity caused by Project dredging activities are expected to be less than those created by natural processes, resulting in a minor to negligible environmental impact.

Water Quality Changes

Dredging can temporarily reduce DO concentrations in the water column. Reduced DO concentrations would be expected to be localized and short term, with minimal impacts (SFEI 2008). In general, DO issues are less likely in well-oxygenated waters such as those of the SFBE, which generally range from 9 to 10 milligrams per liter (mg/L) during periods of high river flow, 7 to 9 mg/L during moderate river flow, and 6 to 9 mg/L during the late summer months when flows are lowest (SFEI 1994). The reduction of DO during dredging is expected to be minimal (1 to 2 mg/L) and transitory in surface waters, but can be more acute in bottom waters, with an estimated reduction of up to 6 mg/L for 4 to 8 minutes (USACE et al. 1998). Most estuarine organisms are capable of tolerating reduced DO conditions for short periods (SFEI 2008). The Basin Plan WQO for DO states that tidal waters downstream of the Carquinez Bridge shall not be depressed below 5 mg/L. Dredging activities are generally not expected to reduce the DO concentration below the WQO, except possibly for very short periods; therefore, DO issues in the SFBE due to dredging impacts are likely limited.

Dredging and dredged material disposal can release sediment-associated metals and other contaminants by desorption and dispersion within the resulting sediment plume (Eggleton and Thomas 2004, Levine-Fricke 2004). Bottom sediments often contain high concentrations of settled contaminants. Disturbing sediments through activities such as dredging can reintroduce these compounds into ecosystems, increasing concentrations in water and aquatic life. Contaminated sediments are not distributed evenly in the SFBE, but tend to be present in localized areas. Trace metals, pesticides, and numerous organic contaminants are monitored for bay sediments through the RMP. Table 4.3-5, which presents the RMP sediment results for Suisun Bay, shows that sediments near the Project area are below ambient concentrations. The sediment sampling results for Suisun Bay exceed the ER-L and ER-M for nickel; however, the ambient bay concentration also exceeds these thresholds. Pollutant concentrations in sediments tend to be highest in harbors, harbor entrances, marinas, and industrial waterways, and lowest in the central portions of the embayments. As indicated in Section 4.3.1.2, no known toxic hot spots are located near the Project area.

<u>Disposal of Dredged Material</u>

Dredged material disposal in the SFBE is regulated by the DMMO. This interagency group evaluates the physical and chemical characteristics of the dredged sediments to make sure that they are compatible for in-water disposal in the SFBE. As part of the DMMO dredging permit requirements, proposed dredging locations are required to be sampled and tested to determine the existence and extent of any contamination and to determine suitability for disposal. Future Project-related dredged sediment disposal would be managed in accordance with the LTMS for Placement of Dredged Material in the San Francisco Bay Region (USACE et al. 2001). Because the effects of dredging and dredged material disposal on water quality are transitory and because sediment composition is evaluated by the DMMO before a dredging permit is issued, the impacts of Project dredging on water quality would be less than significant.

Mitigation Measure: No mitigation required.

Impact WQ-2: Degrade water quality as a result of sediment disturbance from vessel maneuvers. (Less than significant.)

Avon Terminal operations can affect water quality if vessels maneuvering in the immediate vicinity of the wharf erode or disturb bottom sediments. During operations, a ship's propeller generates a turbulent continuous stream of fast-moving water flow known as propeller wash, which can impinge directly on the seabed by eroding sediments and potentially damaging benthic communities.

In 2013, 54 tankers visited the Avon Terminal. These vessels are assisted by tugs in berthing and unberthing operations. The number of tugs used in docking or maneuvering of vessels depends on the size of the vessel and environmental conditions. Tankers are more likely to create turbulence that can erode bottom sediments because the large propellers on these ships are closer to the seafloor as they travel through the SFBE. Tesoro performs annual hydrographic surveys of the seafloor surrounding the Avon Terminal, and sediments appear to be hydrodynamically stable (Connexsys 2013). As discussed in Section 2.0, Project Description, the level of shipment activity and throughput is not expected to change substantially during the proposed 30-year lease agreement period. The anticipated annual ship and barge traffic is approximately 70 to 120 vessels.

The transit of deep-draft vessels through the SFBE to the Avon Terminal can also re-suspend sediments and benthic biota in the water column, where bottom depths are near that of the vessel draft. Depending on the depth of propeller wash scour, re-suspension could cause a brief, localized depression in DO concentrations. However, as discussed in Impact WQ-1, this increase in turbidity would disperse rapidly with the strong tidal currents in the area, and would be rapidly mitigated by tidal mixing with SFBE waters of high DO concentration.

Mitigation Measure: No mitigation required.

Impact WQ-3: Degrade water quality by the discharge of segregated ballast water. (Significant and unavoidable.)

Ballast water is used to stabilize large vessels, including tankers and barges, and is taken up to compensate for the vessel lightering as crude oil and other cargo is delivered. Although a large proportion (over 80 percent) of voyages to California waters retain all ballast water on board, vessels do discharge ballast water for either operational or safety purposes (CSLC 2013b). Segregated ballast water is kept in tanks that are separated from oily cargo. Non-segregated ballast water is considered a hazardous waste in California and cannot be discharged into the SFBE or coastal waters. Vessels may discharge properly managed, segregated ballast water from segregated ballast tanks into the SFBE as they take on product from the Avon Terminal.

The discharged ballast water has the potential to contain a variety of harmful substances, most notably NAS.

The U.S. Coast Guard (USCG) regulates ballast water through the National Invasive Species Act of 1996 (NISA). In 2004, the USCG issued final mandatory ballast water management regulations that required any vessel with ballast water entering United States waters from outside the United States Exclusive Economic Zone to either conduct mid-ocean ballast water exchange, retain the vessel's ballast water onboard, or use an alternative control method approved by the USCG. In 2012, the USCG amended its regulations on ballast water management by establishing a standard for the allowable concentration of living organisms in ballast water discharged from ships in waters of the United States. The USCG also amended its regulations for engineering equipment by establishing an approval process for ballast water management systems.

The USEPA regulates ballast water and other discharges incidental to normal vessel operations through the CWA, specifically the NPDES Permit program. In December 2008, the USEPA released the NPDES Vessel General Permit (VGP) for Discharges Incidental to the Normal Operation of Commercial Vessels and Large Recreation Vessels. In March 2013, the USEPA released the 2013 NPDES VGP to replace the 2008 VGP when it expired in December 2013. The 2013 VGP contains new numeric limits for the concentration of living organisms in discharged ballast water for most vessels. As required by the VGP, the USCG (under NISA) and CSLC (under the Marine Invasive Species Act of 2003 [MISA]), all owner/operators of vessels equipped with ballast water tanks must maintain a ballast water management plan. The BMPs for ballast water designated in the VGP include restricting discharges to only those essential to the operation of the vessel, removal of sediment from ballast tanks in mid-ocean or at dry-dock, avoiding ballast water uptake in areas of known pathogens, conducting mid-ocean ballast exchanges, and retaining all ballast water on board while in United States waters.

To inhibit the introduction and spread of NAS in California, the Coastal Ecosystems Protection Act of 2006 (Senate Bill [SB] 497) established performance standards for the discharge of ballast water, which are administered by the CSLC. Per regulations, vessels have four options to comply with California's performance standards, including: (1) retention of all ballast water on board; (2) use of an alternative ballast water management method, such as potable water; (3) discharge to an approved shore-based ballast water reception and treatment facility; and (4) treatment of all ballast water prior to discharge by a shipboard ballast water treatment system. The performance standards regulations are being implemented gradually based on a vessel's ballast water capacity and year of construction. In a recent study, the CSLC determined that there are no shipboard ballast water treatment systems currently available to meet all of California's performance standards for the discharge of ballast water (CSLC 2013c). Mid-ocean exchange of ballast water is considered an interim measure to reduce the introduction of NAS until effective treatment technologies are developed (Ruiz et al. 2011).

In addition to the MM presented below, implementation of MMs WQ-5, BIO-9a, and BIO-9b (refer to Section 4.2, Biological Resources) would reduce the risk posed by discharge of ballast water.

