APPENDIX D: FACTUAL DETERMINATIONS REGARDING THE IMPACTS OF THE PROPOSED DISCHARGE ON THE AQUATIC ENVIRONMENT (40 C.F.R. § 230.11 AND SUBPARTS C, D, E, AND F)

APPENDIX D: FACTUAL DETERMINATIONS REGARDING THE IMPACTS OF THE PROPOSED DISCHARGE ON THE AQUATIC ENVIRONMENT (40 C.F.R. § 230.11 AND SUBPARTS C, D, E, AND F)

This appendix describes the potential short-term and long-term impacts of the proposed discharge associated with Alternative A, which has been determined to be the preliminary least environmentally damaging practicable alternative on the physical, chemical, and biological components of the aquatic ecosystem, as required by the Clean Water Act (CWA) Section 404(b)(1) Guidelines. The factual determinations regarding the physical, chemical, and biological components of the aquatic ecosystem are provided in Section D.1, Potential Effects of the Proposed Discharge on the Physical, Chemical, and Biological Components of the Aquatic Environment. Support for these factual determinations following Subparts C through F is provided in Section D.3, Support for Factual Determinations. These proposed factual determinations include, among other things, an analysis of the impacts of the proposed discharge on the physical substrate at the proposed disposal site, water circulation, suspended particulates and turbidity, contaminants, and aquatic organisms. This appendix also evaluates the potential impacts of the discharge on human use characteristics, including on water supplies, aesthetics, parks, national and historical monuments, and national natural landmarks.

D.1 Potential Effects of the Proposed Discharge on the Physical, Chemical, and Biological Components of the Aquatic Environment

This section provides the factual determinations required under the Section 404(b)(1) Guidelines (See, 40 Code of Federal Regulations [C.F.R.] § 230.11), as further detailed in 40 C.F.R. Sections 230.20–230.25.

D.1.1 Physical Substrate Determinations (40 C.F.R. §§ 230.11(a), 230.20)

Discharges of fill material into waters of the U.S. would alter the substrate of those waters, usually replacing the aquatic area with dry land or infrastructure and changing the physical, chemical, and biological characteristics of the substrate. Placement and compaction of imported fill would lead to direct impacts on the substrate in waters of the U.S. Fill materials may change elevations or bottom contours in areas where they are placed. Quarry stone, cobbles, or other erosion control materials may be placed near concrete structures at stream crossings and may also change substrate elevations and bottom contours. Grading and placement of fill in waters of the U.S. would result in a direct, permanent loss of jurisdictional waters and irreversible changes to the physical, chemical, and biological characteristics of the substrates at the location of the fill. Indirect impacts of Alternative A on the substrate of waters of the U.S., in the form of sedimentation of waters of the U.S. from erosion of fill areas, would occur only on a limited basis because measures would be implemented to control erosion and siltation. Measures to avoid and minimize this impact to the maximum extent practicable are described in Section D.3.1.1, Substrate (40 C.F.R. § 230.20). Cumulative impacts on substrates of waters of the U.S. could result in the replacement of substrates in waters of the U.S. with concrete or aggregate fill; however, these cumulative projects and Alternative A would be subject to environmental regulations that require “no net loss” of such waters.

D.1.2 Water Circulation, Fluctuation, and Salinity Determinations (40 C.F.R. §§ 230.11(b), 230.23–230.25)

Discharges of fill material into waters of the U.S. would result in permanent, direct, and localized impacts on existing drainage patterns. Discharges of fill could alter normal water fluctuations. Indirect impacts associated with the placement of fill in waters of the U.S. could lead to changes in hydrology, and corresponding changes in current patterns, water circulation, and normal water fluctuations. Measures to avoid and minimize these impacts are described in Section D.3.1.5, Current Patterns and Water Circulation (40 C.F.R. § 230.23), and Section D.3.1.6, Normal Water Fluctuations (40 C.F.R. § 230.24). Discharges of fill are not expected to change existing salinity gradients because all waterway crossings, as well as the proposed realignment of Visitacion Creek under the East Brisbane light maintenance facility (LMF) and the extension of the culvert at

Guadalupe Valley Creek, would be designed to provide unobstructed tidal water exchange. Cumulative impacts on water circulation, fluctuation, and salinity determinations of waters of the U.S. would be avoided through the incorporation of measures into the project design.

