# 3.10 HYDROLOGY AND WATER QUALITY

This section analyzes the surface water and groundwater resources of the Bay Area. Stormwater runoff, flooding, and inundation hazards are also addressed in this section. For a discussion of water supply impacts, including drought, see Section 3.14, "Public Utilities and Facilities."

Comments received in response to the Notice of Preparation (NOP) for this EIR expressed concerns about the effect of additional impervious surfaces on groundwater recharge areas and groundwater availability. These issues are addressed in the impact discussions below. Comments were also received regarding the effects of flooding related to sea level rise. For a discussion of sea (and bay) level rise impacts, see Section 3.6, "Climate Change, Greenhouse Gases, and Energy."

The CEQA Guidelines note that comments received during the NOP scoping process can be helpful in "identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating from detailed study issues found not to be important" (CEQA Guidelines Section 15083). Neither the CEQA Guidelines nor the statutes require a lead agency to respond directly to comments received in response to the NOP, but they do require that they be considered. Consistent with these requirements, the comments received in response to the NOP have been carefully reviewed and considered by MTC and ABAG in the preparation of the impact analysis in this section. Appendix B includes all NOP comments received.

## 3.10.1 Environmental Setting

### CLIMATE

Climatic conditions in the Bay Area are generally characterized as Mediterranean with moist, mild winters and hot, dry summers. However, the region's varied topography creates several microclimates dependent upon elevation, proximity to the San Francisco Bay or coast, and orientation. As a result, stark climatic differences in temperature, rainfall amounts, and evapotranspiration can occur over relatively short distances. The Bay Area is largely governed by weather patterns originating in the Pacific Ocean, primarily by the southern descent of the Polar Jet Stream, which brings midlatitude cyclonic storms in winter. More than 90 percent of precipitation in the Bay Area falls between November and April. Bay Area lowlands (i.e., valley bottoms) receive an annual rainfall of about 15–20 inches in the South Bay and about 20–25 inches in the North Bay. Higher elevations in the region, particularly along the north- or west-facing slopes of the North Bay, may receive over 40 inches of rain per year. In the summer, the Hawaiian High Pressure cell over the northern Pacific creates mild and dry weather for the region. However, summer in the Bay Area is also known for its thick marine fog layer, which is brought into the bay by a diurnal westerly breeze formed by the strong pressure gradient between the hot Central Valley and the cooler coastal areas. This moist air is cooled to dewpoint when it crosses the cooler waters of the California Current near the coast. This advection process results in a thick fog forming just offshore, which is pulled eastward through gaps and passes into the Bay Area. Fog diminishes with distance inland from the bay (MTC and ABAG 2013). **Table 3.10-1** summarizes monthly and annual average precipitation for select sites throughout the Bay Area.

**Table 3.10-1: Average Monthly Precipitation, Selected Bay Area Sites**

| Site | Inches[1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| Fairfield (1950–2016) | 4.8 | 4.0 | 3.1 | 1.4 | 0.6 | 0.2 | 0.0 | 0.1 | 0.2 | 1.3 | 2.8 | 4.3 | 22.7 |
| Los Gatos (1983–2016) | 6.1 | 5.2 | 4.3 | 1.7 | 0.6 | 0.1 | 0.0 | 0.1 | 0.3 | 1.2 | 2.5 | 4.9 | 26.9 |
| Napa, State Hospital (1893–2016) | 5.1 | 4.4 | 3.4 | 1.7 | 0.7 | 0.2 | 0.0 | 0.1 | 0.3 | 1.4 | 3.0 | 4.5 | 24.7 |
| Oakland, Airport (1948–2016) | 3.7 | 2.7 | 2.6 | 1.4 | 0.4 | 0.2 | 0.0 | 0.1 | 0.2 | 1.1 | 2.5 | 3.1 | 18.0 |
| Redwood City (1906–2016) | 4.4 | 3.5 | 2.7 | 1.2 | 0.4 | 0.1 | 0.0 | 0.1 | 0.2 | 1.0 | 2.1 | 3.5 | 19.2 |
| Richmond (1950–2016) | 4.8 | 3.8 | 3.3 | 1.7 | 0.5 | 0.2 | 0.0 | 0.1 | 0.2 | 1.3 | 2.9 | 4.4 | 23.2 |
| San Francisco Oceanside (1948–2016) | 4.0 | 3.6 | 2.8 | 1.2 | 0.5 | 0.2 | 0.0 | 0.1 | 0.2 | 1.1 | 2.7 | 3.8 | 20.0 |
| San Rafael, Civic Center (1894–2016) | 8.1 | 6.5 | 4.7 | 2.0 | 0.7 | 0.2 | 0.0 | 0.1 | 0.4 | 1.9 | 4.1 | 6.8 | 35.6 |
| Santa Rosa/Sonoma (1998–2016) | 5.5 | 6.2 | 4.4 | 2.1 | 1.2 | 0.3 | 0.0 | 0.0 | 0.1 | 1.9 | 3.5 | 7.1 | 32.2 |

[1] Rounded to the nearest one-tenth of an inch.

Source: Western Regional Climate Center 2016

## REGIONAL HYDROLOGY

San Francisco Bay encompasses approximately 1,600 square miles and is surrounded by the nine Bay Area counties, of which seven border the bay. The San Francisco Bay is partially enclosed and is relatively shallow (USGS 2007). Median depth, based on mean sea level, varies from roughly 8 feet in San Pablo Bay to 36 feet in the central area of the bay near the Golden Gate Bridge. Much of the perimeter of the bay is shallow tidal mud flats, tidal marshes, diked or leveed agricultural areas, and salt ponds. The north lobe of San Francisco Bay is brackish and is known as San Pablo Bay. It is surrounded by Marin, Sonoma, Napa, and Solano Counties. Suisun Marsh is between San Pablo Bay and the Sacramento–San Joaquin Delta (Delta) and is the largest contiguous brackish marsh on the west coast of North America, providing more than 10 percent of California's remaining natural wetlands. The south and central lobes of San Francisco Bay are saltier than San Pablo Bay, as the marine influence dominates (DWR 2013).

The San Francisco Bay estuary system is one of the largest in the country and drains approximately 40 percent of California. Water from the Sacramento and San Joaquin Rivers of the Central Valley flows into what is known as the Delta region, then into the subbays, Suisun Bay and San Pablo Bay, and finally into the central area of the bay and out the Golden Gate strait. The Delta is a large triangle of interconnected sloughs and agricultural "islands" that form a key link in California's water delivery system. Some of the fresh water flows through the Delta and into the bay, but much is diverted from the bay for agricultural, residential, and industrial purposes, as well as delivery to distant cities of southern California as part of State and federal water projects.

The two major drainages, the Sacramento and San Joaquin Rivers, receive more than 90 percent of runoff during the winter and spring months from rainstorms and snowmelt. Other surface waters flow either directly to the bay or Pacific Ocean. The drainage basin that contributes surface water flows directly to the bay covers a total area of 3,464 square miles. The largest watersheds include the Alameda Creek (695 square miles), the Napa River (417 square miles), and the Coyote Creek (353

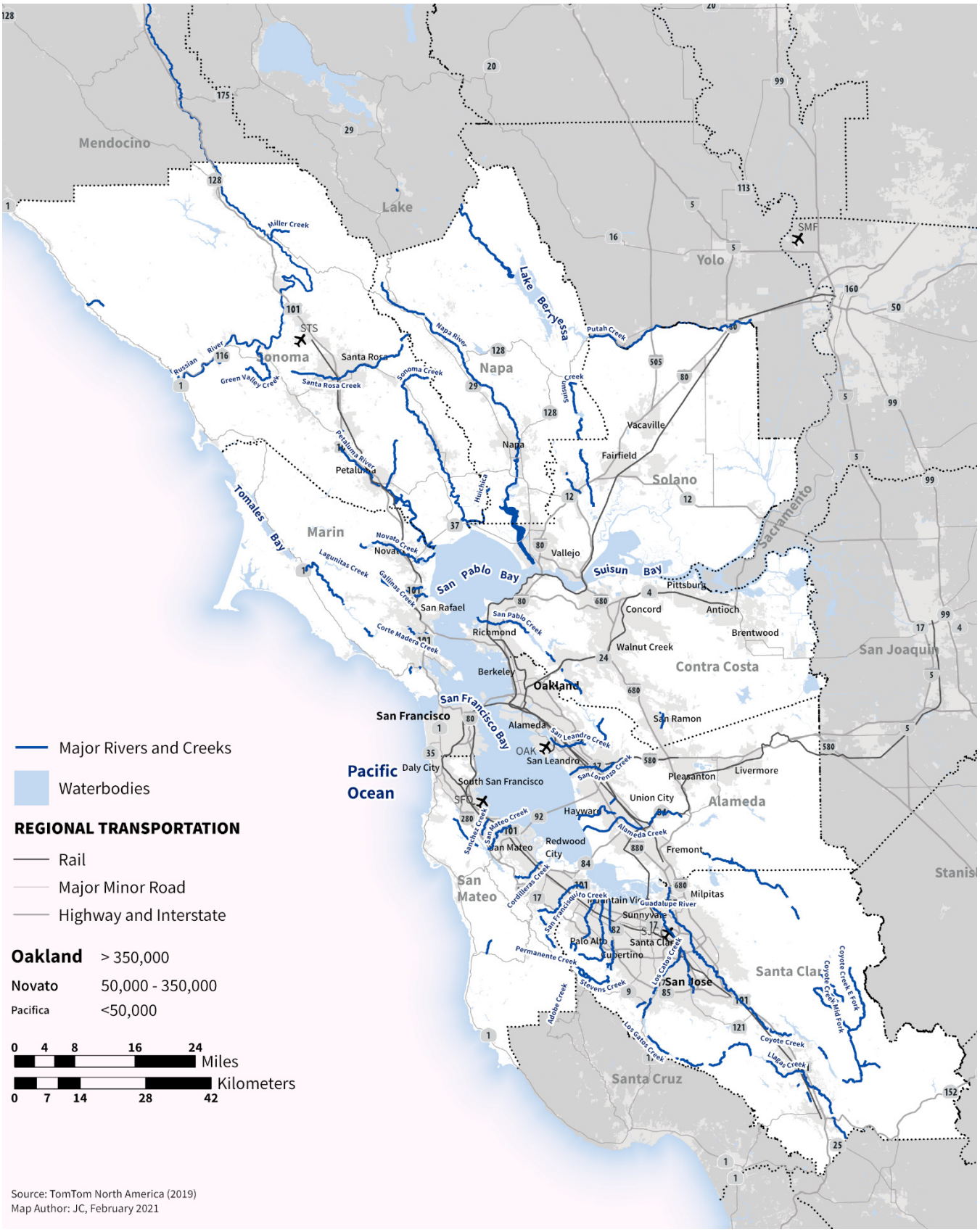
square miles) watersheds. The San Francisco Bay estuary includes deep-water channels, tidelands, and marshlands that provide a variety of habitats for plants and animals.

The interaction between Delta outflow and Pacific Ocean tides determines how far salt water intrudes into the Delta. The salinity of the water varies widely as the landward flows of saline water and the seaward flows of fresh water converge near the Benicia Bridge. The salinity levels in the central area of the bay can vary from near oceanic levels to one-quarter as much, depending on the volume of freshwater runoff, which depends on precipitation, reservoir releases, and upstream diversions. An average of 18.4 million acre-feet of fresh water flows out of the Delta annually into the bay (DWR 2013:SFB-11).

## Surface Waters

Surface waters in the Bay Area include freshwater rivers and streams, coastal waters, and estuarine waters. Many of the original drainages toward the San Francisco Bay have been channelized and put underground through urbanization of the area. Estuarine waters include the Delta from the Golden Gate Bridge to the Sacramento and San Joaquin Rivers, as well as the lower reaches of various streams that flow directly into the bay, such as the Napa and Petaluma Rivers in the North Bay and the Coyote and San Francisquito Creeks in the South Bay. Major water bodies, including creeks and rivers, in the Bay Area are presented in **Figure 3.10-1**. The following major rivers and streams, listed by county, are located in the Bay Area:

- Alameda County: Alameda Creek, San Leandro Creek, and San Lorenzo Creek;
- Contra Costa County: San Pablo Creek;
- Marin County: Corte Madera Creek, Lagunitas Creek, Gallinas Creek, Miller Creek, and Novato Creek;
- Napa County: Huichica Creek and Napa River;
- San Francisco County: none;
- San Mateo County: Cordilleras Creek, San Mateo Creek, and Sanchez Creek;
- Santa Clara County: Adobe Creek, Coyote Creek, Guadalupe River, Llagas Creek (drains to the Pacific Ocean via the Pajaro River), Los Gatos Creek, Permanente Creek, San Francisquito Creek, and Stevens Creek;
- Solano County: Green Valley Creek, Napa River, Putah Creek, and Suisun Creek; and
- Sonoma County: Petaluma River, Russian River, Santa Rosa Creek, and Sonoma Creek.




Source: TomTom North America (2019)
Map Author: JC, February 2021

**Figure 3.10-1: Major Rivers, Creeks, and Other Water Bodies**

## Groundwater

A groundwater basin is an area underlain by permeable materials capable of storing a significant amount of water. Groundwater basins are closely linked to local surface waters. As water flows from the hills toward San Francisco Bay, it percolates through permeable soils into the groundwater basins. The entire Bay Area region is divided into a total of 28 groundwater basins, and two of those basins (Napa-Sonoma Valley and Santa Clara Valley) are further divided into subbasins. **Table 3.10-2** includes groundwater basin sizes, by acres.

**Table 3.10-2: Groundwater Basin Sizes**

| Groundwater Basin | Basin Size (Acres) |
|---|---|
| Alexander Valley | 51,000 |
| Castro Valley | 2,900 |
| Clayton Valley | 2,300 |
| Downtown | 12,200 |
| Gilroy-Hollister Valley | 288,200 |
| Half Moon Bay Terrace | 14,500 |
| Islais Valley | 9,500 |
| Kenwood Valley | 8,400 |
| Livermore Valley | 111,200 |
| Lobos | 3,800 |
| Marina | 3,500 |
| Napa-Sonoma Valley | 213,100 |
| Novato Valley | 33,200 |
| Petaluma Valley | 74,800 |
| Pittsburg Plain | 18,700 |
| Sacramento Valley | 6,291,800 |
| San Joaquin Valley | 13,792,900 |
| San Pedro Valley | 1,100 |
| San Ramon Valley | 11,300 |
| San Rafael Valley | 1,400 |
| Santa Clara Valley | 578,000 |
| Santa Rosa Valley | 170,500 |
| South San Francisco | 3,500 |
| Suisun-Fairfield Valley | 216,600 |
| Sunol Valley | 26,500 |
| Visitacion Valley | 9,300 |
| Westside | 40,600 |
| Wilson Grove Formation Highlands | 140,700 |
| Ygnacio Valley | 24,900 |

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).
Source: Data compiled by MTC/ABAG in 2017

Groundwater is used for numerous purposes, including municipal and industrial water supply, in the Bay Area; however, it accounts for only about 5 percent of total water consumption. Although some of the larger basins (such as Santa Clara Valley, Napa-Sonoma Valley, and Petaluma Valley) can

produce large volumes of groundwater and generally have good water quality, many of the groundwater basins in the Bay Area are relatively thin and yield less water. Further, portions of the Bay Area have poor water quality as a result of past industrial uses or intrusion of brackish bay water. Because of water quality and available resources, water supply for much of the Bay Area is provided by imported water supplies through water conveyance facilities, such as the Hetch Hetchy Aqueduct, the Mokelumne Aqueduct, and the North and South Bay Aqueduct. A detailed discussion of water supply is included in Section 3.14, "Public Utilities and Facilities."