Mitigation Measure:

> **MM WQ-3: Advise Vessels of the Coastal Ecosystems Protection Act and Associated Regulations.** Tesoro Refining and Marketing Company, LLC (Tesoro) shall advise both agents and representatives of shipping companies that have control over vessels that have informed Tesoro of plans to call at the Avon Terminal about the Coastal Ecosystems Protection Act of 2006, National Invasive Species Act of 1996, Marine Invasive Species Act of 2003, and other associated implementing regulations.

Rationale for Mitigation Strict compliance with the Coastal Ecosystems Protection Act, MISA, and associated regulations, including California's performance standards for the discharge of ballast waters, by vessels using the Avon Terminal would significantly reduce the potential for the introduction of NAS.

Residual Impacts Although ballast water discharges are conducted in accordance with effective management practices and are administered by State and federal regulations, risk of NAS introduction to the SFBE cannot be completely eliminated. Discharge of ballast water containing harmful organisms could impair the beneficial uses of the Project area and significantly degrade water quality.

Impact WQ-4: Degrade water quality as a result of discharge of cooling water, sanitary wastewater, bilge water, non-segregated ballast water, or other liquid wastes. (Less than significant.)

In addition to segregated ballast water, a vessel berthing at the Avon Terminal may discharge cooling water from its operating system. Cooling water flows through the main engines and auxiliary equipment operating during the time the ships are berthed. The SWRCB has adopted a Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan), which contains WQOs for coastal and interstate surface waters as well as enclosed bays and estuaries. The Thermal Plan specifies that no discharge to enclosed bays shall cause a surface-water temperature rise greater than 4 ºF above the natural temperature of the receiving waters at any time or place (SWRCB 1998). The volume of these cooling water flows is small compared to the tidal flow past the Avon Terminal. The impacts of cooling water discharges on water quality would be less than significant, as the increase in water temperature would be quickly absorbed by the ambient temperature, and would not be expected to exceed Thermal Plan limits.

The California Clean Coast Act (SB 771) of 2005 prohibits the discharge of hazardous wastes, other wastes, or oily bilge water into California waters, and also prohibits the discharge of greywater and sewage from vessels with sufficient holding-tank capacity or from vessels capable of transferring wastewater to onshore facilities. Any discharges must also comply with the VGP and specific discharge limits for contaminants identified in the VGP. Non-segregated ballast water is considered a hazardous waste in California, and discharge is prohibited. Vessels are not allowed to offload trash, and additionally, no hull cleaning occurs at the Avon Terminal.

The Avon Terminal has the ability to receive oily ballast water or bilge water, which can be conveyed onshore via piping to tankage dedicated to the handling of ballast and residue liquids. The oily waste can be subsequently treated in the Refinery's WWTP. Although this capability exists, ship operators and Tesoro typically cooperate to minimize the amount of oily ballast and/or bilge water sent to the WWTP, and the Avon Terminal will typically receive such water only during emergency situations. Disposal of these wastes is the responsibility of the ship and is handled by a contract disposal service. Therefore, except for the unlikely case of a spill during transfer, none of these wastes would have any impact on water quality in the Project area.

Mitigation Measure: No mitigation required.

Impact WQ-5: Degrade water quality as a result of vessel biofouling. (Significant and unavoidable.)

Vessel biofouling occurs when organisms attach to the hull and other wetted surfaces of a vessel. When vessels move from port to port, biofouling communities are transported along with their "host" structure. Biofouling organisms can be introduced into these new areas when they reproduce, drop off, or are knocked off of the vessel.

Within California, up to 60 percent of the established NAS are considered to have been introduced through vessel biofouling (Ruiz et al. 2011). Even vessels that may be well maintained and that have little to no biofouling present on the hull can still represent a potential for impacts related to NAS through biofouling of certain niches in the vessel. The effects of vessel biofouling are further discussed in Section 4.2, Biological Resources. As indicated in Section 4.2, Impact BIO-9, biofouling by commercial ships has been identified as one of the most important mechanisms for NAS introductions in North America. Pursuant to Section 502 of the CWA, invasive species meet the definition of "pollutant" because they are "biological materials…discharged into water," and they impair or threaten to impair the full range of designated beneficial uses of waterbodies in the SFBE. The SFBE is one of the most invaded estuaries in the world

(Molnar et al. 2008). The San Francisco Bay currently has approximately 257 NAS in its waters (Ruiz et al. 2011). Both Suisun Bay and the Carquinez Strait are identified as impaired for invasive species.

The CSLC regulates vessel biofouling under MISA. In 2008, the CSLC initiated the requirement of annual submittal of the Hull Husbandry Reporting Form for vessels operating in State waters. In an effort to reduce introductions of NAS via vessel biofouling, data reported in the Husbandry Reporting Forms have been used in conjunction with CSLC-sponsored research to develop biofouling management requirements. The CSLC is in the process of developing new regulations that will focus on better recordkeeping and better comprehensive biofouling management.

In addition to the MM presented below, implementation of MM BIO-9a, (refer to Section 4.2, Biological Resources) would ensure that vessels seeking to call at the Avon Terminal are advised of the MISA and are complying as required by the CSLC.

Mitigation Measure:

MM WQ-5: Biofouling Regulations and Standards. Tesoro Refining and Marketing Company, LLC (Tesoro) shall prepare, and maintain current, a fact sheet and provide it to all vessels calling at the Avon Terminal to ensure that they are informed of applicable regulations and standards associated with the prevention of biofouling. Prior to allowing berthing at the Avon Terminal, Tesoro shall confirm with vessels that they are in compliance with the Marine Invasive Species Act of 2003 (MISA), including completion of MISA-required paperwork. Tesoro shall ensure that all vessels submit required reporting forms, as applicable for each vessel prior to the vessel's entry into the San Francisco Bay Estuary or in the alternative, at least 24 hours prior to the vessel's arrival at the Avon Terminal.

Rationale for Mitigation Tesoro has no control over, ownership of, or authority to direct vessels that berth at the Avon Terminal; therefore, details regarding how calling vessels manage biofouling cannot be provided as part of the Project (refer to Section 2.0, Project Description). The vessels would be governed by the applicable CSLC requirements for biofouling management, which would reduce the potential impact of aquatic species invasion from biofouling. Under MM WQ-5 and MM BIO-9a, Tesoro would ensure that vessels seeking to call at the Avon Terminal are advised of the MISA and are complying as required by the CSLC.

Residual Impacts While regulations and provisions have been helpful in reducing the potential of new NAS introductions from biofouling, existing standards and measures are not completely effective. The introduction of additional harmful organisms may impair several of the Project area's beneficial uses. Therefore, the introduction of new NAS via vessel biofouling as a result of continued Avon Terminal operation could pose potential significant and unavoidable adverse impacts on water quality.

Impact WQ-6: Degrade water quality due to anti-fouling paints used on vessel hulls. (Potentially significant.)

Marine anti-fouling paints or coatings are used to reduce nuisance algal and marine growth on ships. Biofouling can significantly affect the drag of the vessel through the water, reducing its fuel economy (refer to Impact WQ-5 and Impact BIO-9 for further discussions on the environmental impacts associated with biofouling). Anti-fouling coatings incorporate biocides such as copper and zinc as the active ingredients. The International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention) went into force in January 2008. It prohibits and restricts application, re-application, installation, or use of harmful anti-fouling paints on ships, especially those containing harmful organotins, such as tributyltin (TBT).

Ninety percent of biocide-based coatings on oil tankers entering California's waters are copper-based, and approximately 8 percent use biocide-free coatings (CSLC 2013c). Biocide-free coatings generally contain silicon, which increases the slickness of the hull so biofouling organisms fall off as the vessel travels at speed.

The VGP requires certain management practices and places technology-based and water quality-based limits on hull leachates. No coatings may contain materials banned from use in the United States. When coatings are reapplied, biocides with the lowest release rate must be used, and the application of organotins is explicitly prohibited, as discussed previously. Vessels that are currently coated with TBT must have it removed or overcoated. Because of the restrictions on the use of TBT, tankers arriving at the Avon Terminal during the new lease period would not represent a significant ongoing source of TBT in the waters near the Avon Terminal.

Per MM WQ-6, Tesoro shall require representatives of vessels berthing at the Avon Terminal to provide documentation certifying that their vessel is in compliance with the 2001 International Maritime Organization Convention on the Control of Harmful Anti-fouling Systems on Ships and other applicable regulations. Adherence to this resolution would help minimize local water quality impacts.