D.1.3 Suspended Particulates/Turbidity Determinations (40 C.F.R. §§ 230.11(c), 230.21)

Potential impacts on the aquatic ecosystem as a result of suspended particulates/turbidity would include reduced light penetration leading to lower rates of photosynthesis and the primary productivity of the aquatic area, increased sedimentation, and degraded water quality. Measures to avoid and minimize these impact to the maximum extent practicable are described in Section D.3.1.2, Suspended Particulates/Turbidity (40 C.F.R. § 230.21). Other development and transportation projects in the San Francisco Bay and Coyote U.S. Geological Survey (USGS) hydrologic unit code (HUC)-8 watershed subbasins (i.e., surface water resource study area [RSA]; see Section 2.6.1.4, Cumulative Impacts, of the Checkpoint C Summary Report), combined with Alternative A, would result in cumulative impacts on water circulation, fluctuation, and salinity determinations. Cumulative projects, including Alternative A, would be subject to regulations and permits required by the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) to minimize impacts on water quality. In addition, compliance with Section 404 and 401 of the CWA would be required for each project, including the high-speed rail (HSR) project, which would reduce cumulative impacts to the maximum extent practicable.

D.1.4 Contaminant Determinations (40 C.F.R. § 230.11(d))

The discharge of fill material placed in waters of the U.S. may contain contaminants, introduced in both suspended or dissolved forms, and result in direct, permanent, and irreversible changes to the chemical characteristics of the substrates at the location of the discharge. The discharge of fill in waters of the U.S. could also change current patterns and water circulation, which could result in downstream substrate erosion, which could result in impacts on aquatic communities or wetland plant communities downstream of the discharge. Cumulative projects could also result in cumulative impacts on jurisdictional waters from the introduction of new chemical constituents in suspended or dissolved form and in substrate disturbance. Additionally, these projects could contribute to the cumulative surface water quality degradation and the collective impact of development could degrade stormwater quality by contributing pollutants during placement of fill in waters of the U.S. within the surface water RSA. Measures to avoid and minimize these impacts are described in Section D.3.1.3, Contaminant Determinations (40 C.F.R. § 230.11(d)).

D.1.5 Aquatic Ecosystem and Organism Determinations (40 C.F.R. §§ 230.11(e), 230.31)

As discussed in Section D.3.2, Subpart D—Potential Impacts on Biological Characteristics of the Aquatic Ecosystem, Alternative A would have direct impacts, through the introduction of fill, on aquatic organisms that occur in waters of the U.S., including fish, crustaceans, mollusks, and other organisms. Threatened and endangered species and other wildlife (resident and transient mammals, birds, reptiles, and amphibians [40 C.F.R. § 230.32(a)]) that occur in aquatic ecosystems would also be impacted. Alternative A would also have indirect impacts, through habitat degradation, on these organisms. With the inclusion of the measures specified in Section D.3.2, however, the proposed discharge associated with Alternative A would not impact the structure and function of the aquatic ecosystem and organisms. The support for this conclusion is provided in the discussions of direct impacts, indirect impacts, cumulative impacts, and secondary effects on threatened and endangered species, aquatic organisms in the food web, and other wildlife presented in Sections D.3.2.1, Threatened and Endangered Species (40 C.F.R. § 230.30), D.3.2.2, Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web (40 C.F.R. § 230.31), and D.3.2.3, Other Wildlife (40 C.F.R. § 230.32), respectively.