## SURFACE WATER QUALITY

The quality of surface water resources in the Bay Area varies considerably and is locally affected by point-source (i.e., emitted from a single point) and nonpoint-source (i.e., diffuse) discharges. Point sources, such as wastewater treatment effluent and industrial waste discharges, are often regulated and monitored to avoid adverse effects on water quality.

Nonpoint-source pollutants are transported into surface waters through rainfall, air, and other pathways. Nonpoint-source pollutants are the leading cause of water quality degradation in the region's waterways. Stormwater runoff is estimated to contribute more heavy metals to San Francisco Bay than direct municipal and industrial dischargers, as well as significant amounts of motor oil, paints, chemicals, debris, grease, and detergents. Runoff in storm drains may also include pesticides and herbicides from landscaping products and bacteria from animal waste. Most urban runoff flows untreated into creeks, lakes, and San Francisco Bay. This nonpoint-source runoff often carries pollutants, including copper from brake linings and lead from counterweights, that contribute heavy metals to local waters.

In addition, many of the region's creeks are channelized, culverted, or otherwise geomorphically altered, and the adverse effects on aquatic and riparian habitats, sediment transfer, and hydrology associated with these modifications can impair water quality. Water quality in the more rural areas of the region has also been affected by grazing and agriculture, confined animal facilities, on-site sewage systems, and land conversions. Coastal watersheds have been impaired because of sedimentation and habitat degradation. Other pollutant sources include upstream historic and current mining discharges and legacy pollutants that were historically emitted by industry or other human activities that are currently banned or have been substantially restricted. Examples include mercury, lead, polychlorinated biphenyls (PCBs), and dichlorodiphenyltrichloroethane.

The San Francisco Bay Regional Water Quality Control Board (RWQCB), the main agency charged with protecting and enhancing surface water and groundwater quality in the Bay Area, has classified the San Francisco Bay and many of its tributaries as impaired for various water quality constituents, as required by the Clean Water Act (CWA) (see Section 3.10.2, "Regulatory Setting," below). The San Francisco Bay RWQCB implements the Total Maximum Daily Load (TMDL) Program for impaired water bodies, which involves determining a safe level of loading for each problem pollutant, determining the pollutant sources, allocating loads to all of the sources, and implementing the load allocations. Within the Bay Area region, the 2018 303(d) list (applied to impaired water bodies, as defined below in the "Regulatory Setting" discussion) includes nearly 350 listings for approximately 130 water bodies. Nearly 120 of these listings have an associated TMDL established. Primary pollutants for which a TMDL has been established on Bay Area surface waters include diazinon (a pesticide), PCBs, the metals mercury and selenium, pathogens, and indicator bacteria. RWQCB staff are currently developing TMDL projects or studies to address more than 190 additional listings. The remaining listings are being addressed through another action (San Francisco Bay RWQCB 2020).

The following TMDL projects have been completed in the Bay Area (the managed pollutant follows name of water body):

- Guadalupe River Watershed – Mercury
- Lagunitas Creek – Sediment
- Muir beach – Bacteria
- Napa River – Nutrients, Sediment, and Pathogens
- North San Francisco Bay – Selenium
- Pescadero/Butano Creeks – Sediment
- Richardson Bay – Pathogens
- San Francisco Bay Beaches – Bacteria
- San Francisco Bay – Mercury and PCBs
- San Vicente Creek and Fitzgerald Marine Reserve – Bacteria
- San Pedro Creek and Pacifica State Beach – Bacteria
- Sonoma Creek – Nutrients, Pathogens, and Sediment
- Tomales Bay – Mercury and Pathogens
- Urban Creeks – Pesticide Toxicity
- Walker Creek – Mercury

The following TMDL projects are in development in the Bay Area (the managed pollutant follows name of water body):

- Kiteboard Beach and Oyster Point Beach – Bacteria
- Permanente Creek – Selenium
- Petaluma River – Bacteria
- Pillar Point Harbor and Venice Beach – Bacteria
- San Francisquito Creek – Sediment
- San Gregorio Creek - Sediment
- Stevens Creek – Toxicity

TMDLs account for all pollutant sources, including discharges from wastewater treatment facilities; runoff from homes, agriculture, and streets or highways; “toxic hot spots”; and deposition from the air. The specific urban runoff best management practices (BMPs) and levels of implementation are determined through TMDL development. Note that one TMDL may address multiple listings. For example, the Diazinon/Pesticide Toxicity TMDL for urban creeks addressed more than 30 impaired creeks or creek segments in the Bay Area (San Francisco Bay RWQCB 2020).

## FLOOD HAZARDS

The San Francisco Bay contains many flat, low-lying marginal areas and highly developed valleys with surrounding steep terrain that are conducive to flooding, especially during intense storms. Urban areas can flood when storm drains and small channels become blocked or surcharged during intense short-duration storms. Valley flooding tends to occur when large, widespread storms fall on previously saturated watersheds that drain into the valley. The greatest flood damages occur in the lower reaches of streams when floodwaters spill onto the floodplain and spread through urban neighborhoods (DWR 2013). Because of the topography of alluvial plains, floodwaters escaping some stream channels may flow away from the flooding stream, crossing open areas or flowing through city streets until they reach an adjacent watercourse. This type of flooding compounds and exacerbates local flooding that occurs when storm drains and small channels become blocked or surcharged during storms. In addition, hillsides denuded by wildfires can exacerbate flood damages by intercepting less precipitation and generating more runoff containing massive sediment loads.

Storm surges coincident with high tides can also create severe flooding in low-lying areas by the mouths of rivers (DWR 2013).

Major floods occur regularly in the Bay Area, and local structural flood damage reduction measures, such as reservoirs, levees, and channel improvements, have been implemented. Two reservoirs in the region have a designated flood protection function: Lake Del Valle and Cull Canyon Reservoir with 38,000 and 310 acre-feet of flood control capacity, respectively. Lake Del Valle is a State Water Project facility that protects Pleasanton, Fremont, Niles, and Union City. Alameda County Flood Control and Water Conservation District constructed Cull Canyon Reservoir to protect Castro Valley. Channel improvement projects designed to reduce stream flooding include channel construction, enlargement, realignment, lining, stabilization, and bank protection (DWR 2013). Flood protection agencies have constructed infrastructure projects along the following waterways to reduce the impacts of flooding (Alameda County Water District et al. 2019):

- Alameda Creek,
- Corte Madera Creek,
- Guadalupe River,
- Napa River,
- Novato Creek,
- Petaluma River, and
- San Francisquito Creek.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP). The program provides subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. FEMA issues Flood Insurance Rate Maps for communities participating in the NFIP. **Figure 3.10-2** identifies federally designated 100-year and 500-year storm event flood hazard zones in the Bay Area.

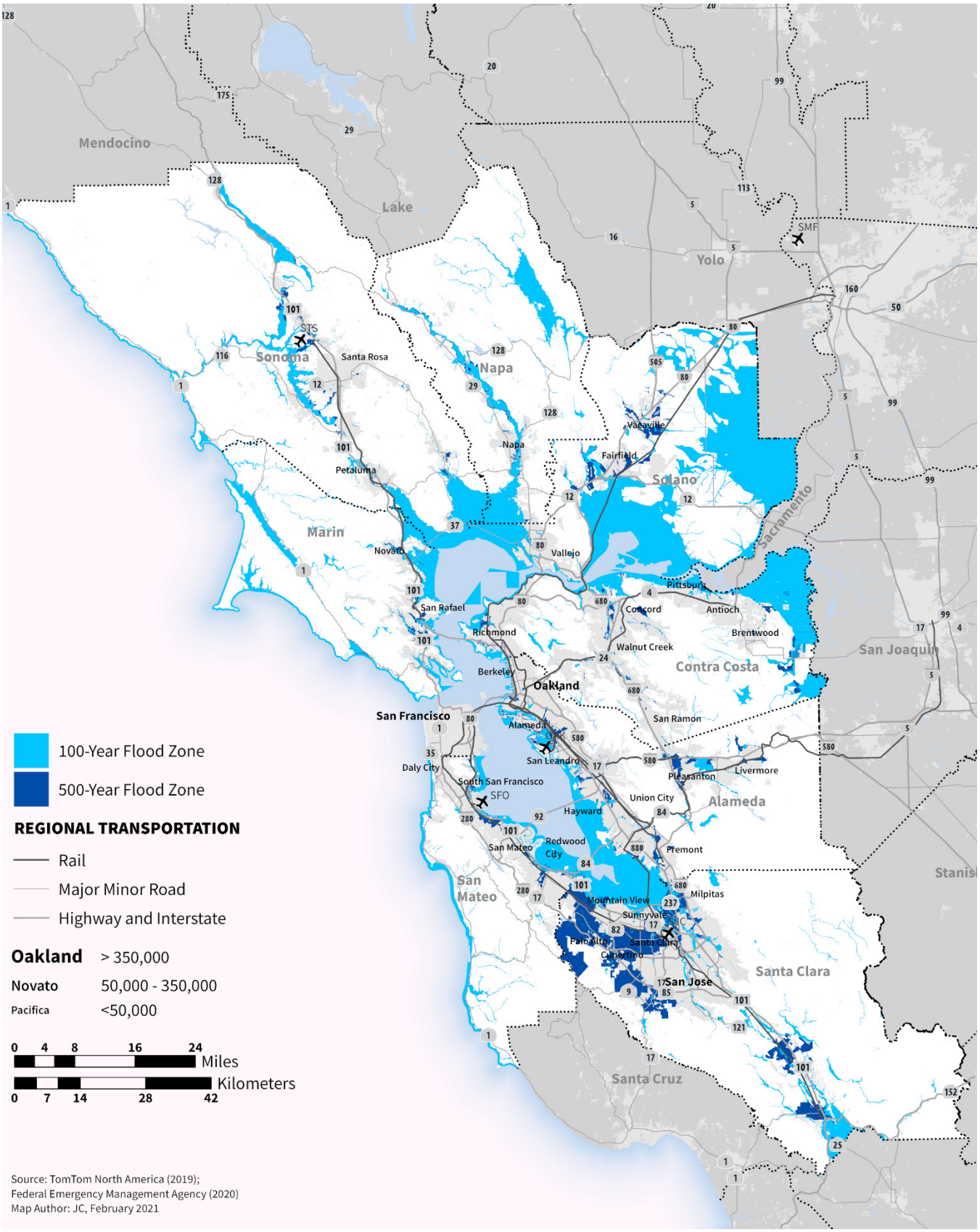



**Figure 3.10-2: Flood Hazard Areas**

FEMA further classifies high-risk flood hazard zones for communities that participate in the NFIP where mandatory flood insurance purchase requirements apply, as shown in **Table 3.10-3**.

**Table 3.10-3: Flood Hazard Zone Classification**

| Zone | Description |
|---|---|
| A | Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones. |
| AE | The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones. |
| A1-30 | These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format). |
| AH | Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. |
| AO | River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones. |
| AR | Areas with a temporarily increased flood risk because of the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations. |
| A99 | Areas with a 1% annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones. |
| **High Risk Coastal Areas** | |
| V | Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones. |
| VE, V1–V30 | Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. |

Notes: BFE = base flood elevation; FIRM = Flood Insurance Rate Map.

## Dam Failure

The California Department of Water Resources (DWR) Division of Safety of Dams (DSOD) oversees the design, construction, and annual inspection of dams Statewide. DSOD imposes strict standards for the design, maintenance, and monitoring of dams under its jurisdiction to ensure that they meet static and seismic standards to prevent catastrophic failure. Periodically, some of these dams will receive modifications, such as the San Pablo Dam, which has undergone a seismic upgrade to increase its stability and minimize the potential for liquefaction to cause any slump or failure of the embankment. Since 1916 there have been seven dam failures Statewide. The most recent was in 1971 with the failure of the San Fernando dam near Los Angeles (ASDSO 2021). A partial failure of a spillway gate at Folsom Lake Dam occurred in 1995, and a partial failure of a spillway gate at Oroville Dam occurred in 2017. Based on these statistics, dam failure is a relatively low likelihood event.

### Seiches and Tsunamis

A tsunami is a series of waves generated in a body of water by a rapid disturbance (e.g., submarine seismic, volcanic, or landslide event) that vertically displaces water. Tsunamis affecting the Bay Area can result from offshore earthquakes within the Bay Area or from distant events. While it is most common for tsunamis to be generated by subduction faults, such as those in Washington and Alaska, local tsunamis can be generated from strike-slip faults (such as the small one that was triggered by the 1906 San Andreas earthquake). In general, a tsunami can move hundreds of miles per hour in the open ocean and reach land with waves as high as 100 feet or more. A total of 51 tsunamis have been recorded or observed within the San Francisco Bay since 1850 (City and County of San Francisco 2019). Of these, the 1964 Alaska earthquake triggered by a 9.2 magnitude earthquake caused the most damage in San Francisco Bay. That wave was just under 4 feet in height and damage was limited to marinas and private boats in Marin County. The geography of the bay reduces the risk of a large tsunami event. A seismic event on the Cascadia subduction zone, which runs roughly from Mendocino County to Vancouver Island and is considered a worst-case scenario for tsunami in the bay, is estimated take several hours to reach the City of San Francisco, providing time to mobilize a response (Varner and Allen-Price 2017). ABAG has mapped portions of the Plan area as within tsunami inundation areas for emergency planning (see **Figure 3.10-3**).

Seiches are oscillations of enclosed and semienclosed bodies of water, such as bays, lakes, or reservoirs, caused by strong ground motion from seismic events, wind stress, volcanic eruptions, large landslides, and local basin reflection of tsunamis. Seiches can result in creation of long-period waves that can cause water to overtop containment features or run-up on adjacent landmasses (City and County of San Francisco 2019).

## 3.10.2 Regulatory Setting

### FEDERAL REGULATIONS

### Clean Water Act

The CWA establishes the basic structure for regulating discharges of pollutants into "waters of the United States." It specifies a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Some of these tools include:

- Section 303(d) – TMDLs
- Section 401 – Water Quality Certification
- Section 402 – National Pollutant Discharge Elimination System (NPDES) Program
- Section 404 – Discharge of Dredged or Fill Material

In 2000, the U.S. Environmental Protection Agency (EPA) established the California Toxics Rule, which sets water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied to inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA.