The concentrations of copper and zinc in water and sediment in the vicinity of the Project are below the WQOs, ambient sediment concentrations, and the ER-L and ER-M (refer to Tables 4.3-5 and 4.3-6). Suisun Bay and the Carquinez Strait are listed as impaired waterbodies on the CWA 303(d) list; however, copper and zinc are not among the identified contaminants of impairment. Although continued vessel traffic in the Carquinez Strait and Suisun Bay is unlikely to cause a measurable increase in copper or zinc concentrations above WQOs or ambient levels, some leaching would always occur. The use of these substances on vessels associated with the Avon Terminal is considered to be a potentially significant adverse impact on water quality.

Mitigation Measure:

MM WQ-6: Tributyltin (TBT) Ban Requirements. Tesoro Refining and Marketing Company, LLC (Tesoro) shall prepare, and maintain current, a fact sheet and provide it to all vessels calling at the Avon Terminal to ensure that they are informed of the requirements of the 2008 International Maritime Organization prohibition of TBT applications to vessel hulls. Prior to allowing berthing at the Avon Terminal, Tesoro shall confirm with vessels that they are in compliance with the Marine Invasive Species Act (MISA) and implementing regulations, including completion of MISA-required paperwork. Tesoro shall ensure that all vessels submit required reporting forms prior to the vessel's entry into the San Francisco Bay Estuary or in the alternative, at least 24 hours prior to the vessel's arrival at the Avon Terminal.

Rationale for Mitigation: Implementation of MM WQ-6 would ensure that berthing vessels comply with the AFS Convention, which would minimize local water quality impacts and would reduce the significant impact to potentially significant.

Impact WQ-7: Degrade water quality as a result of cathodic protection on vessels. (Less than significant.)

Tankers and barges calling at the Avon Terminal are made of steel that requires cathodic protection. Many of these vessels have a coal tar-epoxy coating on their hull that insulates them from salt water. Tankers often use an impressed current system for cathodic protection. Barges typically use sacrificial zinc anodes for cathodic protection. The slow leaching of zinc anodes may increase the concentration of zinc in the waters at the Avon Terminal, but due to the slow rate of exchange of the anodes to seawater, it is considered to be negligible in comparison to ambient zinc in the marine environment. The impact of cathodic protection on water quality is considered less than significant.

Mitigation Measure: No mitigation required.

Impact WQ-8: Degrade water quality as a result of stormwater runoff from the Avon Terminal. (Potentially significant.)

In general, increasing impervious areas could result in the degradation of water quality due to increased runoff and sedimentation. Potential adverse impacts on water quality due to increased imperviousness include increased turbidity, increased temperature, and increased contact with point source contaminants.

The Project would create new onshore impervious surfaces at the Avon Terminal approachway. The increased onshore impervious areas may affect the percolation of precipitation and have the potential to reduce groundwater recharge. Impervious surfaces seal the soil, eliminating rainwater infiltration and natural groundwater recharge. However, any changes in groundwater recharge would be aerially localized, limited to the shallow zone, and negligible because the amount of impervious ground surface would not be substantially increased.

Changes in runoff water quality are expected to be insignificant as a result of this minor addition of impervious surfaces. The anticipated total area of new impervious surfaces (permanent asphalt) for the roadway is approximately 7,470 square feet. The projected peak discharge (calculated using the Rational Method) during a 100-year, 1-day storm event from proposed impervious areas would be 0.03 cfs. The Rational Method predicts the peak runoff according to the formula:

$$Q=CiA$$

where:

- Q is the peak runoff in cfs,
- C is a runoff coefficient (assuming a coefficient of 0.95 for permanent asphalt),
- i is the rainfall intensity in inches/hour (estimated as 0.193 per FCD Frequency Depth Curves), and
- A is the drainage area in acres.

The Refinery discharged an average of 4.35 MGD (or an average of approximately 6.73 cfs) from outfall EFF-001 in 2013; runoff from new impervious surfaces during a 100-year, 1-day storm event would be approximately 19,389 gallons per day or less than 1 percent of the Refinery's typical effluent discharge. According to the current NPDES permit, the Refinery's total hydraulic capacity is 18.52 MGD (SFBRWQCB 2010). Therefore, existing stormwater management and treatment systems could easily accommodate the nominal increase of runoff from new impervious areas.

Stormwater runoff from the Avon Terminal may contribute pollutants to the SFBE. Stormwater runoff is the largest contributor of pollutants to the SFBE (Davis et al. 2000). Hydrocarbons and other contaminants that accumulate on the surfaces of the Avon Terminal would run off to the ocean during storms. As described in Section 2.0, Project Description, and Section 4.3.1.4, stormwater and surface drips are collected and drained into a 1,125-gallon, dock-mounted steel recovery tank that is double-walled, internally coated, and protected from overflowing by level control instrumentation. Recovered drip-pan stormwater and oil collections are typically pumped onshore through a 6-inch-diameter recovered oil pipeline and treated. A similar liquid collection system would be installed at Berth 1A and integrated into the existing wastewater system. The entire concrete platform surface of Berth 1A would have a curbed perimeter serving as a collection area. Discharge from the Berth 1A would be pumped to the onshore WWTP for treatment.

As described in Section 4.3.1.4, collected runoff from the Avon Terminal is combined with process waters and pumped to the Refinery WWTP for full treatment, and is ultimately discharged to Suisun Bay via permitted outfall EFF-001. Activities at the Avon

Terminal are subject to NPDES Permit CA0004961, WDR Order No. R2-2010-0084, issued by the SFBRWQCB. Pursuant to its NPDES permit, Tesoro has prepared a SWPPP, which includes the onshore operations at Refinery. The SWPPP does not specifically address the potential for pollutant input from the Avon Terminal (Tesoro 2013b). Contingent on the SFBRWQCB's approval, stormwater runoff from Berth 1A and the new roadway would be regulated under the current SWPPP (a requirement of the Refinery's existing NPDES permit). BMPs and regulation under the Refinery's NPDES permit would minimize potential impacts related to contaminated stormwater releases and would reduce water quality degradation at the Avon Terminal.

Good housekeeping practices that maintain a clean and orderly work area would reduce the potential for stormwater to be contaminated by waste products, accidental spills, and improperly placed materials. Initial training and periodic retraining of employees in housekeeping techniques is currently conducted at ongoing safety meetings. Housekeeping activities are routinely supervised and inspected.

Mitigation Measure:

MM WQ-8: Update Existing Facility Stormwater Pollution Prevention Plan (SWPPP). Tesoro Refining and Marketing Company, LLC (Tesoro) shall update the existing SWPPP to include specific best management practices (BMPs) to prevent stormwater runoff from the new Berth 1A and approachway. BMPs shall be designed to reduce the input of contaminants to the San Francisco Bay Estuary and prevent leaks and spills during routine activities. Specific stormwater BMPs for Berth 1A and the approachway shall include:

- Concrete berms and containment for spills on Berth 1A.
- Documented inspections of the Avon Terminal approachway, as well as Berth 1A containment systems, in addition to already included requirements for immediate cleanup of any spills or releases.

Rationale for Mitigation On non-bermed areas of the Avon Terminal and approachway, contaminants have the potential to accumulate on surfaces from routine vehicle use, maintenance activities, and daily operations. Project activities require the transport and handling of hazardous materials—such as fuels, oils, and waste products—for operation and maintenance of facility equipment. Hazardous materials that accumulate on surfaces of the Avon Terminal would likely flow into the SFBE during storm events. However, the potential for adverse effects is less than significant with the implementation of MM WQ-8, compliance to regulations regarding the management of hazardous materials, and the existing and proposed secondary containment at the Avon Terminal.

Impact WQ-9: Degrade water quality as a result of oil leaks and spills during unloading. (Significant and unavoidable.)

Accidental releases of petroleum products during loading and unloading operations at the Avon Terminal could contaminate the surrounding surface water with floating product. Petroleum products present in bay waters would likely exceed the Basin Plan WQOs for oil and grease, which includes any visible film or coating on the surface of the water or on objects in the water that cause nuisance or that otherwise adversely affect beneficial uses.