D.1.6 Proposed Disposal Site Determinations (40 C.F.R. § 230.11(f))

Alternative A would entail the placement of fill material in wetlands and nonwetland waters of the U.S. (i.e., disposal sites). Permanent fill material could include imported well-graded soils, sub-ballast, ballast, slab or precast reinforced concrete, or concrete girders. Culverts placed in natural and constructed watercourses would consist of precast reinforced concrete pipe or concrete box culverts. At larger crossings (e.g., major watercourses or waterbodies), bridges and elevated structures would consist of cast-in-place or precast reinforced concrete girders and piles. The fill material would consist of solid or otherwise stable materials, such as precast concrete, which would not leach contaminants into waters of the U.S. or otherwise degrade water quality.

Disposal sites include the following:

- Freshwater emergent wetland drainage ditch west of Caltrain tracks between Egbert Avenue and Salinas Avenue (San Francisco)
- Freshwater emergent wetlands west of Tunnel Avenue (Brisbane)
- Scrub/shrub wetlands west of Tunnel Avenue (Brisbane)
- Saline emergent wetlands at northwestern and southwestern corners of Brisbane Lagoon
- Freshwater emergent wetland between Caltrain tracks and Ingold Road (Millbrae)
- Freshwater emergent wetland along Sanchez Creek Tributary, southwest of Caltrain tracks (Burlingame)
- Freshwater emergent wetland along Fiesta Creek between Caltrain tracks and South Delaware Street (San Mateo)
- Freshwater emergent wetland along Laurel Creek Tributary between Caltrain tracks and El Camino Real (Belmont)
- Constructed watercourses:
  - Visitacion Creek
  - Drainage ditches east or west of Caltrain tracks between South Linden Avenue and Interstate 380 (San Bruno)
  - Colma Creek
  - El Zanjon (aka Cupid Row Canal)
  - Highline Creek Tributary (aka South Lomita Canal)
  - Easton Creek
  - Sanchez Creek
  - Burlingame Creek
  - Matadero Creek
  - Barron Creek
  - Belmont Creek
  - Pulgas Creek
  - Atherton Channel
  - Matadero Creek
  - Adobe Creek
  - Permanente Creek
  - Sunnyvale East Channel
  - Calabazas Creek
  - San Tomas Aquino Creek
- Natural watercourses:
  - Guadalupe Valley Creek
  - Mills Creek
  - San Mateo Creek
  - Borel Creek

- Cordilleras Creek
- San Francisquito Creek
- Stevens Creek

The above disposal sites were identified based on their location within the project footprint and are therefore a conservative representation of the total number of sites that would actually be filled. It is anticipated that many of these sites would be avoided during construction because of opportunities for avoidance provided by design refinements and construction planning. For example, the 1.7 acres of saline emergent wetland within the project footprint (i.e., Caltrain right-of-way) at Brisbane Lagoon would likely be avoided during construction because there are no proposed structures or infrastructure in the wetlands. With the exception of Visitacion Creek, most of the watercourses that cross the project footprint under existing Caltrain bridges and there would be no construction activities in or adjacent to the watercourse channels at these locations. Where fill does occur, the mixing zone would be confined to the smallest practicable zone at each disposal site by implementing the measures described in Section D.3.1.2. For example, the SWRCB Construction General Permit (CGP) stormwater pollution prevention plan (SWPPP) would include measures to minimize the spread of construction-related contaminants, stormwater runoff, and excess sediment into portions of the disposal site that are outside of but adjacent to the areas of discharged fill. Such measures would also specify how the dispersion of discharged fill into adjacent waters would be controlled, including methods to confine suspended particulates/turbidity to a small area (40 C.F.R. § 270.73(c)).

D.1.7 Determination of Cumulative Effects on the Aquatic Ecosystem (40 C.F.R. § 230.11(g))

Alternative A would result in an incremental contribution to cumulative impacts on the physical and chemical characteristics of the aquatic ecosystem from other development and transportation projects in the region, but this incremental contribution would be minimized through the implementation of measures described in Section D.3.1, Subpart C—Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem. The support for this conclusion is provided in the discussions of cumulative impacts for each physical or chemical characteristic (e.g., substrate, suspended particulates, water) presented in Section D.3.1.