**Section 303(d)** requires states, territories, and authorized tribes to develop a list of water quality–limited segments of rivers and other water bodies under their jurisdiction. The waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the list and develop action plans to improve water quality. These are

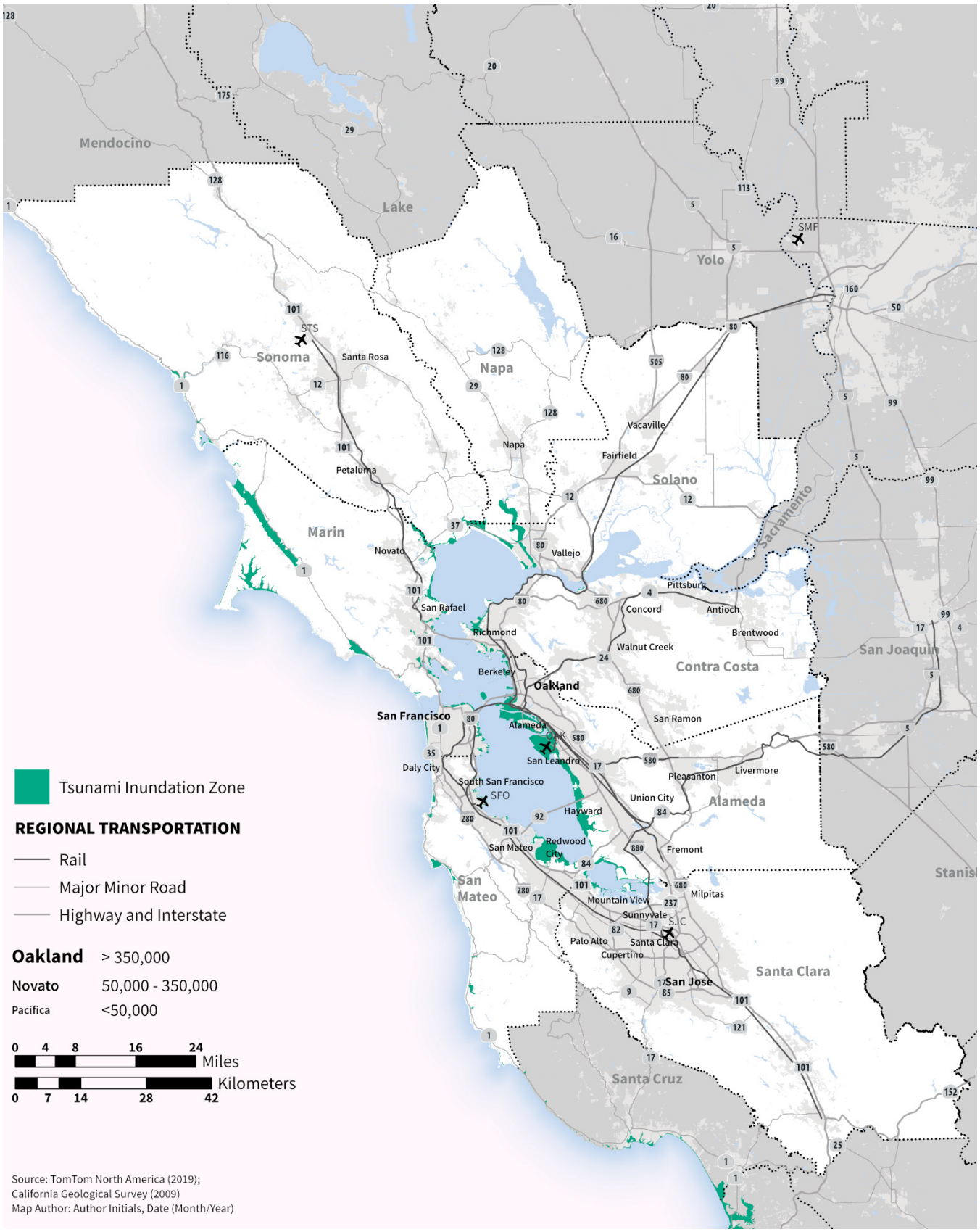



**Figure 3.10-3: Tsunami Inundation Zones**

action plans designed to improve the quality of water resources. As part of the TMDL process, municipalities must examine the water quality problems and identify sources of pollutants to create specific actions designed to improve water quality.

**Section 401** requires every applicant for a federal permit or license for any activity that may result in a discharge to a water body to obtain a water quality certification that the proposed activity will comply with applicable water quality standards.

**Section 402** regulates point-source discharges to surface waters through the NPDES program. In California, the State Water Resources Control Board (SWRCB) oversees the NPDES program, which is administered by the RWQCBs. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. It covers municipalities, industrial activities, and construction activities. The NPDES program includes an industrial stormwater permitting component that covers 10 categories of industrial activity that require authorization under an NPDES industrial stormwater permit for stormwater discharges. For further discussion of the NPDES program's regulation of municipal separate storm sewer systems, refer to Section 3.14, "Public Utilities and Facilities." Permits for construction activities, also administered by SWRCB, are discussed below.

Section 402(p) of the federal CWA, as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, EPA published regulations (CFR Title 40, Part 122) that prescribe permit application requirements for MS4s pursuant to CWA Section 402(p). On May 17, 1996, EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s. MS4 permits include requirements for postconstruction control of stormwater runoff in what is known as Provision C.3. The goal of Provision C.3 is for the permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low-impact development (LID) techniques.

**Section 404** establishes a permit program, administered by the U.S. Army Corps of Engineers (USACE), to regulate the discharge of dredged or fill materials into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. CWA Section 404 permits are issued by USACE.

### Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act, administered by USACE, requires permits for all structures (such as riprap) and activities (such as dredging) in navigable waters of the United States.

### Coastal Zone Act Reauthorization Amendments

The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) require coastal states to have a Coastal Nonpoint Pollution Control Program. CZARA provides state coastal management agencies regulatory control (federal consistency review authority) over all federal activities and federally

licensed, permitted, or assisted activities. Additionally, CZARA requires implementation of 56 management measures to achieve and maintain water quality standards, enforceable policies and mechanisms, and monitoring and tracking of management measure implementation.

### National Flood Insurance Act

The U.S. Congress passed the National Flood Insurance Act in 1968 and the Flood Disaster Protection Act in 1973 to restrict certain types of development on floodplains and to provide for the NFIP. The purpose of these acts is to reduce the need for large, publicly funded flood control structures and disaster relief. The NFIP is a federal program administered by the Flood Insurance Administration of FEMA. It enables individuals who have property (a building or its contents) within the 100-year floodplain to purchase insurance against flood losses. FEMA works with the states and local communities to identify flood hazard areas and publishes a flood hazard boundary map of those areas. Floodplain mapping is an ongoing process in the Bay Area, and flood maps must be regularly updated for both major rivers and tributaries as land uses and development patterns change.

### Executive Order 11988 - Floodplain Management

Executive Order 11988 directs federal agencies to avoid, to the extent practicable and feasible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Further, this executive order requires the prevention of uneconomic, hazardous, or incompatible use of floodplains; protection and preservation of the natural and beneficial floodplain values; and consistency with the standards and criteria of the NFIP.

## STATE REGULATIONS

### Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) was enacted in September of 2014. Pursuant to SGMA, sustainable groundwater management is the management and use of groundwater in a manner that can be maintained during a 50-year planning and implementation horizon without causing undesirable results. The SGMA establishes a new structure for locally managing California's groundwater and includes the following key elements:

- provides for the establishment of a Groundwater Sustainability Agency (GSA) by one or more local agencies overlying a designated groundwater basin or subbasin, as established by DWR Bulletin 118-03;
- requires all groundwater basins found to be of "high" or "medium" priority to prepare Groundwater Sustainability Plans (GSPs). Sonoma, Napa, Solano, Contra Costa, Alameda, and Santa Clara Counties include basins designated as high or medium priority (see **Figure 3.10-4**);
- provides for the proposed revisions, by local agencies, to the boundaries of a DWR Bulletin 118 basin, including the establishment of new subbasins;
- provides authority for DWR to adopt regulations to evaluate GSPs and review the GSPs for compliance every 5 years;
- requires DWR to establish BMPs and technical measures for GSAs to develop and implement GSPs; and

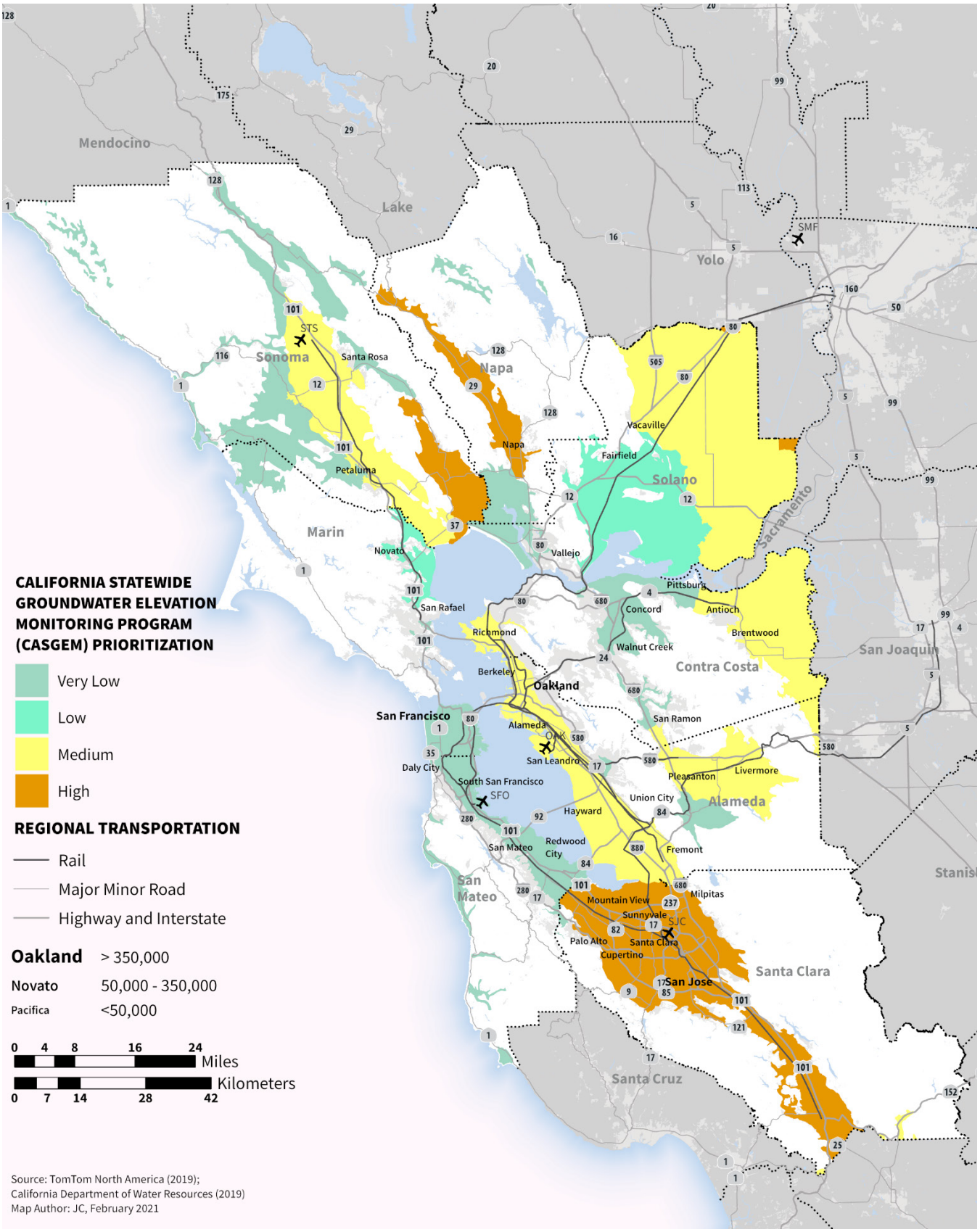



**Figure 3.10-4: Groundwater Basin Prioritization**

- provides regulatory authorities for SWRCB for developing and implementing interim groundwater monitoring programs under certain circumstances (such as lack of compliance with development of GSPs by GSAs).

- The medium and high priority basins in the Plan area are developing GSPs or have submitted alternative plans to comply with SGMA (**Table 3.10-4**).

**Table 3.10-4: Groundwater Sustainability Plan Status of High and Medium Priority Basins in the Plan Area**

| Groundwater Basin Name (Basin Number) | County | SGMA Basin Prioritization | Groundwater Sustainability Plan Status |
|---|---|---|---|
| Santa Rosa Valley - Santa Rosa Plain (1-055.01) | Sonoma | Medium | Under development. Draft anticipated Fall 2021. |
| Petaluma Valley (2-001) | Sonoma | Medium | Under development. Draft anticipated Fall 2021. |
| Napa-Sonoma Valley - Sonoma Valley (2-002.02) | Sonoma | High | Under development. Draft anticipated Summer/Fall 2021. |
| Napa-Sonoma Valley - Napa Valley (2-002.01) | Napa | High | Under development. Draft published for public review. |
| Sacramento Valley - Solano (5-021.66) | Solano | Medium | Under development. Draft published for public review. |
| Sacramento Valley - Yolo (5-021.67) | Solano | High | Under development. |
| San Joaquin Valley - East Contra Costa (5-022.19) | Contra Costa | Medium | Under development. Draft anticipated Fall 2021. |
| Santa Clara Valley - East Bay Plain (2-009.04) | Contra Costa/Alameda | Medium | Under development. |
| Santa Clara Valley - Niles Cone (2-009.01) | Alameda | Medium | Existing plan approved as an alternative in July 2019. |
| Livermore Valley (2-010) | Alameda | Medium | Alternative based on an analysis of basin conditions that demonstrates the basin has operated within its sustainable yield over a period of at least 10 years approved in July 2019. |
| Gilroy-Hollister Valley - North San Benito (3-003.05) | Santa Clara | Medium | Under development. |
| Gilroy-Hollister Valley - Llagas Area (3-003.01) | Santa Clara | High | 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins approved on July 17, 2019 as an Alternative for both the Santa Clara and Llagas Subbasins. |
| Santa Clara Valley - Santa Clara (2-009.02) | Santa Clara | High | 2016 Groundwater Management Plan for the Santa Clara and Llagas Subbasins approved on July 17, 2019 as an Alternative for both the Santa Clara and Llagas Subbasins. |

Sources: Data compiled by MTC/ABAG in 2021 based on data from DWR 2019a, 2019b, and 2021; Santa Rosa Plain GSA 2021; Petaluma Valley GSA 2021; Sonoma County GSA 2021; Napa County 2021; Solano County Water Agency 2021; Yolo Subbasin Groundwater Agency 2021; East Contra Costa County Integrated Regional Water Management 2021; East Bay Municipal Utility District 2021; Santa Clara Valley Water District 2021

## Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) established SWRCB and divided the State into nine regions, each overseen by an RWQCB. The nine regional boards have the primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter-Cologne Act, water quality objectives are limits or levels of water quality constituents or characteristics established for the purpose of protecting beneficial uses. The act requires the RWQCBs to establish water quality objectives while acknowledging that water quality

may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, also constitute water quality standards under the federal CWA. Therefore, the water quality objectives form the regulatory references for meeting State and federal requirements for water quality control.

Each RWQCB is required to prepare and update a Basin Plan for its jurisdictional area. The Porter-Cologne Act authorizes the State to develop approaches to address nonpoint source pollution and requires preparation of plans that identify approaches to achieve water quality targets (e.g., TMDL load allocations). Pursuant to the CWA NPDES program, the RWQCB also issues permits for point-source discharges that must meet the water quality objectives and must protect the beneficial uses defined in the Basin Plan.

### Antidegradation Policy

California's antidegradation policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (SWRCB Resolution No. 68-16), restricts degradation of surface water and groundwater. It protects waters where existing quality is higher than necessary for the protection of beneficial uses. Any actions with the potential to adversely affect water quality must (1) be consistent with maximum benefit to the people of the State, (2) not unreasonably affect present and anticipated beneficial use of the water, and (3) not result in water quality less than that prescribed in water quality plans and policies. Any actions that can adversely affect surface waters are also subject to the federal antidegradation policy (40 CFR Section 131.12) developed under the CWA.