Accidental oil spills directly to the SFBE could occur during unloading operations. When introduced in the marine environment, the oil goes through a variety of transformations involving physical, chemical, and biological processes. Physical and chemical processes, which begin soon after petroleum is spilled into surface waters, include evaporation, spreading, emulsification, dissolution, sea-air exchange, and sedimentation. Chemical oxidation of some of the components of petroleum is also induced in the presence of sunlight. The degraded products of these processes include floating tar lumps, dissolved and particulate hydrocarbon materials in the water column, and materials deposited into bottom sediments and the shoreline. Biological processes are generally slower than physical or chemical processes, and include degradation by microorganisms and uptake by large organisms and subsequent metabolism.

Release scenarios at the Avon Terminal are presented in Impact OS-1 in Section 4.1, Operational Safety/Risk of Accidents. The consequences of a spill for water quality would depend on the size of the spill; the effectiveness of the response effort; and the biological, shoreline, and water resources affected by the spill. A small spill of 1 gallon or less would result in an impact that could be mitigated, while a large spill of 1,000 barrels (42,000 gallons) most likely would result in a significant, adverse impact that would have residual effects after cleanup. The impacts of spills between 1 gallon and 1,000 barrels (42,000 gallons) depend on the effectiveness of response efforts and the resources impacted. As discussed in Section 4.1, Operational Safety/Risk of Accidents (refer to Impact OS-1), a 1-gallon spill would be expected approximately every 6.4 years on average (an annual spill probability of 0.34). The annual probability of a 1,000-gallon spill from the Avon Terminal is approximately 0.02, which is equal to once every 59 years on average. The annual probability of a 1,000-barrel spill from the Avon Terminal is 0.003, which is equal to once every 300 years on average. Because the proposed lease renewal period is 30 years, there is an approximately 10 percent chance of a 1,000-barrel spill at the Avon Terminal over the life of the lease. Larger spills are possible, but have even lower probabilities.

As discussed in Section 4.1, Operational Safety/Risk of Accidents, several oil spill trajectory models were previously conducted for projects at nearby locations, and were evaluated to consider the potential extent of impacts that could occur from a range of spill scenarios at the Avon Terminal. These models and their relevance to the Avon Terminal lease renewal environmental impact analysis are summarized in Impact OS-1. Details of each of the models and results are provided in Appendix B.

Tesoro's Oil Spill Response Plan and Manual, last updated in November 2012, provides spill prevention measures and protocol in the event of an accidental release. BMPs would be implemented to reduce the risk of potential releases, and the refueling of vessels would be conducted at nearby fuel docks, rather than on site, to the extent possible. All exposed piping, valves, and flanges are inspected during loading/unloading operations to check for leaks. Drip pans are placed beneath areas with high potential for leaks, such as hose and pipe connections. The drip pans discharge directly to the slops tank installed beneath the wharf. As described in Impact WQ-8, the existing and proposed slops tanks have an electronic gauging system that is provided to determine the level in the tank; a high alarm will sound if the tank is overfilled. The sump pump for the existing tank is activated automatically when the volume in the tank reaches a programed level, or it can be used manually. An auxiliary pump is installed in case the primary pump fails. The proposed tank would have a similar sump and auxiliary pump. Incidental spills collected in the slops tanks are pumped onshore to the Refinery's WWTS.

Prior to a transfer, an Avon Terminal and vessel visual inspection is performed, a pre-transfer conference is held, and documentation is completed to ensure that a sound understanding exists among the parties involved. During loading or transfer operations, the control room is in continuous radio contact with field operators.

Tesoro has contracted with Bay Area Ship Services to assist with initial oil spill response services, including the immediate execution of approximately 600 feet of harbor boom in approximately 30 minutes. In addition, Tesoro contracts with Marine Spill Response Corporation to serve as the primary Oil Spill Response Organization contractor in its Oil Spill Response Plan for offshore, onshore, and shallow-water response services. Refer to Section 2.4.16 in Section 2.0, Project Description, and Section 4.1, Operational Safety/Risk of Accidents, for a more detailed description of the Avon Terminal oil spill response capabilities and equipment.

The Avon Terminal is subject to regulations promulgated by the USEPA that require the preparation of a Spill Prevention, Control, and Countermeasures Plan (SPCC Plan) and regulations adopted by both the USEPA and CDFW's Office of Spill Prevention and Response (OSPR) covering the development and maintenance of oil spill response and contingency plans. Plans have been prepared in accordance with these regulatory requirements for the Avon Terminal. In addition, Tesoro has a Wharf Operations Manual governing Avon Terminal operations, including spill prevention. The OSPR also requires a Certificate of Financial Responsibility to demonstrate that it has adequate financial resources to pay cleanup and damage costs arising from an oil spill. Contingency planning and response measures for oil releases—as discussed in Section 4.1, Operational Safety/Risk of Accidents—would be implemented, per regulations, to minimize this impact to the extent feasible and practicable.

Tesoro has contingency planning and response measures for oil releases in place, including an existing facility SPCC Plan (2012), Oil Spill Contingency Response Plan (2012), and SWPPP (2013). Additionally, the CSLC has developed the MOTEMS, which apply to all existing and new marine oil terminals in California. MOTEMS includes criteria for inspection; structural analysis and design; mooring and berthing; geotechnical considerations; and fire, piping, mechanical, and electrical systems. Refer to Section 4.1, Operational Safety/Risk of Accidents, for a more comprehensive discussion on MOTEMS and spill-prevention practices.

Mitigation Measure: MMs OS-1a, Remote Release Systems; OS-1b, Tension Monitoring Systems; and OS-1c, Allision Avoidance Systems apply to this impact.

Rationale for Mitigation The measures provide greater safety in preventing spills and improving response capability and help to reduce impacts on water quality to the maximum extent feasible. The measures would lower the probability of an oil spill by allowing for quick release of mooring lines, monitoring of tension of the mooring lines, and allision avoidance. The measures help to reduce the potential for spills and their associated impacts.

Residual Impacts As discussed previously, operational protocols proposed by Tesoro are designed to minimize the potential for accidental releases, and existing improvements include the use of secondary containment for all anticipated Avon Terminal drips and small releases. However, even strict adherence to these protocols and spill response measures cannot guarantee that contaminants would never be released. The probability of a serious spill would be minimized to the extent feasible with implementation of MMs OS-1a, OS-1b, and OS-1c, but the risk cannot be eliminated. Consequences of a spill would depend on the spill conditions, and could range from relatively small spills that could be contained during first-response efforts with rapid clean up and less than significant impacts, to spills that are larger or difficult to clean up with significant residual impacts after mitigation. Even with the implementation of contingency planning and response measures for oil spills, a spill could spread over a large area and impact water quality in the SFBE. In such a case, impacts on water quality would be significant and unavoidable.

Impact WQ-10: Degrade water quality due to oil releases from vessels in transit in the San Francisco Bay Estuary or along the outer coast. (Significant and unavoidable.)

The water quality impacts of oil spills associated with vessel transit in the SFBE or along the outer coastline are similar to the effects described in Impact WQ-9. However, a larger oil spill is more likely to result from accidents associated with vessels in transit than from a spill during the controlled conditions of unloading at the Avon Terminal. Most tanker spills/accidents that occur in transit are larger spills that cannot be quickly contained, and would result in significant and unavoidable impacts.

As presented in Impact OS-4 in Section 4.1, Operational Safety/Risk of Accidents, the probability of a release in the SFBE from a tank vessel transiting to the Avon Terminal is equivalent to one spill every 4,500 years. Modeling results presented in Impact OS-4 and in Appendix B indicate that if a release occurs, probabilities of exceeding the level of concern (approximately 50 gallons present in 1 square nautical mile, as pre-defined in the modeling program) range from 75 to 100 percent along the shoreline east and west of the Carquinez Bridge in both summer and winter, with higher probabilities of exceedance extending into San Pablo Bay and Suisun Bay during winter months. While the modeling is useful and appropriate for demonstrating the extent to which a spill of this magnitude may be capable of spreading, it is based on the specific modeled spill scenario, including location. Vessels en route to the Avon Terminal could potentially experience an accidental spill at any location along their transit route. Based on the degree of spreading demonstrated by modeling, vulnerable resources in any area of the SFBE and eastward to the Antioch area could potentially be impacted by a potential spill.