Alternative A would also result in an incremental contribution to cumulative impacts on biological characteristics of the aquatic ecosystem from other development and transportation projects in the region, but this incremental contribution would be minimized through the implementation of measures described in Section D.3.2. The support for this conclusion is provided in the discussions of cumulative impacts for each biological characteristic (e.g., threatened or endangered plants, fish, and wildlife; fish, crustaceans, mollusks, and other aquatic organisms) presented in Section D.3.2.

D.1.8 Determination of Secondary Effects on the Aquatic Ecosystem (40 C.F.R. § 230.11(h))

Secondary effects on the aquatic ecosystem are those associated with a discharge of fill material that do not result from the actual placement of the fill material in waters of the U.S. Secondary effects on aquatic ecosystems may occur as a result of HSR construction and operation. Secondary effects are effects on the aquatic ecosystem attributable to the project in general, which are dependent on and enabled by discharges of fill into waters. Construction of Alternative A would require such activities as channel widening, placement of concrete footings, installation of culverts, and other discharges of fill material in the aquatic ecosystem. Soil excavation, placement of construction materials in uplands, construction of impervious surfaces such as parking lots, and other activities in uplands are dependent on the placement of fill material in the aquatic ecosystem. Such activities could affect the aquatic ecosystem as a result of increased peak runoff flows, accelerated erosion, contamination by urban runoff pollutants, and other effects.

On-site stormwater management measures and facilities would be designed and constructed to capture and detain runoff on-site and to reduce off-site runoff such as constructed wetland

systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters) (HYD-IAMF#1: Stormwater Management).

D.2 Findings of Compliance (40 C.F.R. § 230.12)

As documented in Sections D.1.1, Physical Substrate Determinations (40 C.F.R. §§ 230.11(a), 230.20) through D.1.8, Determination of Secondary Effects on the Aquatic Ecosystem (40 C.F.R. § 230.11(h)), Alternative A would result in the discharge of fill material in waters of the U.S. Measures included for Alternative A would avoid impacts on the chemical, physical, and biological integrity of waters of the U.S. to the maximum extent practicable and minimize the impacts that cannot be avoided, such that along with compensatory mitigation, these sites would result in a minimal loss of environmental values and would not result in or contribute to a significant degradation of the aquatic environment. Alternative A would comply with CWA Section 404(b)(1) Guidelines as follows:

- The proposed discharge on **physical substrates** would be offset by implementing the measures described in Section D.3.1.1.
- The proposed discharge would avoid or minimize effects on **water circulation, fluctuation, and salinity** by implementing the measures described in Section D.3.1.5, Section D.3.1.6, and Section D.3.1.7, Salinity Gradients (40 C.F.R. § 230.25).
- The proposed discharge would avoid or minimize effects on waters of the U.S. from **suspended particulates/turbidity** by implementing the measures described in Section D.3.1.2.
- The proposed discharge would avoid or minimize effects on waters of the U.S. from **contaminants** by implementing HMW-IAMF#9: Environmental Management System, and the measures described in Section D.3.1.3.
- The proposed discharge would avoid or minimize effects on the **aquatic ecosystem and organisms** by implementing the measures described in Section D.3.2.
- Proposed **disposal sites** are specified in Section D.1.6, Proposed Disposal Site Determinations (40 C.F.R. § 230.11(f)). Alternative A would avoid impacts at the disposal sites to the maximum extent practicable and would minimize the impacts that cannot be avoided by implementing the measures described in Section D.3.1.2. The loss of waters of the U.S. at these disposal sites would be offset by preparing and implementing a compensatory mitigation plan for impacts (BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources).
- The proposed discharge would result in an incremental contribution to **cumulative effects** on the aquatic ecosystem but would be minimized and offset by implementing the measures described in Section D.3.
- The proposed discharge would avoid or minimize **secondary effects** on the aquatic ecosystem through on-site stormwater management and design features (HYD-IAMF#1).