### Construction General Permit

The California Construction Stormwater Permit (Construction General Permit)[1], adopted by SWRCB, regulates construction activities that include clearing, grading, and excavation resulting in soil disturbance of at least 1 acre of total land area. The Construction General Permit authorizes the discharge of stormwater to surface waters from construction activities. It prohibits the discharge of materials other than stormwater and all discharges that contain a hazardous substance in excess of reportable quantities established in Title 40, Section 117.3 or 302.4 of the CFR, unless a separate NPDES permit has been issued to regulate those discharges.

The Construction General Permit requires that all developers of land where construction activities will occur over more than 1 acre do the following:

- complete a risk assessment to determine pollution prevention requirements pursuant to the three risk levels established in the General Permit,
- eliminate or reduce nonstormwater discharges to storm sewer systems and other waters of the nation,
- develop and implement a stormwater pollution prevention plan (SWPPP) that specifies BMPs that will reduce pollution in stormwater discharges to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology standards, and
- perform inspections and maintenance of all BMPs.

[1] *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities,* Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ, National Pollutant Discharge Elimination System No. CAS000002.

To obtain coverage under the NPDES Construction General Permit, the legally responsible person must electronically file all permit registration documents with SWRCB before the start of construction. Permit registration documents must include:

- Notice of Intent,
- risk assessment,
- site map,
- SWPPP,
- annual fee, and
- signed certification statement.

Typical BMPs contained in SWPPPs are designed to minimize erosion during construction, stabilize construction areas, control sediment, control pollutants from construction materials, and address postconstruction runoff quantity (volume) and quality (treatment). The SWPPP must also include a discussion of the program to inspect and maintain all BMPs.

### California's Nonpoint Source Pollution Control Program

The *2020–2025 Nonpoint Source Program Implementation Plan* was prepared by SWRCB, the RWQCBs, and the California Coastal Commission, collectively, the colead agencies. The goal of this 5-year plan is to present, in one place, the general goals and objectives of the colead agencies for addressing nonpoint source pollution over the timeframe of January 2021 to June 2025. This plan was also prepared to meet CWA Section 319 requirements and to implement Section 6217 of CZARA.

California Coastal Commission goals set in the plan include ensuring that coastal development projects for which the commission is the permitting authority, and local governments' coastal planning documents (e.g., new or updated Local Coastal Programs, Long Range Development Plans, and Port Master Plans), implement appropriate management measures and BMPs to protect and restore coastal waters.

### California Green Building Standards Code

Chapters 4 and 5 of the California Green Building Standards Code (CALGreen) include mandatory measures for residential and nonresidential development, respectively. Section 4.106.2 requires residential projects that disturb less than 1 acre and are not part of a larger common plan of development to manage stormwater drainage during construction through use of on-site retention basins, filtration systems where stormwater is conveyed to a public drainage system, and/or compliance with a stormwater management ordinance. Section 5.106.1 requires newly constructed nonresidential projects and additions of less than 1 acre to prevent the pollution of stormwater runoff because of construction through compliance with a local ordinance or by implementing BMPs that address soil loss and good housekeeping to manage equipment, materials, and wastes.

### California Department of Transportation NPDES Permit

The California Department of Transportation (Caltrans) was originally issued a Statewide NPDES permit (Order 99-06-DWQ) in 1999, which requires Caltrans to regulate nonpoint-source discharge from its properties, facilities, and activities. The Caltrans permit requires development of a program for communication with local agencies, and coordination with other MS4 programs where those programs overlap geographically with Caltrans facilities. As part of the permit, Caltrans is required to create and annually update a Stormwater Management Plan (SWMP) that is used to outline the regulation of pollutant discharge caused by current and future construction and maintenance activities. SWMP requirements apply to discharges from Caltrans stormwater conveyances, including

catch basins and drain inlets, curbs, gutters, ditches, channels, and storm drains. The SWMP applies to discharges consisting of stormwater and nonstormwater resulting from:

- maintenance and operation of State-owned highways, freeways, and roads;
- maintenance facilities;
- other facilities with activities that have the potential for discharging pollutants;
- permanent discharges from subsurface dewatering;
- temporary dewatering; and
- construction activities.

The discharges addressed by the SWMP flow through municipal stormwater conveyance systems or flow directly to surface water bodies in the State. These surface water bodies include creeks, rivers, reservoirs, lakes, wetlands, lagoons, estuaries, bays, and the Pacific Ocean and tributaries.

This SWMP applies to the oversight of activities performed by outside agencies or non-Caltrans entities (third parties) within Caltrans' MS4 to ensure compliance with stormwater regulations. Non-Caltrans activities include highway construction and road improvement projects, as well as residential use and business operations on leased property.

The SWMP must be approved by SWRCB, and as specified in the permit, it is an enforceable document. Compliance with the permit is measured by implementation of the SWMP. Caltrans' policies, manuals, and other guidance related to stormwater are intended to facilitate implementation of the SWMP. Caltrans also requires all contractors to prepare and implement a program to control water pollution effectively during the construction of all projects., Caltrans continues to modify its policies and procedures to be consistent with the SWRCB's General Construction Permit, described above.

### California Department of Transportation Highway Design Manual

The Highway Design Manual was prepared for use on the California State highway system. The manual establishes uniform policies and procedures to inform and guide Caltrans employees. Chapter 870 includes standards for bank protection and erosion control, Chapter 880 provides shore protection standards, and Chapter 890 relates to stormwater management.

### California Department of Transportation Project Planning and Design Guide

The Project Planning and Design Guide provides guidance on the process and procedures for evaluating project scope and site conditions to determine the need for and feasibility of incorporating BMPs into projects within Caltrans right-of-way. It provides design guidance for incorporating those stormwater quality controls into projects during the planning and project development process. The Project Planning and Design Guide was prepared in support of the Statewide Stormwater Management Plan. The document addresses key regulatory, policy, and technical requirements by providing direction on the procedures to incorporate stormwater BMPs into the design of all Caltrans projects.

### California Stormwater Quality Association Best Management Practices Handbooks

The California Stormwater Quality Association (CASQA) is a professional member association dedicated to the advancement of stormwater quality management through collaboration, education, implementation guidance, regulatory review, and scientific assessment. CASQA's membership is composed of a diverse range of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout the State. CASQA develops and publishes four BMP handbooks. The New Development and Redevelopment Handbook provides guidance on developing

project-specific SWMPs, including selection and implementation of BMPs, for a particular development or redevelopment project.

### Cobey-Alquist Floodplain Management Act

The Cobey-Alquist Floodplain Management Act (California Water Code 8400–8415) and Executive Order B-39-77 give support to the NFIP. The act encourages local governments to plan, adopt, and enforce land use regulations for floodplain management in order to protect people and property from flooding hazards. It also identifies requirements that jurisdictions must meet to receive State financial assistance for flood control. Executive Order B-39-77 requires State agency compliance with good floodplain management practices.

### California Fish and Game Code

The California Department of Fish and Wildlife is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code (Section 1602) requires an entity to notify the agency of any proposed activity that may substantially modify a river, stream, or lake. Notification is required by any person, business, State or local government agency, or public utility that proposes an activity that would:

- substantially divert or obstruct the natural flow of any river, stream, or lake;
- substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the floodplain of a body of water.

### Ocean Standards

SWRCB's ocean standards protect the beneficial uses of California's marine waters through establishing water quality objectives and implementation provisions in Statewide water quality control plans and policies. Ocean standards plans and policies include the Water Quality Control Plan for Ocean Waters of California, the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California, and the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling.

### California Ocean Plan

To protect the quality of ocean waters for use and enjoyment by the people of the State, SWRCB requires control of the discharge of waste to ocean waters and control of intake of seawater through the California Ocean Plan. The plan is reviewed at least every 3 years to guarantee that the current standards are adequate and are not allowing degradation to marine species or posing a threat to public health. This plan is applicable, in its entirety, to point source discharges to the ocean. This plan is not applicable to discharges to enclosed bays and estuaries or inland waters or the control of dredged material.

### California Coastal Act

The California Coastal Act is intended to protect California's coastal resources. The California Coastal Commission works to ensure that all nonexempt development along the California coast undergoes the act's independent permit review process and secures the required Coastal Development Permit. The Coastal Commission's Water Quality Program works to integrate effective nonpoint source water quality protection measures into coastal development projects and local governments' land use planning documents, in accordance with Coastal Act requirements. In coordination with other agencies, staff also provide educational and technical assistance to address development activities that may affect coastal resources by generating polluted runoff or changes in runoff flows.

Section 30231 of the act provides for protection of coastal watersheds through implementation of management measures and BMPs, including minimizing adverse effects of discharges, controlling runoff, minimizing hydromodification and stream alterations, and maintaining natural vegetation buffers. Section 30253 provides the commission with the authority to control development that contributes to flooding, erosion, and surface alterations in and around the development site. It also gives the commission the ability to limit development activities that are sited in highly erodible areas with steep slopes and unstable soils or that accelerate the volume or rate of runoff from a site, thus affecting downstream habitats and structures.

## REGIONAL AND LOCAL REGULATIONS

### McAteer-Petris Act/San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act is a provision under California law that preserves San Francisco Bay from indiscriminate filling. It established the San Francisco Bay Conservation and Development Commission (BCDC) as the agency charged with preparing a plan for the long-term use of the bay and regulating development in and around the bay while the plan was being prepared. The San Francisco Bay Plan, completed in January 1969, includes policies on 18 issues critical to the wise use of the bay, ranging from ports and public access to design considerations and weather. The McAteer-Petris Act authorizes BCDC to incorporate the policies of the bay plan into State law. The bay plan has two features: policies to guide future uses of the bay and shoreline, and maps that apply these policies to the bay and shoreline.

### Bay Area Stormwater Management Agencies Association

The Bay Area Stormwater Management Agencies Association (BASMAA) is a consortium of the following nine San Francisco Bay Area municipal stormwater programs: Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Fairfield-Suisun Urban Runoff Management Program, Marin County Stormwater Pollution Prevention Program, Napa Countywide Stormwater Pollution Prevention Program, San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, Sonoma County Water Agency, and Vallejo Sanitation and Flood Control District. BASMAA was started in an effort to promote regional consistency and to facilitate efficient use of public resources. BASMAA has prepared *BASMAA Post-Construction Manual Design Guidance for Stormwater Treatment and Control for Projects in Marin, Sonoma, Napa, and Solano Counties* (BASMAA 2014), which is a LID approach to implementing Provision E.12 of the Phase II Small MS4 General Permit.

### Flood Planning

Many agencies in the region have performed some level of flood planning. The city of Napa has a system of road closures based on the stage of the Napa River that reduces the risk to individuals and property in the event of flooding. The Contra Costa Resource Conservation District has a watershed

management plan for Alhambra Creek that discusses a myriad of options to reduce the risk of flooding in Martinez and surrounding areas. The Bay Area Flood Protection Agencies Association is a consortium of flood control and water agencies in the region that provides a forum for discussing flood issues, collaborating on multiagency projects, and sharing resources.

All local jurisdictions regulate development within floodplains. Construction standards are established within local ordinances and planning elements to reduce flood impedance, safety risks, and property damage.

### Dam Inundation

Counties are required by State regulation to map potential dam inundation areas and prepare emergency plans and procedures for preparing for and responding to a dam breach as part of their multihazard mitigation plans (Title 19 CCR Section 2575). Additionally, the Federal Energy Regulatory Commission is required to approve local emergency action plans for dams with the potential to cause massive damage. Emergency action plans outline notification procedures for people and property owners within a potential inundation area. Because of the large number of dams within the Plan area, many of the proposed development areas would likely be located within one or more inundation areas. There is no policy or regulatory requirement restricting development within potential dam inundation areas largely because of the continued maintenance and oversight, which results in a relatively low risk for damage or injury.

### City and County General Plans

Of the seven required general plan elements, the conservation, open space, and safety elements are the most relevant to hydrology and water quality. The conservation element typically addresses watershed protection; land or water reclamation; prevention or control of the pollution of streams and other coastal waters; and regulation of land uses along stream channels and in other areas required to implement the conservation plan (e.g., buffer areas), control or correct soil erosion, and provide flood control. The open space element applies to the preservation of natural resources, including fish and wildlife habitat, rivers, streams, bays and estuaries, and open space. The safety element applies to the potential risk of death, injuries, property damage, and economic and social dislocation resulting from floods and other hazards.

Government Code Section 65302, as amended, requires that on or after January 1, 2009, the updated safety elements of general plans must incorporate significantly enhanced geographic data, goals, and policies related to flood hazards. This enhanced assessment of flood hazards must include flood mapping information from multiple agencies including FEMA, USACE the Office of Emergency Services, DWR, and any applicable regional dam, levee, or flood protection agencies; historical data on flooding; an inventory of existing and planned development (including transportation infrastructure) in flood zones; and new policies that comprehensively address existing and future flood risk in the planning area.

## 3.10.3 Impact Analysis

### SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, the criteria used in the Plan Bay Area 2040 EIR (2017), and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

- violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality (Criterion HYDRO-1);
- substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin (Criterion HYDRO-2);
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site, or provide substantial additional sources of polluted runoff (Criterion HYDRO-3);
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site (Criterion HYDRO-4);
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows (Criterion HYDRO-5); or
- in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation (Criterion HYDRO-6).

## METHOD OF ANALYSIS

This program-level EIR evaluates potential impacts on water resources based on the location of the proposed Plan's footprint associated with the forecasted development pattern (i.e., the land use growth footprint), sea level rise adaptation infrastructure (i.e., sea level rise adaptation footprint), and transportation projects (i.e., transportation system footprint) relative to the known distribution of water resources throughout the Bay Area. Quantitative results are presented for the region (i.e., the entire footprint, often summarized by county) and for the portions of the land use growth footprint specifically within transit priority areas (TPAs). TPAs are presented as a subset of the regional and county totals. Information provided by county includes both incorporated and unincorporated areas in the county.

The baseline for the following analysis is the NOP, released in September 2020. The analysis compares the general location of the projected land use development pattern, sea level rise adaptation infrastructure, and transportation project to existing resources, such as 303(d)-listed water bodies, groundwater basins, flood hazard areas, levees, dam inundation areas, and seiche zones, and describes how the subsequent projects would be subject to existing federal, State, and local laws, regulations, and plans that are in place to avoid adverse changes in existing hydrology and avoid or substantially lessen contaminants within stormwater and nonstormwater flows and within surface waters and groundwaters in the Plan area.

For this impact assessment, a geographic information system (GIS) was used to digitally overlay the proposed Plan's footprints associated with forecasted land use development, sea level rise adaptation infrastructure, and transportation projects over resource-related data. See Section 3.1, "Approach to the Analysis," for additional details regarding the GIS modeling for this analysis.

Effects on area hydrology could occur where projects substantially alter stormwater drainage, groundwater recharge, or potential for flooding. Effects on water quality could result from increases in erosion and other non-point-source pollutants at levels exceeding established regulatory thresholds. This evaluation of hydrology and water quality impacts assumes that construction and development under the proposed Plan would adhere to applicable federal, State, and local regulations and would conform to appropriate standards in the industry, as relevant for individual projects. Where existing regulatory requirements or permitting requirements exist that are law and binding on responsible agencies and project sponsors, it is reasonable to assume that they would be implemented, thereby reducing impacts. For additional information on analysis methodology, refer to Section 3.1.3, "General Methodology and Assumptions."