All tanker companies operating within California waters must demonstrate by signed contract to the USCG and CDFW that they have the necessary response assets to respond to a worst-case release, as defined under federal and State regulations. While Tesoro does not have legal responsibility for tankers it does not own, it does have the responsibility to participate in improving general response capabilities.

Mitigation Measure: MMs OS-4a, USCG Ports and Waterways Safety Assessment (PAWSA) Workshops and OS-4b, Spill Response to Vessel Spills apply to this impact.

Rationale for Mitigation MMs OS-4a and OS-4b would reduce the probability of an oil spill and the resulting effects on the surface or marine waters. The identified measures would enhance planning and preparedness to respond to the oil spill, and would reduce both the potential oil spill size and the potential for oil spills. The measures would also increase the effectiveness of an oil spill cleanup effort.

Residual Impacts Even with the implementation of MMs OS-4a and OS-4b, the consequences of a spill could result in significant, adverse impacts on the SFBE or outer coast. No additional feasible mitigation measures have been identified that would further reduce the potential for significant impacts.

Impact WQ-11: Re-direct flood flows within the 100-year flood plain, or expose people, structures, or facilities to significant risk from flooding. (Less than significant.)

The Federal Emergency Management Agency (FEMA) is responsible for administering the National Flood Insurance Program (NFIP), which provides flood insurance for properties located within floodplains. The NFIP requires properties located within mapped 100-year floodplains to purchase flood insurance (FEMA 2009). A 100-year flood refers to a flood level with a 1 percent or greater chance of being equaled or exceeded in any given year. FEMA Flood Insurance Rate Maps, Community Panel Number 06013C0090F, show that the Avon Terminal and the onshore Project area are within the designated 100-year floodplain.

The new Berth 1A and the approachway would add impervious surfaces, and therefore, potentially increase runoff volumes from the Avon Terminal. Additionally, the surface stormwater flow may be altered, which could result in an increased potential for flooding. Rainfall events that result in runoff volumes exceeding the capacity of the storm drains could also cause temporary, localized ponding until the runoff drains away. The proposed concrete roadway/walkway in Areas C and D would create approximately 7,470 square feet of new impervious surface. As such, the small increase of impervious area from the new approachway would not impede or redirect flood flows off site, compromise the use of the stormwater management system, or notably increase the risk of flooding at the Project site or on surrounding properties.

Tesoro does not anticipate that any modifications would be made to existing stormwater drainage systems. The existing stormwater management system is capable of accommodating the proposed stormwater runoff. The Avon Terminal would have two 1,125-gallon slops tanks (one existing and one proposed) to collect incidental spills and stormwater runoff. The existing slops tank is equipped with a high-level alarm system and the proposed tank on Berth 1A would be designed with a similar alarm system. In the event the dock-mounted slops tanks exceed capacity, stormwater may be routed to the onshore 15,000-barrel slops tank.

In addition to storm events, the Project area has the potential to become inundated due to catastrophic tidal flooding. The coastline of Suisun Bay is susceptible to potential tsunami or seiche inundation. However, projected wave height and tsunami run-up is expected to be small in the interior portions of the SFBE (Borreo et al. 2006). Tsunamis and seiches are rare, and there is not enough data in the historical record to adequately derive a reoccurrence period. Per MOTEMS, Tesoro maintains a Tsunami Response Plan that considers the possible effect of tsunamis on the Avon Terminal. To ensure a constant watch for a potential tsunami, the Avon Marine Terminal Shipping Supervisor and Marine Superintendent/Port Captain, and the Refinery Shift Superintendent are subscribed to the Pacific Tsunami Warning Center email warning notification system

(Tesoro 2013a). The Tsunami Response Plan outlines steps to be taken by the Refinery and Avon Terminal personnel if notified about a tsunami. Under the worst-case scenario, evacuation and shut down of the Avon Terminal are required.

As described in Section 2.4.16, Tesoro conducts hydrographic surveys at the Avon Terminal on a quarterly basis, and conducts underwater and above-water structural MOTEMS inspections. These surveys and inspections would, over time, detect increased water depth and potential corrosion at higher-elevation splash zones. The Avon Terminal Operating Limit diagrams would be re-evaluated when subsequent MOTEMS audits deem the sea-level rise to be significant enough to impact operations. Tesoro has and will continue to consider sea-level rise in Avon Terminal assessments.

Mitigation Measure: No mitigation required.

Impact WQ-12: Degrade water quality as a result of discharges of firewater during fire system testing. (Less than significant.)

As part of the fire protection program at the Avon Terminal, Tesoro would have to periodically discharge water during testing or maintenance of the fire protection system. Firewater runoff has the potential to contain a variety of harmful substances, including fire suppressant foams, fire retardant chemicals, and other chemicals. Firewater runoff can also carry with it numerous contaminants and solids that may enter groundwater or a waterbody and potentially pose a health risk or cause ecological harm. At the Avon Terminal, the source of water flow for testing is Suisun Bay water in the immediate vicinity of the Avon Terminal. The fire water pump (vertical deep-well pump) takes suction on bay water, which is then discharged back into the bay via a hydrant located on at the Avon Terminal. The water flow is measured at the hydrant, which takes a few minutes. The amount of bay water used during the duration of the test period is approximately 5,000 gallons. The firewater distribution system is equipped with a flow test loop, with indication and block valves that route back to the source and a discharge block valve preventing opportunities for contamination to occur while flow testing is occurring. Once fire system testing is completed, the water is discharged directly back into the bay.

At the Avon Terminal, Aqueous Film- Forming Foam (AFFF) is utilized at either 1 percent or 3 percent foam concentrate. All modern AFFF agents (except for some produced in China) contain telomer-based fluorosurfactants. (Fire Fighting Foam Coalition [FFFC] 2014). Telomer-based AFFF agents are considered the most effective foams currently available to fight flammable liquid fires. Telomer-based foams are not made with any chemicals that are currently considered by environmental authorities to be persistent, bioaccumulative, and or toxic (FFFC 2014). The foam suppression system at the Avon Terminal is static and available for use in the case of a fire; flow testing is not required. The metal tanks that store the AFFF are compatible with the foam contained within and no flushing or purging is required. The intentional release of AFFF would only occur in the event of a fire.

The impacts of firewater discharge due to testing are considered to be less than significant because the firewater is contained within a flow test loop, preventing the exposure to contaminants. Additionally, the foam suppression system does not require the release of AFFF during testing. Testing of fire suppression systems is a necessary safety precaution at the Avon Terminal. The potential for fire during continued operations and the Avon Terminal's response capability are discussed in Section 4.1, Operational Safety/Risk of Accidents, Impact OS-3.

Mitigation Measure: No mitigation required.

Renovation

Impact WQ-13~~2~~: Degrade surface water quality as a result of onshore MOTEMS renovation activities. (Potentially significant.)

Spills from Renovation-related Materials

Renovation activities could result in degradation of surface water quality in local streams by reducing the quality of stormwater runoff. During Project renovation, lubricants, fuels, and other chemicals used for construction machinery could be spilled during normal usage or during refueling. Spilled material could run off into nearby watercourses. Spills associated with construction equipment, such as oil/fuel drips or gasoline/diesel spills during fueling, typically involve small volumes that can be effectively contained within the work area and cleaned up immediately. Fuel, oil, and chemical storage would be performed off site or sited on an impervious base within an appropriately sized containment area. The use of standard BMPs—such as drip pans, contained refueling areas, regular inspection of equipment and vehicles, and immediate repairs of leaks—would reduce the potential for material from onshore demolition and renovation activities to be transported off site and enter surface waters or Suisun Bay.

Cast-in-place Concrete and Concrete Wash

As detailed in Section 2.0, Project Description, concrete for the new sections of the approachway would be precast to the extent possible. However, the Project would also involve some cast-in-place concrete (approximately 470 cy). The precast panels would be manufactured off site, reducing the potential for impacts on water quality. The use of cast-in-place concrete can potentially have adverse effects on the environment. Fresh concrete is very alkaline (with a pH near 12) and corrosive, and can result in potentially significant impacts on surface waters (USEPA 2011). The safe pH range for aquatic life habitats is 6.5 to 9 for fresh water and 6.5 to 8.5 for salt water. The use of wet concrete and cement within or near any watercourse would be carefully controlled to minimize the risk of any material entering the water.