## IMPACTS AND MITIGATION MEASURES

### Impact HYDRO-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality (LTS)

As described in Chapter 2, "Project Description," the regional growth forecast for the Bay Area projects that by 2050 the region will support an additional 2.7 million residents and 1.4 million jobs, resulting in 1.4 million new households. The proposed Plan designates growth geographies and identifies a set of land use strategies to accommodate the projected growth that would result in focused housing and job growth concentrated primarily in or adjacent to already developed areas and along existing transit corridors. Implementation of the proposed Plan would include transportation projects that would maintain and optimize the existing transportation system, create healthy and safe streets, and build a next-generation transit network. Sea level rise adaptation infrastructure could result in the construction of levees, seawalls, elevated roadways, marsh restoration projects, and tidal gates.

#### Land Use Impacts

#### Construction

Accommodation of anticipated growth in the Plan area would require construction and operation of new residential units and employment centers. Construction would result in ground disturbance that can result in erosion and sedimentation with potential to adversely affect water quality. Development activities associated with implementation of the proposed Plan would also temporarily increase the use of potentially hazardous materials and petroleum products commonly used in construction (e.g., diesel fuel, lubricants, paints and solvents, and cement products containing strong basic or acidic chemicals), as evaluated in Section 3.9, "Hazards and Wildfire." Following construction, common urban pollutants associated with sustained, expanded use of household hazardous materials, herbicides and pesticides, and erosion from soil disturbance could be transported in runoff and potentially adversely affect the quality of receiving surface waters or groundwater.

The following provides an analysis of the potential for implementation of the Plan to result in degradation of surface water and groundwater quality, including the potential to conflict with or obstruct implementation of a water quality control plan. The discussion is focused on potential adverse effects on surface water quality associated with discharge to waters listed under Section 303(d) of the CWA. The potential water quality implications of drainage pattern alterations and construction activities are also analyzed in Impacts HYDRO-3 (with respect to erosion) and HYDRO-4 (with respect to rates and amounts of urban runoff caused by an increase in the extent of impervious surfaces).

The Section 402 NPDES MS4 Phase I and Phase II permits required under the CWA, which cover all jurisdictions, as well as large institutional users (as further described in the State regulatory setting discussion, above), require agencies and developments to implement SWMPs, which in turn require the implementation of source and treatment control measures. Section 402 NPDES Construction General permits require project proponents to incorporate general site design control measures into project design. These control measures may include conserving natural areas, protecting slopes and channels, and minimizing impervious areas. Treatment control measures may include use of vegetated swales and buffers, grass median strips, detention basins, wet ponds, or constructed wetlands, infiltration basins, and other measures. Filtration systems may be either mechanical (e.g., oil/water separators) or natural (e.g., bioswales and settlement ponds). Selection and implementation of these measures would occur on a project-by-project basis depending on project size and stormwater treatment needs. NPDES MS4 permittees are also required to develop and enforce ordinances and regulations to reduce the discharge of sediments and other pollutants in runoff and must verify compliance. NPDES Construction General permittees are also required to develop a SWPPP for each site that identifies BMPs to reduce potential construction impacts.

The construction contractor's Qualified SWPPP Developer would prepare the SWPPP, which would identify stormwater BMPs that minimize erosion and sedimentation that may result from temporary changes in drainage patterns, including BMPs for temporary drainage systems and temporary stream diversion and dewatering. All Qualified SWPPP Developers must be trained to ensure that SWPPPs are prepared according to the requirements of the permit. The construction contractor's Qualified SWPPP Practitioner would be responsible for implementing the SWPPP. As part of that responsibility, the effectiveness of construction BMPs would be monitored before, during, and after storm events. Records of these inspections and monitoring results would be submitted to the RWQCBs as part of the annual report required by the permit.

In addition, all projects, including those that would disturb less than 1 acre, would be subject to the CALGreen requirements related to stormwater drainage that have been designed to prevent or reduce discharges of sediments, chemicals, and wastes through BMPs that include on-site retention and filtration. Smaller projects may also be subject to additional requirements, which vary by local jurisdiction. In many cases, stormwater drainage measures and compliance with RWQCB Municipal Regional Stormwater Permit Order No. 2011-0083 Provision C.3 may be required by local jurisdictions as standard conditions of approval for building permit applications.

Typical BMPs used to meet regulatory standards, as required by CALGreen, are described below. These measures protect surface water and groundwater quality by removing or substantially lessening the amount of pollutants that flow off-site and into surface water or groundwater.

As noted under Mitigation Measure AQ-2 in in Section 3.4, "Air Quality," there are several construction best practices for addressing entrained dust. Some of these include the following (see Section 3.4 for a full list):

- Water all exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) two times per day. For projects over 5 acres in size, soil moisture should be maintained at a minimum of 12 percent. Moisture content can be verified by lab samples or a moisture probe.
- Cover all haul trucks transporting soil, sand, or other loose material off-site.
- Cover on-site dirt piles or other stockpiled particulate matter, install wind breaks, and employ water and/or soil stabilizers to reduce wind-blown dust emissions. The use of approved nontoxic

soil stabilizers shall be incorporated according to manufacturers' specifications to all inactive construction areas.

- Limit all vehicle speeds on unpaved roads and surfaces to 15 mph.
- Complete all roadway, driveway, and sidewalk paving as soon as possible. Building pads shall be paved as soon as possible after grading.
- Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- Operate all transfer processes involving a free fall of soil or other particulate matter in such a manner as to minimize the free fall distance and fugitive dust emissions.
- Wash off all trucks and equipment, including their tires, before they leave the site.
- Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible, and water it appropriately until vegetation is established.
- Store hazardous materials used on the construction sites, such as fuels and solvents, in covered containers that are protected from rainfall, runoff, and vandalism.

Construction activities associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. The impact would be less than significant (LTS) because future construction associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Through these actions, it is anticipated that growth would occur without resulting in a violation of water quality standards.

**Operation**

As noted above, implementation of the proposed Plan would result in the operation of new residential units and employment opportunities. Following construction, common urban pollutants associated with sustained, expanded use of household hazardous materials, herbicides and pesticides, and erosion from soil disturbance could be transported in runoff and potentially adversely affect the quality of receiving surface waters or groundwater.

The following BMPs typically are used during operation:

- Design roadway and parking lot drainage to run through grass median strips that are contoured to provide adequate storage capacity and to provide overland flow, detention, and infiltration before runoff reaches culverts or detention basins. Oil and sediment separators or absorbent filter systems may also be installed within the storm drainage system to provide filtration of stormwater before discharge to reduce the potential for water quality impacts.
- Use integrated pest management techniques (i.e., methods that minimize the use of potentially hazardous chemicals) in landscaped areas.
- Handle, store, and apply potentially hazardous chemicals in accordance with all applicable laws and regulations.
- Implement an erosion control and revegetation program designed to allow reestablishment of native vegetation on slopes in undeveloped areas as part of the long-term sediment control plan.

- Use alternative discharge options (e.g., constructed wetland, infiltration basin, bioretention) to protect sensitive fish and wildlife populations in areas where habitat for fish and other wildlife would be threatened by facility discharge.

Under Section 303(d) of the CWA, states evaluate water quality–related data and information to develop a list of waters that do not meet established water quality standards (referred to as "impaired") and develop a TMDL for every pollutant/water body combination on the list. This includes the development of a loading capacity that is allocated among various point sources and nonpoint sources. As discussed above, the San Francisco Bay RWQCB has identified nearly 350 listings for approximately 130 water bodies that are classified as impaired under Section 303(d) of the CWA. Standards have been developed for approximately 120 of these listings. Water quality constituents addressed through existing TMDLs include mercury and sediment loading.

Permits for discharge from point sources are issued through the NPDES program. In addition, several jurisdictions in the Plan area have adopted BMPs and ordinances that address runoff resulting from new development. Where TMDLs have been established, compliance with the standards (which is required through the NPDES permitting process) would substantially address the potential to contribute to existing pollution. Therefore, projects associated with forecasted land use development would not be expected to contribute to violations of water quality standards.

As noted above under "Method of Analysis," this evaluation assumes that construction and development under the proposed Plan would adhere to applicable federal, State, and local regulations and would conform to appropriate standards in the industry, as relevant for individual projects. Where existing regulatory requirements or permitting requirements exist to protect water quality that are law and binding on responsible agencies and project sponsors, it is reasonable to assume that they would be implemented, including adopted regulatory provisions of Basin Plans. As described above, consistency with these plans would be determined at the project level and enforced through the permitting process. There is no attribute of the proposed Plan that would obstruct the implementation of this process. The proposed Plan would provide a guiding vision and strategy for the manner in which the region could accommodate growth but would not supplant established regional plans for the protection of water quality and water supply. Individual projects would be required to demonstrate compliance with the applicable water quality or groundwater management plan in place at the time of the application through the permitting process.

Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. The impact would be less than significant (LTS) because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Through these actions, it is anticipated that growth would occur without resulting in a violation of water quality standards.

### Sea Level Rise Adaptation Impacts

#### Construction

The proposed Plan includes sea level rise adaptation infrastructure to protect communities that are in regularly inundated shoreline areas that may be affected by sea level rise. The implementation of this adaptation infrastructure would result in construction of a variety of levees, seawalls, elevated roadways, marsh restoration, and tidal gates. Similar to the construction effects described above for the land use impacts, this adaptation infrastructure could result in temporary construction that could result in release of sediment and other pollutants that can degrade water quality.

These potential impacts would be addressed through compliance with NPDES Construction General Permits and implementation of a SWPPP that identifies BMPs to reduce potential construction impacts, as described above. In addition to the standard erosion control measures listed above, in-water work could include excavation during low tide and use of floating containment berms to limit the potential for sediment entrainment and transport. Because the NPDES permitting process requires compliance with TMDLs for 303(d)-listed waters, construction of infrastructure in accordance with these permits would not be expected to contribute to violations of water quality standards. Further, individual projects would be required to demonstrate compliance with the applicable water quality or groundwater management plan in place at the time of the application through the permitting process. Therefore, although these types of projects are more frequently in proximity of, or in direct contact with, surface water than other projects included in the Plan, potential effects on water quality would be addressed through compliance with applicable regulations described above.

In addition, Section 404 of the CWA establishes a permit program, administered by USACE, to regulate discharge of dredged or fill materials into waters of the United States. Levees, road modifications, and other sea level rise adaptation infrastructure projects would be subject to this permit. Projects within the San Francisco Bay would be completed under the oversight of BCDC and the requirement of Section 66605 of the McAteer-Petris Act that Bay fill for a project be the minimum necessary to achieve the purpose of the fill. These regulations, which are related to dredging and fill of waterways, provide additional regulatory framework to address the potential for construction to disturb the sediments in a manner that substantially degrades water quality. Therefore, construction of sea level rise adaptation infrastructure associated with the proposed Plan would be less than significant (LTS).

#### Operation

Once constructed, the adaptation infrastructure would not substantially degrade water quality, such as by violating water quality standards or waste discharge requirements. Levees, sea walls, and wetland restoration projects would not be expected to release pollutants or cause erosion that would contribute to degradation of surface water or groundwater quality. Further, levees with native plants and wetland restoration projects could increase filtration of polluted or contaminated waters. Elevation of roadways and bridges to adapt to sea level rise also would not be expected to adversely alter the quality of runoff and its potential for effects on surface water or groundwater quality. The impact would be less than significant (LTS) because the sea level rise adaptation infrastructure would adhere to existing regulations.

### Transportation System Impacts

#### Construction and Operation

Transportation projects would include a variety of improvements, such as new express lanes, auxiliary lanes, roadway widening, increased transit service, and other maintenance and rehabilitation projects, as well as new rail projects that would increase the amount of impervious surface in the region. Transportation projects would require drainage control measures similar to those described above for land use projects. New impervious surfaces required for roadways or rail infrastructure could have minor effects on the receiving waters, water that filters into the ground, and groundwater basins, all of which could be affected by pollutants in the runoff from proposed future projects.

As discussed above for land use and growth under the Plan, specific regulations, such as the statewide Construction General Permit, are in place to substantially reduce the effects of construction activities on receiving waters. Transportation projects that fall under Caltrans jurisdiction would be covered by the Caltrans NPDES Stormwater Program. As described in Section 3.10.2, “Regulatory Setting,” above,

this NPDES permit regulates all stormwater discharges from Caltrans-owned conveyances, maintenance facilities, and construction activities. Caltrans also has a Statewide SWMP (Caltrans 2016) that describes the procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters. Guidance documents have also been developed by Caltrans to implement stormwater BMPs in the design, construction, and maintenance of highway facilities. The need for, and design of, BMPs would be dictated by the project-level SWPPP and the presence of surrounding sensitive resources. During the SWPPP development process, BMPs intended to reduce erosion and subsequent sediment transport, such as silt fencing, fiber rolls, sandbag barriers, and slope stabilization, would be identified to substantially reduce or eliminate the discharge of pollutants into receiving waters, including 303(d)-listed water bodies. During operations and maintenance of planned transportation improvements, operational BMPs would prevent substantial water quality degradation in compliance with applicable stormwater runoff discharge permits. Operation-phase BMPs would be evaluated during the development of drainage designs and would consider factors such as permanent stabilization of disturbed soil and natural stormwater quality treatment. Planned transportation improvements where local agencies are the lead agency would be subject to local and State regulations for runoff prevention.

Additionally, Attachment G of the Phase II MS4 permit requires all permittees in the jurisdiction of the San Francisco Bay RWQCB to develop and implement integrated pest management (IPM) policies to prevent the impairment of streams by pesticide-related toxicity from vegetation management conducted in or near aquatic resources. The IPM policies would regulate the use of the following pesticides of concern: organophosphorous pesticides (chlorpyrifos, diazinon, and malathion), pyrethroid pesticides (bifenthrin, cyfluthrin, betacyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambdacyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil. The IPM policies would require all employees and landscape contractors involved in the application or use of pesticides to be trained in IPM practices. The implementing agencies would be required to track the use of pesticides of concern by employees and contractors and report use information to the San Francisco Bay RWQCB when requested.

The regulatory requirements outlined above would require treatment of runoff to substantially reduce or eliminate the discharge of pollutants to storm drain systems and receiving waters. For projects that discharge to 303(d)-listed impaired water bodies, compliance with established TMDLs that target the removal of the pollutants causing the impairment would be required. Impacts would be less than significant (LTS) because construction and operation of transportation projects would require adherence to existing regulations and would be operated under the oversight of applicable regulatory agencies. Implementation of transportation network improvements and programs associated with the proposed Plan would not substantially degrade water quality in violation of applicable water quality standards.

**Conclusion**

Implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects would have a **less-than-significant (LTS)** impact because existing federal, State, and local regulations and oversight are in place to specify mandatory actions that must occur during project development, which would adequately address potential for construction or operation of projects to result in violation of water quality standards or waste or stormwater discharge requirements. No mitigation is required.

## Mitigation Measures

None required.

## Impact HYDRO-2: Substantially decrease groundwater supplies or interfere with groundwater recharge such that the project may impede sustainable groundwater management of the basin (LTS)

### Land Use Impacts

#### Construction and Operation

As described in Chapter 2, "Project Description," the regional growth forecast for the Bay Area projects that by 2050 the region will support an additional 2.7 million residents and 1.4 million jobs, resulting in 1.4 million new households. The proposed Plan designates growth geographies and identifies a set of land use strategies to accommodate the projected growth that result in focused housing and job growth concentrated primarily in or adjacent to already developed areas and along existing transit corridors. The forecasted growth pattern is a result of existing zoning and other land use policies, the regional growth forecast, and the proposed Plan's growth geographies and land use strategies. As summarized in **Table 2-5**, urbanization—growth on land not designated as urban built-up land as defined by the California Department of Conservation through the Farmland Mapping and Monitoring Program (FMMP)—is forecasted to occur on approximately 12,300 acres, or 31 percent of the land use growth footprint. The remaining 69 percent of the land use growth footprint would be within land designated as urban built-up—which the FMMP defines as "land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel"—reflective of the proposed Plan's core-focused growth strategy to leverage existing infrastructure.

The following analysis addresses the potential for the proposed Plan to draw groundwater at a rate that outpaces recharge or results in development that would inhibit recharge such that the project would be in conflict with plans to manage groundwater in a sustainable fashion. The capacity for water purveyors to provide adequate water supply to meet water demand associated with anticipated development is analyzed in Section 3.14, "Public Utilities and Facilities."

Urbanized portions of the Plan area depend upon a combination of surface water, groundwater, recycled water, and water conservation to provide water supplies for existing and planned residents and businesses. Groundwater pumping typically increases during dry years and is less in wet years, when surface water supplies are more available. Groundwater supplies are decreased when use outpaces recharge. SGMA provides a regulatory framework for the management and use of groundwater in a manner that can be maintained without causing undesirable results. Under this act, undesirable results are defined as the chronic lowering of the groundwater table, reduction of storage capacity, intrusion of seawater, degradation of groundwater quality, subsidence of land, and depletions of interconnected surface water; these conditions must be both significant and unreasonable to be considered an undesirable result.

As discussed above, SGMA requires the formation of GSAs to manage local groundwater basins; this includes the development of GSPs by 2022. Groundwater basins throughout much of the Plan area, including TPAs where development could occur, have been classified as high- or medium-priority basins under SGMA (see **Figure 3.10-4**). Under SGMA, agencies high- and medium-priority basins are required to be managed to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. As noted above, GSPs have not been submitted to DWR for most of these basins (see **Table 3.10-4**).

Urban development could interfere with groundwater recharge by creating additional impervious surfaces that interfere with infiltration of precipitation, which can result in decreased groundwater supplies. Most (69 percent) of the forecast growth would occur in areas that are already developed.

Concentrating development within urban cores, as proposed by the Plan, could reduce the groundwater recharge effects.

Infiltration rates can vary and largely depend on the characteristics of the exposed overlying soils and vegetation. In general, sandy soils have higher infiltration rates and can contribute to groundwater recharge; clay soils tend to have lower percolation potentials; and impervious surfaces, such as pavement, substantially reduce infiltration capacity. Regional development associated with implementation of the proposed Plan may result in the addition of new impervious surface areas, which may interfere with infiltration of precipitation. This can result in localized lowering of the groundwater table.

**Table 3.10-5** summarizes the acreage of the land use growth footprint within groundwater basins, by county. The proposed Plan would guide the forecasted land use development pattern away from undeveloped locations that may be well suited to facilitating groundwater recharge, and this total acreage of potential development is largely within developed areas that may currently include impervious surfaces. In addition, extensive storm drainage systems present in these areas currently intercept rainfall and runoff waters, thus limiting the amount of groundwater recharge that occurs. These basins are generally large (see **Table 3.10-2**), and the land use growth footprint where development is expected to increase the extent of impervious surfaces is generally a small portion of the basin.

**Table 3.10-5: Acreage of Land Use Growth Footprint within Groundwater Basins**

| County | | Total (acres) |
|---|---|---|
| Alameda | County Total | 6,500 |
| | Within TPAs | 3,300 |
| Contra Costa | County Total | 6,300 |
| | Within TPAs | 1,100 |
| Marin | County Total | 570 |
| | Within TPAs | 190 |
| Napa | County Total | 730 |
| | Within TPAs | 60 |
| San Francisco | County Total | 3,300 |
| | Within TPAs | 2,700 |
| San Mateo | County Total | 2,400 |
| | Within TPAs | 1,300 |
| Santa Clara | County Total | 8,500 |
| | Within TPAs | 5,300 |
| Solano | County Total | 3,700 |
| | Within TPAs | 140 |
| Sonoma | County Total | 1,800 |
| | Within TPAs | 260 |
| Regional Total | County Total | 33,800 |
| | Within TPAs | 14,200 |

Notes: TPA acreages are a subset of county acreages. Whole numbers have been rounded (between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum because of independent rounding.
Sources: MTC/ABAG 2021; DWR 2019c

As new development and redevelopment occurs, on-site drainage plans would be designed to retain, capture, and convey increased runoff in accordance with the city or county design standards (e.g., Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Santa Clara Clean Water Program) and State requirements, such as Provision C.3 site control features. These standards and regulations generally require or encourage the use of LID features, such as vegetated swales, permeable paving, landscaping used for infiltration, and other measures that would retain runoff as much as possible and allow for on-site infiltration.

Land development projects could increase the total amount of impervious surfaces in the region by as much as 12,300 acres and, as a result, redirect precipitation that might otherwise recharge groundwater. However, existing regulatory requirements at the local, State, and federal level include measures to minimize any increases in off-site stormwater runoff by encouraging on-site infiltration, which should effectively minimize the potential reduction in groundwater recharge to an acceptable level. Activities would be implemented under California regulations governing use of groundwater, including the SGMA, as well as groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. Further, as discussed above under Impact HYDRO-1, Provision C.3 of the NPDES program and CALGreen require new development to incorporate LID strategies, including on-site infiltration, as initial stormwater management strategies.

The land use strategy described in the proposed Plan would accommodate growth forecasted in the Plan area and would not directly increase the potential for growth, associated development, and groundwater demand. Further, by promoting infill development, the proposed Plan would minimize the potential for new impervious surfaces that could impede groundwater recharge. The type of development envisioned under this plan would be served by water purveyors that manage water supplies and generally would not use individual groundwater wells. Any “water demand project,” as defined by Section 15155 of the State CEQA Guidelines, requires preparation of a water supply assessment that must be prepared by the governing body of a public water system, or the city or county lead agency, pursuant to and in compliance with Sections 10910–10915 of the Water Code. Further, as described above, the medium- and high-priority basins in the Plan area are developing GSPs or have submitted alternative plans to comply with SGMA and manage groundwater to conserve supplies. The GSPs are required to provide mechanisms that allow the sustainable use of groundwater, with growth projections considered. Therefore, the regional impacts of implementation of the Plan on sustainable groundwater management would be less than significant (LTS).

### Sea Level Rise Adaptation Impacts

#### Construction

The proposed Plan includes environmental strategy EN1, “Adapt to Sea Level Rise,” to protect shoreline communities affected by sea level rise. This would be achieved through a series of adaptation archetypes. Sea level rise adaptation infrastructure is primarily planned in Alameda, Marin, Santa Clara, San Mateo, and Solano Counties. In total, the sea level rise adaptation footprint is 5,500 acres.

The Plan would address sea level rise adaptation through construction of structural barriers, such as levees and sea walls; restoration projects; and elevation of key infrastructure. Levees and wetland restoration projects would not impair groundwater recharge. Where projects would result in impermeable surfaces, they would be relatively small footprints and may largely replace existing structures (e.g., elevation of existing roadways). Therefore, these modifications would not substantially decrease groundwater supplies or interfere with groundwater recharge in a manner that may impede sustainable groundwater management. The impact would be less than significant (LTS).

### Operation

Implementation of sea level rise adaptation infrastructure is not anticipated to result in new impervious surfaces that impede infiltration and would be unlikely to require groundwater pumping during operation. Installation of sea walls and other barriers can alter the hydrogeology and potential exchange of surface water and groundwater, particularly in areas that are underlain with Bay mud, a thick and impermeable clay that underlies the San Francisco Bay. This could restrict intermixing of the Bay water and groundwater at the local scale, potentially improving groundwater quality in the vicinity of the barrier, but would not be expected to alter groundwater quality of the basin overall. Therefore, these modifications would not substantially decrease groundwater supplies or interfere with groundwater recharge in a manner that may impede sustainable groundwater management. The impact would be less than significant (LTS).

## Transportation System Impacts

### Construction and Operation

As stated in Impact HYDRO-1, the proposed transportation projects may result in some increases in the extent of impervious surfaces. **Table 3.10-6** provides the total acreage of groundwater basins potentially affected by the proposed transportation projects, by county. Many of the proposed transportation facilities would be located on or adjacent to existing highways, streets, and roads. Extensive storm drainage systems present in these areas currently intercept rainfall and runoff waters, thus limiting the amount of groundwater recharge that occurs. Local agency standards (e.g., Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Santa Clara Clean Water Program, as well as any City drainage control requirements) and Caltrans standards, combined with State and federal regulations and BMPs, require drainage studies for transportation projects. These studies address drainage issues, including incorporation of infiltration systems where appropriate to limit off-site runoff volumes. New impervious surfaces required for roadways or rail infrastructure would have limited potential to interfere with groundwater recharge. As discussed above for land use impacts, established regulations encourage the use of design features that manage increased runoff in a manner that does not impair basin recharge. As a result, transportation projects, which are often linear, generally do not result in a substantial effect on any one groundwater basin.

**Table 3.10-6: Acreage of Transportation Projects Footprint within Groundwater Basins**

| County | Total (acres) |
|---|---|
| Alameda | 2,500 |
| Contra Costa | 1,100 |
| Marin | 100 |
| Napa | 90 |
| San Francisco | 550 |
| San Mateo | 1,600 |
| Santa Clara | 4,500 |
| Solano | 1,100 |
| Sonoma | 120 |
| Regional Total | 11,700 |

Notes: Whole numbers have been rounded (between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum because of independent rounding.
Sources: MTC/ABAG 2021; DWR 2019c

Many of the planned transportation projects, such as the addition of new lanes to a roadway or highway, would result in relatively small increases in the extent of impervious surfaces in areas that already include extensive storm drainage systems that intercept rainfall and runoff waters. On-site drainage plans for new features would be designed to retain, capture, and convey runoff in accordance with the city or county design standards, where applicable, and federal and State requirements. Depending on site features, BMPs that improve stormwater quality and promote groundwater recharge, such as stormwater collection basins and vegetated swales that promote on-site infiltration, may be incorporated into project designs. These projects would also be unlikely to require groundwater pumping during operation. The impacts of the planned transportation improvements would be less than significant (LTS).

**Conclusion**

Implementation of the proposed Plan's forecasted land use development pattern, sea level rise adaptation infrastructure, and transportation projects could increase the total amount of impervious surfaces in the region and, as a result, redirect precipitation that might otherwise recharge groundwater. However, existing regulatory requirements at the local, State, and federal level include measures to minimize any increases in off-site stormwater runoff by encouraging on-site infiltration, which would effectively minimize the potential reduction in groundwater recharge to an acceptable level. Therefore, the proposed Plan would have a **less–than-significant (LTS)** impact.

### Mitigation Measures

None required.

## Impact HYDRO-3: Substantially alter existing drainage patterns, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion, siltation, or additional sources of polluted runoff (LTS)

**Land Use Impacts**

**Construction**

Land development that occurs to accommodate forecast population in the Plan area would have the potential to alter existing drainage patterns. Existing regulations establish permitting and oversight responsibilities for federal, State, and local agencies that are intended to ensure that such alteration does not substantially alter the existing drainage pattern of the site or area in a manner that would result in substantial erosion, siltation, or polluted runoff. State and federal agencies (including EPA, SWRCB, and RWQCBs) have established basin plans, water quality standards, and waste discharge requirements to prevent the degradation of water quality pursuant to the CWA.

Construction and grading activities associated with development of the proposed Plan could require temporary disturbance of underlying soils through excavation, soil stockpiling, boring, and grading activities that strip existing vegetation or pavement before commencing with construction of proposed improvements. These activities could result in exposure of soil to runoff, potentially causing erosion and entrainment of sediment and contaminants in the runoff. The extent of the impacts is dependent on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, and topography and proximity to drainage channels. If precautions are not taken to contain sediments, construction activities could produce substantial pollutants in stormwater runoff.

Erosion and sedimentation in the watershed as a result of urban development generally are controlled through compliance with applicable NPDES permits and local drainage and erosion design and standards. All development within the region that would disturb 1 acre or more would be required to prepare and implement a SWPPP, in accordance with the NPDES Construction General Permit. The SWPPP would include BMP erosion control measures, such as those listed in the discussion of HYDRO-1, above. Projects that would disturb less than 1 acre would be subject to the CALGreen requirements related to stormwater drainage that have been designed to prevent or reduce discharges of sediments through BMPs that include on-site retention and filtration. Generally, earthwork and ground-disturbing activities also require a grading permit, compliance with which minimizes erosion, and local grading ordinances ensure that construction practices include measures to protect exposed soils. Additional reports, such as a soil engineering report, engineering geology report, or plans and specifications for grading, may be required by local building or engineering departments, depending on the proposal. The application, plans, and specifications (if any) would be checked by the appropriate building official or engineer and may be reviewed by other departments of the county or city to ensure compliance with the laws and ordinances under their jurisdiction. Earthwork recommendations for improved erosion controls, based on site conditions, would be incorporated into the project construction documents. For further discussion of the potential for direct impacts related to erosion, refer to Section 3.8, "Geology, Seismicity, and Mineral Resources."

Development near the coast would be subject to the California Coastal Commission's Coastal Development Permit under the California Coastal Act. This permitting process would impose specific management measures and BMPs for protection of coastal watersheds and provides the commission with authority to control development that contributes to erosion. It also gives the commission the ability to limit development activities that are sited in highly erodible areas with steep slopes and unstable soils or that accelerate the volume or rate of runoff from a site in a manner that would affect downstream habitats and structures. Future development would be required to incorporate BMPs and LID stormwater management principles. In accordance with federal, State, and local stormwater management regulations, new construction must maintain preproject hydrology, incorporate proper pollutant source controls, and treat stormwater runoff through BMPs when source control or exposure protection are insufficient for reducing runoff pollutant loads. Therefore, construction impacts associated with the implementation of the proposed Plan's forecasted land use development pattern that could result in additional runoff would be less than significant (LTS).

**Operation**

Common urban pollutants (e.g., petroleum hydrocarbons, lubricants, herbicides and pesticides, sediments, and metals [generated by the wear of automobile parts]) could be transported in runoff and washed by rainwater from rooftops and landscaped areas into local drainage networks, potentially adversely affecting the quality of receiving surface waters or groundwater. Managed landscaping areas in the region could provide a source of nutrients, weed abatement herbicides, and irrigation runoff. Contributions of these contaminants and other common urban pollutants to stormwater and nonstormwater runoff could degrade the quality of receiving waters (surface water and groundwater) if they are not properly managed. During the dry season, vehicle use and other urban activities release contaminants on impervious surfaces and in landscaped areas, where they can accumulate until the first storm event. During this initial storm event, or first flush, the concentrated pollutants can be transported via runoff to stormwater drainage systems. Contaminants can also be released during the dry season as a result of overirrigation and other urban water uses (e.g., car washing, hosing down paved surfaces). Runoff during storm events and nonstormwater flows (e.g., overirrigation) can transport contaminants into stormwater drainage systems that discharge into rivers, agricultural ditches, sloughs, and channels and ultimately could

degrade the water quality of any of these water bodies. Contaminated runoff can also infiltrate into groundwater basins and negatively affect groundwater quality.