Additionally, cast-in-place concrete can generate washwater (washout water), a slurry that contains fine particles and a high pH. Concrete washwater is toxic to fish and aquatic life, and can contaminate drinking water supplies. Improper disposal of washwater may obstruct storm drain pipes, which could potentially result in flooding. Rainfall may cause uncovered concrete washout containers to overflow and transport the washwater to surface waters. Stormwater polluted with concrete washwater has the potential to percolate through the soil and alter the soil chemistry, inhibit plant growth, and contaminate the groundwater. Impacts on groundwater from renovation-related activities are further discussed in Impact WQ-13. The Project would minimize the use of cast-in-place concrete by utilizing precast concrete to the greatest extent possible. The limited use of cast-in-place concrete would decrease the potential impacts of washwater. To further reduce the impacts on water quality, the concrete batching plant would be washed out and cleaned off site or in contained areas, as far from watercourses as practical.

Wetlands

The Project may result in a transitory disturbance to surrounding wetland habitats and associated plant and wildlife species due to vegetation clearing and operation of heavy equipment related to onshore renovation and demolition activities. Figure 4.2-7 in Section 4.2, Biological Resources, shows the wetlands within the Project vicinity.

The Project would minimize impacts on wetlands by avoiding designated wetlands and sensitive areas. Tesoro does not anticipate that the Project would require heavy equipment to be moved through wetland areas during renovation. Temporary construction crane access pads would be used to access renovation areas. Cranes would be used to lift the existing railway and timber decking off of the existing timber pile caps in large sections. A marine barge or flatbed trailer would remove trackway materials from the site or move them to the laydown area for processing and off-site disposal. Impacts on wetlands and MMs are further discussed in Section 4.2, Biological Resources, Impact BIO-19. As discussed in MM BIO-19a, on-site staging areas would be located away from designated wetlands. After proposed renovation activities have been completed, implementation of MM BIO-19b would ensure that marshlands are restored. Tesoro shall retain a qualified restoration specialist or botanist to develop a revegetation and restoration plan that describes how marsh habitats shall be enhanced or recreated and monitored over a minimum period of 5 years (further described in BIO-19b). The implementation of MMs BIO-19a and BIO-19b would reduce impacts on wetlands to less-than-significant levels.

<u>Soil Disturbance and Stormwater Runoff</u>

Project renovation activities that cause soil disturbance can accelerate the rate of erosion. Clearing existing vegetation may reduce the surface roughness and infiltration rate, thereby increasing runoff velocities and volumes, which in turn increases erosion and sedimentation of waterways, resulting in a degradation of water quality. If eroded soil were to come in contact with stormwater, runoff may have increased levels of turbidity, and subsequently, additional sedimentation could potentially occur in surface waters and Suisun Bay. Effective erosion and sedimentation control requires that the soil surface be protected from the erosive forces of wind, rain, and runoff, and that eroded soil is controlled on site. Erosion controls, such as geomembrane fabric, would be used during renovation activities to reduce runoff of soils and associated contaminants. Geomembrane fabric is a permeable textile material that is used with a base (soil, rock, earth, etc.) to increase stability and decrease wind and water erosion. It allows the base to shed water, and prevents the soil around it from working its way into the base. No soil is anticipated to be removed during the trackway removal or the roadway construction process. Staging and stockpile areas would be designed and constructed as required by applicable permits.

As discussed in Section 4.3.2.2, projects that disturb 1 or more acre of soil are required to obtain coverage under the Construction Storm Water General Permit (NPDES General Permit No. CAS000002, Order No. 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation. Although a section of the gravel road on the east side of the Ox Pond that would receive heavy construction traffic is greater than 1 acre, this would not meet the definition of “disturb,” as described above. In addition, during renovation, all of the stormwater runoff from the approachway and other renovation areas would be contained within bermed areas and would not drain off site. Therefore, a Construction Storm Water General Permit and a construction SWPPP would not be required.

The Project would incorporate acceptable BMPs for control of sediment and stabilization of erosion in the Project area. BMP provisions may include:

- implementation of hazardous or contaminated soil-handling procedures, such as placing materials into lined bins and covering soils with plastic sheeting;
- locating staging and soil stockpile areas away from streams and designated wetlands;
- refueling equipment within a designated refueling containment area away from the shoreline, streams, or any designated wetland areas;

- inspecting all vehicles and/or equipment daily for fluid leaks before leaving the staging area, and repairing any leaks before the vehicle and/or equipment resumes operation;
- utilizing drip pans under stationary equipment, during refueling, and when equipment is maintained;
- deploying applicable sediment and runoff-control measures, such as wattles and geotech fabric;
- minimizing new land disturbance during the rainy season and avoiding disturbance of sensitive areas (e.g., natural watercourses and designated wetlands);
- providing temporary stabilization of disturbed soils whenever active renovation is not occurring on a portion of the site;
- delineating a site perimeter to prevent disturbing areas outside of the Project limits;
- implementing handling and storage procedures for water generated during renovation dewatering;
- implementing hazardous materials storage, containment, and control measures, such as secondary containment berms;
- diverting upstream run-on safely around or through Project renovation areas; and
- monitoring to verify that BMPs are implemented and kept in good working order.

Renovation activities are not expected to significantly degrade stormwater quality or surface water quality; therefore, potential impacts would be less than significant.

Mitigation Measure: MMs BIO-19a, Avoidance and Minimization Measures for Impacts to Wetlands and Waters and BIO-19b, Revegetation and Restoration Plan apply to this impact.

Rationale for Mitigation Implementation of MMs BIO-19a and BIO-19b would reduce short-term renovation-related impacts on wetlands by protecting biologically sensitive areas in the immediate Project area, providing for construction supervision, and requiring restoration and monitoring of impacted habitats. After implementation of these MMs, impacts on wetlands from short-term restoration activities would be mitigated to a less-than-significant level.

Impact WQ-14~~3~~: Degrade groundwater quality as a result of onshore MOTEMS renovation activities. (Less than significant.)

Lubricants, fuels, and other chemicals used for construction machinery could be spilled during normal usage or during refueling. Spilled material in unpaved areas could infiltrate the soil column and percolate to groundwater. Most of the contaminants expected to be involved in the renovation, however, would be heavier-grade fuels and oils that are not very mobile in the subsurface; these contaminants tend to sorb onto the soil matrix and are slow to infiltrate. Past site investigations and groundwater monitoring indicate that the groundwater elevation in the Project area is shallow, at approximately 0.51 foot mean sea level (msl) to 12.54 feet msl, with an average groundwater elevation of 3.25 feet msl.

As described in Section 4.3.1.3, a cluster of four water supply wells is located approximately 1.75 miles northwest and hydrologically upgradient of the Project area. Given the distance from and orientation to the Project area, identified water supply wells are not expected to be affected. The Ygnacio Valley Groundwater Basin, which underlies the Project, has potential beneficial uses listed in the Basin Plan, but no existing beneficial uses.

During the renovation period, it would be required that an SPCC Plan be prepared for the Contra Costa County Department of Health Services if a total of 1,320 gallons of petroleum would be stored on-site in aboveground tanks or in containers with a storage capacity equal to or greater than 55 gallons (40 CFR 112.7). At no time during Project renovation would renovation contractors store greater than 1,320 gallons of oil. Mobil fueling would be provided, on an as-needed basis, for construction equipment. Therefore, an SPCC Plan would not be required for the Project.

Mitigation Measure: No mitigation required.

Impact WQ-154: Degrade surface water quality as a result of offshore MOTEMS renovation activities. (Potentially significant.)

Spills from Renovation-related Materials

The use and refueling of derrick barges, tug boats, and construction equipment over water during the installation of Berth 1A and the removal of Berth 5 could result in the accidental release of renovation-related chemicals (e.g., lubricants and solvents) and fuel from construction vessels operating in Suisun Bay and the Carquinez Strait. The potential for fuel spills would be minimized because lubricants and solvents would be stored in approved containers, and the refueling would normally take place at approved dockside facilities. With the relatively small volumes involved and spill prevention measures required by regulations, the probability of a substantial release occurring from construction vessels is low. Furthermore, spill response capabilities currently in place and required under existing regulations would be adequate to mitigate reasonably foreseeable spills from construction vessels. Further discussion is provided under Impact OS-1 in Section 4.1, Operational Safety/Risk of Accidents.

Creosote-treated Timber Piles and Sediment Disturbance

Renovation activities would include installation of new piles for Berth 1A. This work would take place over an approximate 6-month period. The new piles would be corrosion-resistant, hollow steel piles, and because they are hollow, they would be expected to displace/disturb relatively minor amounts of sediment. New steel piles would be installed using a vibratory hammer or impact hammer. No removal or disposal of sediment associated with pile driving is anticipated.

As described in Section 2.0, Project Description, the Berth 5 facility includes a total of 390 piles. Of these, 168 are precast, steel-reinforced concrete piles that provide the primary support for the deck, 60 are steel "H" piles that provide lateral support for the wharf, and 163 are creosote-treated timber fender piles. The concrete piles are 18 inches square in section, and the steel batter piles are HP 14 inches by 73 inches (refers to a beam with an “H” cross-section). Approximately 70 timber tiles support the transition structure between Berth 1 and Berth 5. Piles would be entirely removed, if possible. Because of the embedded depth and age of the timber piles, which have a high probability of breaking during removal attempts, it may not be feasible to completely remove them and they may be sheared off below the mudline instead. Tesoro proposes that the standard depth for pile removal during demolition of the Avon Terminal be at least 3 feet below the current mudline. Without maintenance dredging, it is anticipated that pile stubs would remain buried under at least 2 feet of sediment. Whether or not scour would reduce this cover would be monitored over time. The general practice for pile removal in the San Francisco Bay Area is removal to at least 3 feet below the mudline. This practice is appropriate in areas where scour is not expected to occur and is sufficient to ensure that the pile stubs remain buried within the sediments and do not have the potential to protrude above the seafloor, posing a potential hazard to navigation (CSLC 2013a).

Creosote-treated timber piles removed during the demolition of Berth 5 could potentially cause adverse environmental impacts. Creosote, a mixture of hydrocarbon compounds, was historically used to protect wood products. Creosote can break down and could leach out of the wood and accumulate in the environment to harmful levels in the surrounding water column and sediment. The CSLC and other agencies, including the SFBRWQCB, prohibit the use of creosote-treated wood in new construction of docks and other aquatic structures that require pilings. The Berth 5 timber pile removal would occur using one of two methods: vibratory hammer or barge-mounted crane (refer to Section 2.0, Project Description). During the removal process, chips or shavings of creosote-treated wood have the potential to be released into Suisun Bay, either from friction from the equipment or as a result of the pile breaking. If timber pile breakage occurs using either method, the actual breakage depth for each timber pile would be verified by measuring the length between the mud and the bottom of the broken segment of timber pile that is brought to the surface. To minimize introduction of creosote to the water column, the timber stub would not be "chewed off" with a clam shell dredge or other equipment.

During pile removal, installation, and renovation activities, particulate-bound pollutants could become remobilized and/or dissolved in the water column, and could result in potential water quality degradation. However, the contaminants present in sediment in the surrounding area (metals, PAHs, PCBs, and pesticides) tend to sorb strongly onto sediment/soil and are not readily mobilized. Additionally, as illustrated in Tables 4.3-5 and 4.3-6, chemical concentrations in sediment in Suisun Bay and in the proposed dredging area are generally lower than ambient San Francisco Bay sediment concentrations.

Biofouling from Construction Vessels

As discussed in Impact WQ-5 and Impact BIO-9, biofouling can have significant adverse impacts on the local water quality. Renovation-related vessels, such as cranes and barges, are generally considered some of the highest risk vessel types because of their operational profile (slow moving and stationary for long periods). Because fuel efficiency is not a critical factor, construction barges are not typically cleaned or coated with anti-fouling paints, which further increases the risk of biofouling. In addition to MM WQ-14, below, MM WQ-5: Biofouling Regulations and Standards and MM BIO-17d, Minimization of Creosote Release would minimize the risk of biofouling.

MM WQ-154: Utilize Local/Regional Barges and Vessels during Renovation. During renovation activities, Tesoro Refining and Marketing Company, LLC shall utilize barges and other vessels originating with the local vicinity or the Pacific Coast Region, to the extent practicable.

Rationale for Mitigation The effects of sediment suspension during pile removal and installation are expected to have little effect on water quality due to the low mobility and low concentrations of contaminants. The implementation of MM BIO-17d would reduce the potential impacts from sediment disturbance and accidental release of pollutants to less-than-significant levels. The risk of introduction of new NAS would be mitigated to a less-than-significant level with the implementation of MMs WQ-5 and WQ-14. Adherence to biofouling regulations would minimize the risk of new introductions of NAS, and using local vessels for renovation activities would prevent new species from being introduced from different areas.

4.3.4.2 Alternative 1: No Project

Impact WQ-16~~5~~: Degrade water quality during decommissioning of the Avon Terminal. (Less than significant.)

This alternative would eliminate the water quality impacts associated with operations at Avon Terminal. Under the No Project alternative, the lease would not be renewed and the existing Avon Terminal would be decommissioned, with all of its components abandoned in place or removed. The effects on water quality during decommissioning, such as sediment disturbance or risk of leaks from construction equipment, would result in temporary, adverse, but less-than-significant impacts on water quality.

Mitigation Measure: No mitigation required.

Impact WQ-17~~6~~: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines. (Significant and unavoidable.)

This alternative assumes that the Avon Terminal lease would not be extended. Refinery operations would be dependent on crude oil receipts through various non-marine sources to meet regional refining demands. Land-based transportation options for crude transfer could include rail cars and trucks, and pipeline connections to other San Francisco Bay Area marine terminals. An uncontained spill or substantial leak from land-based transport may result in a significant impact on water quality. A subsurface pipeline release of crude oil could also migrate upward through preferential soil pathways and appear at the surface, where it would pool and eventually flow down gradient in the direction of Suisun Bay and Carquinez Strait.

Tesoro would implement the contingency planning and response measures for oil releases discussed in Impact WQ-9 and Section 4.1, Operational Safety/Risk of Accidents. These measures would protect against spills to the extent feasible. However, even with the implementation of contingency planning and response measures, an oil release during transfer, particularly from a pipeline, could spread over a large area and impact water quality. In such a case, impacts would be significant and unavoidable.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under the California Environmental Quality Act (CEQA).

Impact WQ-18~~7~~: Degrade water quality due to stormwater runoff during construction. (Less than significant.)

Pipeline and rail delivery may require construction of new pipelines and/or new rail lines. During construction, lubricants, fuels, and other chemicals used for construction machinery could be spilled during normal usage or during refueling. Spilled material could run off into nearby watercourses or storm drains, resulting in a significant, adverse impact. Project construction activities would involve trenching, grading, and excavation. Such soil-disturbing activities could cause erosion. If eroded soil were to come in contact with stormwater, runoff may have increased levels of turbidity, and subsequently, additional sedimentation could potentially occur in nearby waterbodies.

Runoff of sediment and contaminants during construction activities would be minimized through compliance with the State General Permit for Discharges of Stormwater Associated with Construction Activity (Water Quality Order 2009-0009-DWQ) and a project-specific SWPPP. Standard stormwater BMPs—such as erosion controls, soil barriers, sedimentation basins, site contouring, and others—would be used during construction activities to minimize runoff of soils and associated contaminants. As a result of BMP implementation and stormwater management, construction would not be expected to notably degrade stormwater quality or receiving water quality, and potential impacts would be less than significant.

Mitigation Measure: No mitigation required.

4.3.4.3 Alternative 2: Restricted Lease Taking Avon Terminal Out of Service for Oil Transport

Impact WQ-19~~8~~: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines. (Significant and unavoidable.)

Refer to Impact WQ-17~~6~~.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA.

Impact WQ-20~~19~~: Degrade water quality due to stormwater runoff during construction. (Less than significant.)

Refer to Impact WQ-18~~7~~.

Mitigation Measure: No mitigation required.

4.3.5 CUMULATIVE IMPACT ANALYSIS

Impact CUM-WQ-1: Cause contaminant impacts on San Francisco Bay Estuary water quality. (Significant and unavoidable).