Local and State regulations would require developments to apply BMPs, implement control measures, adhere to NPDES permit requirements, and comply with local drainage standards. Drainage plans would be consistent with the San Francisco Bay RWQCB MS4 NPDES permit or any applicable local drainage control requirements that exceed or reasonably replace any of these measures to protect receiving waters from pollutants. In addition, NPDES Provision C.3 requirements include postconstruction drainage control requirements that address the volume of off-site flows, which can be effective in reducing sedimentation effects on downstream receiving waters. Project proponents are required to plan, design, and develop sites to (1) protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota and/or are particularly susceptible to erosion and sediment loss; (2) limit increases in the extent of impervious areas; (3) limit land disturbance activities, such as clearing and grading, and cut-and-fill to reduce erosion and sediment loss; (4) limit disturbance of natural drainage features and vegetation; and (5) reduce erosion and, to the extent practicable, retain sediment on-site during and after construction.

Under Provision C.3, the San Francisco Bay RWQCB requires appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges. In some cases, adherence to NPDES Provision C.3 requirements may result in improved retention of stormwater rates and volumes, compared to existing conditions, through implementation of LID drainage control measures. LID features include creating bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. These features result in a corresponding reduction of the potential for stormwater pollution. The LID approach to stormwater management overlaps with NPDES site control measures that include conserving natural areas, protecting slopes and channels, and minimizing impervious areas. Projects would also generally comply with the design guidelines established in the *Stormwater Best Management Practice Handbook: New Development and Redevelopment* (CASQA 2003) to minimize increases in the amount of pollutants entering the storm drain system.

The proposed Plan would result in new development and redevelopment that would have the potential to disturb underlying soils and result in changes to existing drainage patterns. Although there is potential for the forecasted land use development pattern to cause or contribute to a long-term increase in discharges of urban contaminants into the stormwater drainage system compared to existing conditions, subsequent projects would be required to incorporate BMPs and LID stormwater management principles. In accordance with federal, State, and local stormwater management regulations, new development must maintain preproject hydrology, incorporate proper pollutant source controls, and treat stormwater runoff through BMPs when source control or exposure protection are insufficient for reducing runoff pollutant loads. Therefore, impacts associated with the implementation of the proposed Plan's forecasted land use development pattern that could result in additional runoff would be less than significant (LTS).

### Sea Level Rise Adaptation Impacts

#### Construction

As described above, the sea level rise adaptation infrastructure would protect communities and infrastructure from sea level rise through a strategy that employs a variety of levees, seawalls, elevated roadways, marsh restoration, and tidal gates. Construction of the sea level rise infrastructure could result in short-term hydromodification and expose soils to erosion. As described above for the land

use development, existing permitting requirements for land disturbance would address the potential for erosion and siltation during construction. As described in Section 3.9, "Hazards and Wildfire," use of hazardous materials during construction of the sea level rise adaptation infrastructure is not expected to require use of potentially hazardous materials that would create a substantial hazard or potential for substantial additional sources of polluted runoff.

Sea level rise adaptation infrastructure within the bay and other waterways would require permits that would impose requirements to study the potential effects of any hydromodification and protect against undesirable impacts, including erosion. The design of in-water structures, such as sea walls and levees, would be subject to permitting from agencies, including the California Coastal Commission, BCDC, USACE, the San Francisco Bay RWQCB, and EPA. Projects that would discharge dredged or fill materials into waters of the United States would be subject to permitting under Section 404 of the CWA. Construction sites disturbing 1 or more acres would be required to comply with the State's General Stormwater Permit for Construction Activities. These established oversight mechanisms would address construction methods and project design of specific future projects to minimize the potential for hydromodification that could generate substantial erosion, siltation, or pollution. The construction impact associated with sea level rise adaptation infrastructure would be less than significant (LTS).

#### Operation

Once constructed, projects such as levees, seawalls, marsh restoration, and tidal gates would not be expected to cause or contribute to erosion or pollution runoff. Elevated roadway adaptation infrastructure would improve the transportation system's resilience to sea level rise and would be subject to the regulations described below for other transportation projects that reduce the potential for release of pollutants. Thus, because of the nature of the sea level rise adaptation infrastructure and through compliance with established regulations that would address the potential for hydromodification that could provide substantial additional sources of polluted runoff, the operational impacts associated with sea level rise adaptation infrastructure would be less than significant (LTS).

### Transportation System Impacts

#### Construction

Construction and earth-moving activities associated with transportation projects could increase erosion, which could result in sediment loading in local waterways and subsequent effects on water quality. The extent of the impacts would be dependent on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, topography, and proximity to drainage channels. Transportation projects that would disturb more than 1 acre would be required to adhere to the same NPDES Construction General Permit requirements discussed above for land development projects. The permit requirements include preparation and implementation of a SWPPP detailing BMPs that would be employed to control on-site stormwater drainage during construction. Projects that fall under Caltrans's jurisdiction also would be required to adhere to the Caltrans NPDES permit. Projects that would disturb less than 1 acre would be subject to the CALGreen requirements related to stormwater drainage for nonresidential projects, including BMPs designed to prevent soil loss and release of contaminants.

The design of transportation projects that would have the potential to alter drainage patterns, such as road widening or construction of other additional impervious surfaces, would conform to local stormwater drainage master plans, regional MS4 permit requirements, and any applicable Caltrans drainage requirements. Caltrans has a Storm Water Management Plan that describes the procedures

and practices it implements to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters. The Caltrans Project Planning and Design Guide (2017) was developed with the intention to reduce, to the maximum extent practicable, pollutant loadings from a project site after construction, and comply with the Caltrans NPDES permit and Construction General Permit. Permanent stormwater BMPs reduce suspended particulate loads in runoff and, thus, pollutants associated with sediment particles (e.g., certain metals, such as lead and mercury, PCBs, and polycyclic aromatic hydrocarbons). The Caltrans Project Planning and Design Guide contains guidance on the selection and implementation of many of the Phase II MS4 permit requirements, such as site design measures, stormwater treatment, and hydromodification management BMPs. The Caltrans Storm Water Management Plan sets the maintenance practices for controlling erosion and siltation. Therefore, the potential impacts associated with the implementation of proposed Plan's transportation projects would be less than significant (LTS).

**Operation**

Operation of the proposed Plan's transportation projects and programs could also increase nonpoint pollution of stormwater runoff because of litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that could affect the quality of receiving waters. During the dry season, vehicles and other urban activities release contaminants onto the impervious surfaces, where they can accumulate until the first storm event. During a storm event, the concentrated pollutants can be transported via runoff to stormwater drainage systems that discharge into rivers, agricultural ditches, sloughs, and channels and ultimately could degrade the water quality of any of these water bodies. As new roads, lanes, or other new impervious surfaces are added to accommodate projected vehicular traffic, the potential also increases for associated stormwater pollutants to enter receiving waters because of the increase in the extent of impervious surfaces and the anticipated increase in vehicle travel. For further discussion of pollutants commonly associated with transportation corridors, refer to Section 3.9, "Hazards and Wildfire."

Any enhancements or modifications to California State highways would be required to follow Caltrans guidelines, which include the preparation of a hydraulic study and submittal of a hydraulics study report for any project intercepting a waterway or encroaching upon a floodplain, to assess the potential impacts on natural processes and beneficial uses as part of the environmental review (Caltrans 2016). Transportation projects for which local agencies are the lead agency are subject to local and State regulations for construction and nonconstruction runoff prevention. In accordance with federal, State, and local stormwater management regulations, new construction must incorporate proper pollutant source controls and treat stormwater runoff through BMPs when source control or exposure protection is insufficient for reducing runoff pollutant loads. Because transportation projects would comply with these requirements, implementation of the proposed Plan would not be expected to alter existing drainage patterns in a manner that would result in substantial erosion, siltation, or additional sources of polluted runoff. Therefore, the potential impacts associated with the implementation of proposed Plan's transportation projects would be less than significant (LTS).

**Conclusion**

Implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects could result in new development and redevelopment that would have the potential to result in project-specific changes to existing drainage patterns. In compliance with adopted regulations, individual projects are expected to adopt BMPs appropriate to local conditions. This impact would be **less than significant (LTS)** because there are existing federal,

State, and local regulations and oversight in place that would effectively reduce the potential for erosion and siltation or release of pollutants due to drainage pattern changes to an acceptable level.

### Mitigation Measures

None required.

## Impact HYDRO-4: Substantially alter existing drainage patterns, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in runoff that exceeds capacity of existing or planned stormwater drainage systems or results in flooding on- or off-site (LTS)

#### Land Use Impacts

#### Construction and Operation

Implementation of the proposed Plan's forecasted land use development pattern would increase the amount of impervious surface in the region, such as new paved areas, building rooftops, and parking lots. This increase in the amount of impervious surface has the potential to generate additional stormwater runoff. In addition, runoff could discharge at a greater rate, leading to higher peak flows during storm events that could increase the potential for stormwater to cause flood conditions. Urban areas can flood when storm drains and small channels become blocked or surcharged during intense short-duration storms.

Drainage plans would be consistent with the San Francisco Bay RWQCB MS4 NPDES permit or any applicable local drainage control requirements that exceed or reasonably replace any of these measures to control the rate of stormwater runoff. NPDES Provision C.3 includes postconstruction drainage control requirements that address the volume of off-site flows. As described above, project proponents are required to plan, design, and develop sites to limit both increases in the extent of impervious areas and disturbance of natural drainage features. Under Provision C.3, the San Francisco Bay RWQCB requires designs that prevent increases in runoff flows from new development and redevelopment projects. In some cases, adherence to NPDES Provision C.3 requirements may result in improved retention of stormwater rates and volumes, compared to existing conditions, through implementation of LID drainage control measures. LID features include creating bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. Projects that would disturb less than 1 acre would be subject to the CALGreen requirements related to stormwater drainage. Projects would also generally comply with the design guidelines established in the *Stormwater Best Management Practice Handbook: New Development and Redevelopment* (CASQA 2003) to minimize increases in both the volume and rate of stormwater runoff. In addition, development near the coast would be subject to the California Coastal Commission's Coastal Development Permit under the California Coastal Act, which would impose specific management measures and BMPs for protection of coastal watersheds. The California Coastal Act also provides the commission with authority to control development that contributes to flooding and surface alterations in and around the development site.

As described in Section 3.14, "Public Utilities and Facilities," development could require the expansion or construction of new stormwater drainage facilities consistent with State water quality standards, applicable local ordinance, and any design standards adopted by the local utility. These may include on-site retention or detention ponds and upgrades to off-site stormwater transmission (e.g., pipeline improvements, culvert upgrades, or enhanced flood protection along natural drainageways used for

stormwater conveyance) that attenuate flow from the site and facilitate conveyance. Local plan review would generally require preparation of hydrologic engineering reports that demonstrate the project would not substantially increase the rate or amount of off-site flow, as well as analysis of the capacity of off-site infrastructure to accommodate flows. Based on local conditions and applicable local ordinances, on-site LID measures to reduce flow would be incorporated into the project. The application, plans, and specifications (if any) would be checked by the appropriate building official or engineer and may be reviewed by other departments of the county or city to ensure compliance with the laws and ordinances under their jurisdiction.

Land development that occurs to accommodate forecast population in the Plan area would have the potential to alter existing drainage patterns. In accordance with federal, State, and local stormwater management regulations, new construction must maintain pre-project hydrology. Local ordinances generally provide prescriptive requirements related to infrastructure capacity and design and limit the potential for development to increase off-site flows. All projects that would disturb 1 acre or more would be subject to San Francisco Bay RWQCB requirements that prevent increases in runoff flows from new development and redevelopment projects. The required LID drainage control measures may, in some cases, result in improved retention of stormwater rates and volumes compared to existing conditions. Development near the coast would be subject to the California Coastal Commission's Coastal Development Permit and oversight. Therefore, impacts associated with the implementation of the proposed Plan's forecasted land use development pattern would be less than significant (LTS).

**Sea Level Rise Adaptation Impacts**

**Construction and Operation**

As described above, the sea level rise adaptation infrastructure would protect communities and infrastructure from sea level rise through a strategy that employs a variety of levees, seawalls, elevated roadways, marsh restoration, and tidal gates. Marsh restoration and horizontal levees can intentionally open an area to flooding and attenuate rising tides. Both BCDC and the proposed Plan support use of wetlands to buffer tides and streamflows to reduce the potential for flooding.

Many of these projects (e.g., levees and sea walls) would be located in proximity to the San Francisco Bay and would not contribute additional runoff to a storm drain system, because they would drain directly to the surface water bodies (see Impact HYDRO-1 for further discussion). Elevated roadway adaptation infrastructure would improve the transportation system's resilience to sea level rise and would not result in a substantial increase in runoff volumes. Additionally, as discussed above for the land use impacts, compliance with existing regulations, particularly the San Francisco Bay RWQCB MS4 NPDES permit, would address the potential for construction or operation of the sea level rise infrastructure to result in an increase in runoff. However, because they provide a physical barrier to potential floodwater, sea walls and traditional levees could affect shore hydrology and the potential for off-site flooding if not designed appropriately. These projects would be subject to oversight and permitting from a variety of agencies, potentially including the California Coastal Commission, BCDC, USACE, the San Francisco Bay RWQCB, and EPA. Implementing agencies would conduct or require project-specific hydrology studies for projects proposed to be constructed within floodplains to demonstrate compliance with Executive Order 11988 (for federally funded projects) and the Cobey-Alquist Floodplain Management Act, which prohibits construction of structures in the designated floodway that would restrict carrying capacity. Engineering designs would evaluate the anticipated project-level effects to area hydrology, and permitting agencies would limit fill or other shoreline modifications.

As described above, sea level rise adaptation infrastructure within the bay and other waterways would require permits from the State that would impose requirements to study the potential effects of any hydromodification. The design of in-water structures, such as sea walls and levees, would be subject to permitting from agencies, including the California Coastal Commission and the San Francisco Bay RWQCB, that require projects to demonstrate that there would not be a substantial increase in off-site runoff and that off-site flooding would not occur. Therefore, impacts associated with the implementation of the proposed Plan's sea level rise adaptation infrastructure would be less than significant (LTS).

### Transportation System Impacts

#### Construction and Operation

Many of the transportation projects would involve alteration or expansion of existing facilities. Improvements to existing facilities, such as the conversion of paved shoulders to lanes, would not likely alter drainage patterns because the facilities are already served by drainage systems and there would not be a substantial increase in the extent of impervious surfaces. However, those improvements that involve grading, recontouring, bridge pilings, and new impervious surfaces may alter existing drainage patterns, including the course of streams and rivers, which may result in increased stormwater flow volumes and velocity, resulting in the potential for erosion, additional sources of polluted runoff, and on- and off-site flooding.

The design of transportation projects that would have the potential to alter drainage patterns would conform to local stormwater drainage master plans and regional MS4 permit requirements, as described above for the land use changes. Transportation projects for which local agencies are the lead agency are subject to local and State regulations for construction and nonconstruction runoff prevention. Transportation projects would also be required to incorporate BMPs and LID stormwater management principles.

In addition, any enhancements or modifications to California State highways would be required to follow Caltrans guidelines, which include the preparation of a hydraulic study and submittal of a hydraulics study report for any project intercepting a waterway or encroaching upon a floodplain, to assess the potential impacts on natural processes and beneficial uses as part of the environmental review (Caltrans 2016). The Caltrans Highway Design Manual (2010) requires that road storm drain systems be designed to safely drain the 25-year return interval storm, cross-culverts be designed to safely drain the 10-year interval storm, and the headwater depth for the 100-year interval storm not overtop freeways. These existing regulatory requirements substantially address the potential for impacts on drainage patterns and rates.

In accordance with federal, State, and local stormwater management regulations, new construction must maintain preproject hydrology. Because transportation projects would comply with these requirements, implementation of the proposed Plan would not be expected to alter existing drainage patterns in a manner that would result in runoff that exceeds the capacity of existing or planned stormwater drainage systems or results in flooding. Therefore, impacts associated with the implementation of the proposed Plan's transportation infrastructure would be less than significant (LTS).

### Conclusion

Implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects could result in new development and redevelopment that would have the potential to result in project-specific changes to existing drainage patterns. In compliance with adopted regulations, individual projects are expected to adopt BMPs appropriate to local conditions. This impact would be **less than significant (LTS)** because there are existing State and

local regulations and oversight in place that would effectively reduce the potential for erosion and siltation, release of pollutants, or flooding related to drainage pattern changes to an acceptable level.

## Mitigation Measures

None required.

## Impact HYDRO-5: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows (LTS)

### Land Use Impacts

#### Construction and Operation

In addition to hydromodifications that could cause localized flooding discussed in Impact HYDRO-4, development of areas that are currently prone to flooding could impede or redirect flood flows. As described above and depicted in **Figure 3.10-2**, FEMA has designated 100-year and 500-year storm event flood hazard zones in the Bay Area. While the majority of proposed Plan's land use growth footprint is outside these hazard areas, implementation of the development pattern identified in the Plan could result in 4,000 acres of development in the 100-year floodplain and an additional 4,900 acres of development in the 500-year floodplain (**Table 3.10-7**).

**Table 3.10-7: Acreage of Land Use Growth Footprint within Flood Zones**

| County | | 100-Year (acres) | 500-Year (acres) |
|---|---|---|---|
| Alameda | County Total | 440 | 800 |
| | Within TPAs | 130 | 350 |
| Contra Costa | County Total | 910 | 340 |
| | Within TPAs | 70 | 30 |
| Marin | County Total | 390 | 220 |
| | Within TPAs | 90 | 120 |
| Napa | County Total | 50 | 30 |
| | Within TPAs | 30 | 20 |
| San Francisco | County Total | 0 | 0 |
| | Within TPAs | 0 | 0 |
| San Mateo | County Total | 300 | 360 |
| | Within TPAs | 130 | 220 |
| Santa Clara | County Total | 1,300 | 2,900 |
| | Within TPAs | 710 | 1,600 |
| Solano | County Total | 380 | 180 |
| | Within TPAs | 10 | 30 |
| Sonoma | County Total | 200 | 60 |
| | Within TPAs | 1 | 20 |
| Regional Total | County Total | 4,000 | 4,900 |
| | Within TPAs | 1,200 | 2,400 |

Notes: TPA acreages are a subset of County acreages. Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100. Figures may not sum because of independent rounding.
Sources: Data compiled by MTC/ABAG in 2021 based on data from FEMA 2020

FEMA delineates the regulatory floodplain to assist local governments with land use and floodplain management decisions to avoid flood-related hazards. Structures that impede flood flows can cause a backwater effect by potentially raising flood levels, causing more severe flooding impacts on existing vulnerable areas, or exposing new areas that would not have previously flooded to flooding impacts. To avoid flooding, FEMA and the local agencies require that an encroachment into a floodplain not increase the water surface elevation of the 100-year flood by more than 1 foot in floodplains and 0.1 foot in floodways. In addition, any projects constructed within areas subject to flooding because of levee failure, as mapped by FEMA, must be built in compliance with standard building codes and federal, State, and local regulations.

Development (including construction, reconstruction, renovation, repair, expansion, or alteration of buildings, bridges, streets, and other paving and installation of utilities) within a floodplain requires a local floodplain development permit. The specific requirements for a project depend on the flood zone and the type of development. The basic standards that must be met by any floodplain development are that the proposed development must be reasonably safe from flood damage (which for most buildings means elevated above the height of floodwaters) and must not result in physical damage to any other property. Additional requirements for development in flood hazard zones contained in local ordinances and standards may also apply. Technical analysis may be required if there is potential for increased flood heights or diversion of flow.

Any developments proposed within the 100-year flood zone would be required to meet local, State, and federal flood control design requirements. Implementing agencies would conduct or require project-specific hydrology studies for projects proposed to be constructed within floodplains to demonstrate compliance with Executive Order 11988 (for federally funded projects), the NFIP, the National Flood Insurance Act, and the Cobey-Alquist Floodplain Management Act, as well as any further FEMA or State requirements that are adopted at the local level. These studies would identify project design features that reduce impacts on either floodplains or flood flows that would be required through the permitting process. Projects in TPAs that are located within a floodplain or floodway do not qualify as sustainable community projects under Section 21155.1 of the Public Resources Code unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a flood. With these floodplain development requirements, continuing flood protection programs, and the drainage requirements described above, impacts related to flood flows would be less than significant (LTS).

**Sea Level Rise Adaptation Impacts**

**Construction and Operation**

Sea level rise adaptation infrastructure would protect existing businesses, residences, and infrastructure from rising seas. **Table 3.10-8** provides the acreage of the sea level rise adaptation footprint within the 100-year and 500-year flood zones established by FEMA. The sea level rise adaptation infrastructure could affect flooding and surface waters in the region. Although intended to protect the parts of the Plan area most vulnerable to flooding caused by sea level rise, there is a potential that the adaptation infrastructure could redirect flows. For example, sea walls and traditional levees could affect shore hydrology and the potential for off-site flooding if not designed appropriately because they provide a physical barrier to potential floodwater. In addition, tidal gates can intentionally open an area to flooding to attenuate rising tides and reduce the potential for flooding of upland areas. Marsh restoration and horizontal levees require careful engineering that evaluates the potential to redirect floodwaters. Elevated roadway adaptation infrastructure would improve the transportation system's resilience to sea level rise but may require structures, such as bridge abutments, within the floodplain.

**Table 3.10-8: Acreage of SLR Resilience Footprint within Flood Zones**

| County | 100-Year (acres) | 500-Year (acres) |
|---|---|---|
| Alameda | 630 | 300 |
| Contra Costa | 240 | 10 |
| Marin | 700 | 40 |
| Napa | < 1 | 0 |
| San Francisco | 0 | 0 |
| San Mateo | 540 | 30 |
| Santa Clara | 600 | 80 |
| Solano | 590 | 11 |
| Sonoma | 140 | 2 |
| Regional Total | 3,400 | 480 |

Notes: Numbers less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum because of independent rounding.
Sources: Data compiled by MTC/ABAG in 2021 based on data from FEMA 2020

In addition to the oversight for development of floodplains through the NFIP and related local regulations, sea level rise adaptation infrastructure projects would be subject to oversight and permitting from a variety of agencies, potentially including the California Coastal Commission, BCDC, USACE, the San Francisco Bay RWQCB, and EPA. Potential for such projects to alter existing drainage patterns in a manner that would adversely affect conditions outside of the area they are designed to protect would be evaluated and mitigated, as appropriate, through the permitting process. As discussed above, implementing agencies would conduct or require project-specific hydrology studies for projects proposed to be constructed within floodplains. These studies would identify project design features that reduce impacts on either floodplains or flood flows, which would inform the project's permit requirements. As described above, FEMA and the local agencies require that an encroachment into a floodplain (i.e., activities or construction within the floodway, including fill, new construction, substantial improvements, and other development) not increase the water surface elevation of the 100-year flood by more than 1 foot in floodplains and 0.1 foot in floodways. With these floodplain development requirements, continuing flood protection programs, and the drainage requirements described above, impacts related to flood flows would be less than significant (LTS).

## Transportation System Impacts

### Construction and Operation

Some of the transportation projects included in the proposed Plan intersect areas mapped within the flood hazard areas. In total, approximately 1,700 acres of potential construction are anticipated in 100-year flood zones for the entire region and an additional 1,900 acres of development in the 500-year floodplain (see **Table 3.10-9**). Those projects in identified flood hazard areas could involve support structures or other aboveground improvements in the floodway that could potentially obstruct floodwaters in some locations. Placement of structures within a floodplain can displace floodwaters and alter the base flood elevations in the surrounding areas. As described above, structures can create a backwater effect, resulting in an increase in the flood elevation level upstream and in neighboring areas. Drainage areas could also be altered by highway corridors, in which floodwaters could be detained by medians and along the roadside. Proposed bridge supports could block debris in waterways, creating obstructions and further elevating upstream flood levels.

**Table 3.10-9: Acreage of Transportation Projects Footprint within Flood Zones**

| County | 100-Year (acres) | 500-Year (acres) |
|---|---|---|
| Alameda | 280 | 140 |
| Contra Costa | 110 | 50 |
| Marin | 40 | 30 |
| Napa | 8 | 2 |
| San Francisco | 0 | 0 |
| San Mateo | 370 | 250 |
| Santa Clara | 660 | 1,300 |
| Solano | 230 | 80 |
| Sonoma | 60 | 2 |
| Regional Total | 1,700 | 1,900 |

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum because of independent rounding.
Sources: Data compiled by MTC/ABAG in 2021 based on data from FEMA 2020

The regulatory requirements listed in the discussion of land use impacts also apply to transportation projects. Projects and programs in the proposed Plan also would be required to comply with FEMA regulations, which mandate no development within the 100-year regulatory floodplain if it could increase the flood elevation by 1 foot or more in floodplains and 0.1 foot in floodways. Any enhancements or modifications to California State highways would be required to follow Caltrans guidelines, which include the preparation of a hydraulic study and submittal of a hydraulics study report for any project intercepting a waterway or encroaching upon a floodplain, to assess the potential impacts on natural processes and beneficial uses as part of the environmental review (Caltrans 2016). Federally funded projects must also comply with the federal Executive Order 11988, which requires that floodplain encroachment occur only if there is no alternative to avoid the floodplain and that all feasible mitigation for floodplain impacts be included in the project. With these floodplain development requirements, continuing flood protection programs, and the drainage requirements described above, impacts related flood flows would be less than significant (LTS).

#### Conclusion

Because implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects would be required to adhere to appropriate federal, State, and local requirements designed to ensure that flooding conditions are not exacerbated, this impact would be **less than significant (LTS)** because there are existing federal, State, and local regulations and oversight in place that would effectively manage surface runoff.

### Mitigation Measures

None required.

## Impact HYDRO-6: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation (LTS)

#### Land Use Impacts

#### Construction and Operation

As described above, flooding occurs regularly in the Plan area, and local structural flood damage reduction measures, such as reservoirs, levees, and channel improvements, have been implemented.

Impact HYDRO-5 discusses the potential for the Plan to result in development in flood hazard zones. Because the Plan is intended to reduce risks from hazards, including planning to protect homes, businesses, and transportation infrastructure from flooding, it is expected to minimize the risk of release of pollutants attributable to flooding in established hazard zones. Further, although tsunami and seiche zones are mapped in the Plan area, the risk of release of pollutants attributable to inundation is considered low based on the limited documented history of tsunami- and seiche-induced flooding of the Plan area. No substantial damage is expected from either tsunamis or seiches in the Plan area, and implementation of the Plan would not increase the inherent risk of these natural forces on the Plan area.

Numerous existing federal, State, and local laws and regulations are in place to address the management and control of pollutants, including regulations addressing the proper disposal, transportation, storage, and handling of potentially hazardous materials (refer to Section 3.9, "Hazards and Wildfire"). The proposed Plan's forecasted land use development pattern would be subject to these regulations for the management of pollutants, which would limit the release of pollutants in the event of inundation attributable to flood, levee or dam failure, or seiche. Moreover, subsequent development would be subject to existing regulations intended to limit the potential for flooding to affect development. These include FEMA flood insurance and State flood protection regulations intended to limit flood risk, as well as local flood management programs, zone districts, and regulations; and California Building Code requirements. These regulations would guide growth away from hazardous areas. Therefore, considering the existing regulatory framework, physical context of the Plan area and proposed areas of improvements, the forecasted development under the Plan would not result in risk related to the release of pollutants attributable to flooding, seiche, or tsunami. Impacts associated with construction and implementation of the proposed Plan would be less than significant (LTS).

### Sea Level Rise Adaptation Impacts

#### Construction and Operation

The sea level rise adaptation infrastructure would be located in flood hazard, tsunami, and seiche zones. Construction of the sea level rise adaptation infrastructure would use potentially hazardous materials in limited quantities for maintaining and operating construction equipment. As described in Section 3.9, "Hazards and Wildfire," these activities are regulated, and the routine use of hazardous materials is unlikely to result in a substantial risk release of pollutants related to project inundation. Once constructed, the sea level rise adaptation infrastructure would not include uses that would result in the release of pollutants if inundated.

Therefore, although sea level rise adaptation infrastructure is likely to be located in flood hazard, tsunami, and seiche zones, it is intended to reduce the risk of secondary flooding hazards, including release of pollutants. The impact of construction and operation of this adaptation infrastructure would be less than significant (LTS).

### Transportation System Impacts

#### Construction and Operation

Some of the transportation projects included in the proposed Plan would be placed within the 100-year flood hazard area and potential dam inundation areas. In addition, projects located in the immediate vicinity of shoreline areas may be exposed to inundation from tsunami or seiche waves. As noted above, new transportation structures proposed within a floodplain or inundation areas would

be required to adhere to State and federal regulations. The Caltrans Highway Design Manual also requires that the headwater depth for the 100-year interval storm not overtop freeways.

Similar to the sea level rise infrastructure, limited hazardous materials use would be associated with construction of the transportation projects. As described in Section 3.9, "Hazards and Wildfire," these activities are regulated, and the routine use of hazardous materials is unlikely to result in a substantial risk release of pollutants related to project inundation. Once constructed, the facilities could be used to transport hazardous materials, but storage of materials that could be released if inundated would be unlikely. As discussed in Section 3.9, "Hazards and Wildfire," the routine transport of hazardous materials on transportation infrastructure in the Plan area would not present a substantial hazard to the public or the environment. The transportation system would not substantially increase the risk of release of pollutants related to project inundation in flood hazard, tsunami, or seiche zones. This impact would be less than significant (LTS).

**Conclusion**

Implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects would be subject to implementation of local, State, and federal floodplain regulations and project-level review. Further, the sea level rise adaptation infrastructure would decrease the potential for inundation in flood hazard, tsunami, and seiche zones, which could reduce the potential for release of pollutants from existing uses. Therefore, considering the existing regulatory framework and physical context of the Plan area, potential for release of pollutants attributable to flooding would be reduced to an acceptable level, and this impact would be **less than significant (LTS)**.

## Mitigation Measures

None required.

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