The water quality of the SFBE has been degraded by inputs of pollutants from a variety of sources, including point sources such as municipal wastewater and industrial discharges, and nonpoint sources such as urban and agricultural runoff; riverine inputs;

dredging and dredge material disposal; marine vessel inputs; and inputs from air pollutants, spills, and accidents. In general, stormwater runoff is responsible for the greatest mass loadings of most contaminants (Davis et al. 2000).

The sources of SFBE contaminants and the levels of contamination are discussed in detail in Section 4.3.1. The identified stressors or pollutants in Suisun Bay and Carquinez Strait, pursuant to the CWA Section 303(d) list, include pesticides, dioxins/furans, mercury, NAS, nickel, PCBs, and selenium. Any contribution of these contaminants from Avon Terminal operations could result in a significant, adverse cumulative impact.

Of this list, only NAS have been identified as potentially degrading water quality due to Avon Terminal operations. As discussed previously in Impacts WQ-3 and WQ-5, NAS can be introduced in ballast water and via vessel biofouling. As discussed in Impact WQ-3, Tesoro would not allow the discharge of non-segregated ballast water to the SFBE. Non-segregated ballast water is considered a hazardous waste in California and cannot be discharged into the SFBE or coastal waters. In the event of an emergency, non-segregated ballast water can be pumped onshore to tankage for holding, treating, and isolation prior to treatment at the Refinery WWTP. Finally, as discussed in MM WQ-5 and MM BIO-9a, Tesoro would ensure that vessels calling at the Avon Terminal are informed of applicable regulations and standards associated with the prevention of vessel biofouling, and prior to allowing berthing at the Avon Terminal, Tesoro would confirm with vessels that they are in compliance with MISA. Although vessels that call at the Avon Terminal are required to comply with federal and State regulations, compliance with the current standards is not enough to ensure full mitigation of this impact. Thus, significant cumulative impacts would occur even with implementation of MMs.

Though no contaminants associated with anti-fouling paints are on the 303(d) list for Suisun Bay or Carquinez Strait, anti-fouling paints are a significant concern for water quality in the SFBE. As discussed in Impact WQ-3, tankers visiting the Avon Terminal may contribute to water contamination through the use of anti-fouling paints, which contain copper and zinc, both of which are highly toxic to aquatic species. MM WQ-5 requires all vessels that visit the Avon Terminal to comply with the 2001 International Maritime Organization Convention on the Control of Harmful Anti-fouling Systems on Ships and other applicable regulations. The continuing operation of the Avon Terminal would contribute cumulatively to copper and other biocides. Due to the high toxicity of these biocides, contribution from the vessels calling at Avon Terminal could be potentially significant.

Mitigation Measure: MM BIO-9a, Marine Invasive Species Act Reporting Forms; MM WQ-3, Advise Vessels of the Coastal Ecosystems Protection Act and Associated Regulations; and MM WQ-5, Biofouling Regulations and Standards apply to this impact.

Rationale for Mitigation Implementing regulatory requirements with industry BMPs can lower the risk and effects of contaminated stormwater runoff, anti-fouling paints, and NAS.

Residual Impacts The Project's contribution to cumulative impacts would remain significant and unavoidable.

Impact CUM-WQ-2: Cause re-suspension of sediment. (Less than significant.)

Dredging activities and propeller wash are likely to disturb seafloor sediments. However, increases in water column turbidity would be temporary and localized, and would be unlikely to compound increases in turbidity that may arise from other projects in the region. If sediments are contaminated by legacy pollutants, their disturbance can lead to increases in contaminant concentrations within the water column. The effects of dredging and dredged material disposal on water quality are regulated and subject to acquisition of a dredging permit prior to dredging. Potential cumulative impacts on water quality from the disturbance of contaminated sediments can be fully eliminated by testing for and confirming the absence of elevated pollutant concentrations within sediments prior to conducting the work.

Mitigation Measure: No mitigation required.

Impact CUM-WQ-3: Degrade water quality due to releases from vessels in transit in the San Francisco Bay Estuary or along the outer coast. (Significant and unavoidable.)

As discussed in Impact WQ-10, a major oil spill from a vessel in transit in the SFBE or along the outer coast would have a significant, adverse impact on water quality. The incremental effects of such a vessel transiting to or from the Avon Terminal would also be cumulatively significant. Section 4.1, Operational Safety/Risk of Accidents, Impact CUM-OS-1, presents a discussion of cumulative oil spill risk. Impacts would be minimized to the extent feasible with MMs OS-4a and OS-4b (refer to Section 4.1, Operational Safety/Risk of Accidents), but the risk cannot be eliminated.

Mitigation Measures: MMs OS-4a, USCG Ports and Waterways Safety Assessment (PAWSA) Workshops and OS-4b, Spill Response to Vessel Spills apply to this impact.

Rationale for Mitigation Implementing regulatory requirements with industry BMPs can lower the risk and effect of an accidental oil spill.

Residual Impacts Impacts of large spills would remain significant.

4.3.6 SUMMARY OF FINDINGS

Table 4.3-11 includes a summary of anticipated impacts on water quality and associated MMs.

Table 4.3-11: Summary of Water Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Proposed Project	
WQ-1: Degrade water quality as a result of maintenance dredging.	No mitigation required
WQ-2: Degrade water quality as a result of sediment disturbance from vessel maneuvers.	No mitigation required
WQ-3: Degrade water quality by the discharge of ballast water.	WQ-3: Advise vessels of the Coastal Ecosystems Protection Act and Associated Regulations (Also refer to MMs WQ-5, BIO-9a, and BIO-9b)
WQ-4: Degrade water quality as a result of discharge of cooling water, sanitary wastewater, bilge water, or other liquid wastes.	No mitigation required
WQ-5: Degrade water quality as a result of vessel biofouling.	WQ-5: Biofouling Regulations and Standards (Also refer to MM BIO-9a)
WQ-6: Degrade water quality due to anti-fouling paints used on vessel hulls.	WQ-6: Tributyltin (TBT) Ban Requirements
WQ-7: Degrade water quality as a result of cathodic protection on vessels.	No mitigation required
WQ-8: Degrade water quality as a result of stormwater runoff from the Avon Terminal.	WQ-8: Update Existing Stormwater Pollution Prevention Plan (SWPPP)
WQ-9: Degrade water quality as a result of oil leaks and spills during unloading.	Refer to MMs OS-1a, OS-1b, and OS-1c
WQ-10: Degrade water quality due to releases from vessels in transit in the San Francisco Bay Estuary or along the outer coast.	Refer to MMs OS-4a and OS-4b
WQ-11: Re-direct flood flows within the 100-year flood plain, or expose people, structures, or facilities to significant risk from flooding.	No mitigation required
WQ-12: Degrade water quality as a result of discharges of firewater during fire system testing.	No mitigation required
WQ-13~~2~~: Degrade surface water quality as a result of onshore MOTEMS renovation activities.	Refer to MMs BIO-19a and BIO-19b
WQ-14~~3~~: Degrade groundwater quality as a	No mitigation required

Impact	Mitigation Measure(s)
result of onshore MOTES renovation activities.	
WQ-15~~4~~: Degrade surface water quality as a result of offshore MOTES renovation activities.	WQ-15~~4~~: Utilize Local/Regional Barges and Vessels during Renovation (Also refer to MMs WQ-5 and BIO-17d)
Alternative 1: No Project	
WQ-16~~5~~: Degrade water quality during decommissioning of the Avon Terminal.	No mitigation required
WQ-17~~6~~: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA
WQ-18~~7~~: Degrade water quality due to stormwater runoff during construction.	No mitigation required
Alternative 2: Restricted Lease Taking Avon Terminal Out of Service for Oil Transport	
WQ-19~~8~~: Degrade water quality due to accidental spills from rail cars, trucks, and/or pipelines.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA
WQ-20~~19~~: Degrade water quality due to stormwater runoff during construction.	No mitigation required
Cumulative Impacts	
CUM-WQ-1: Cause contaminant impacts on San Francisco Bay Estuary water quality.	Refer to MMs WQ-3, WQ-5, and BIO-9a
CUM-WQ-2: Cause re-suspension of sediment.	No mitigation required
CUM-WQ-3: Degrade water quality due to oil releases from vessels in transit in the San Francisco Bay or along the outer coast.	Refer to MM OS-4a and OS-4b

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