Based on the foregoing, the proposed disposal sites for discharge of fill material complies with the Section 404(b)(1) Guidelines.

D.3 Support for Factual Determinations

The information in the following subsections supports the factual determinations provided in Section D.1.

D.3.1 Subpart C—Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

For the purposes of evaluating proposed impacts on jurisdictional waters, an aquatic RSA was established, which encompasses the project footprint and a 250-foot buffer surrounding the project footprint. The aquatic RSA, located on the west side of the San Francisco Bay, passes through two major geophysical regions (distinct landscapes)—the San Francisco Peninsula and

the Santa Clara Valley. Elevations in the aquatic RSA range from approximately 1 foot below sea level at the northern end of the aquatic RSA to 74 feet above sea level in the southern part of San Francisco. Most of the slopes are nearly level to gently sloping.

A surface water RSA was also created that encompasses receiving waters within the areas of disturbance, as defined by the two USGS HUC-8 watershed subbasins that overlap with the project footprint—San Francisco Bay (HUC-8 118050003) in the north and Coyote (HUC-8 18050003) in the south (USEPA 2018). This is the same area evaluated for cumulative impacts on the aquatic ecosystem pursuant to 40 C.F.R. Section 230.11(g).

D.3.1.1 Substrate (40 C.F.R. § 230.20)

The natural landforms in the aquatic RSA consist of tidal marshes, dunes, recent alluvial fans and floodplains, and uplands and mountain slopes. The characteristics of the substrate that underlie the wetlands and nonwetland waters in the aquatic RSA vary widely and include native soil, sediments, and rocks, as well as imported material such as spoils soil, concrete, asphalt, and other waste materials. In some cases, the waste materials have been mixed with the underlying native soils and sediments.

Based on soil pits excavated and other field observations made during the wetland delineation field surveys conducted in the aquatic RSA, in most areas the substrate underlying the wetlands and nonwetland waters includes both native soil and fill material. The soil in these areas is primarily low in organic matter or is inorganic. The soil texture ranges from clay to extremely gravelly sandy loam. The soil material in the beds of (nonwetland waters) steeper-gradient stream channels tends to be coarser than the soil in wetlands and in some cases the soil is crudely stratified. In some areas, the native surface and subsurface layers have been removed by construction activities, exposing the native subsoil or parent material.

The remaining areas generally correspond to the saline emergent wetlands, which occur, for example, along the shoreline of Brisbane Lagoon. The substrate in these areas consists of high organic-matter-content mineral soils that are clayey and have moderate salinity (U.S. Department of Agriculture, Natural Resources Conservation Service 2018). The soils are underlain by Bay mud a few feet below existing grade.

Direct Impacts

Construction of Alternative A would require the use of heavy machinery for grading, excavation, and placement of permanent fill in constructed watercourses and natural waterbodies (e.g., natural watercourses). Fill that may be placed in waters of the U.S. include imported well-graded soils, subballast (coarse-grained material), ballast (crushed stone), and slab (concrete). Culverts placed in natural and constructed watercourses would consist of precast, prestressed concrete pipe; corrugated steel pipe; and concrete box culverts.

Placement and compaction of imported fill would lead to direct impacts on the substrate in waters of the U.S. Fill materials may change elevations or bottom contours in areas where they are placed. Quarry stone, cobbles, or other erosion control materials may be placed near concrete structures at stream crossings and may also change substrate elevations and bottom contours.

Placement of fill in waters of the U.S. would result in irreversible changes to the physical, chemical, and biological characteristics of the substrates at the location of the fill within the disposal sites. Specifically, Alternative A would result in the crossing of linear jurisdictional waters (i.e., natural and constructed watercourses) and potential placement of fill in freshwater emergent wetlands, scrub/shrub wetlands, and saline emergent wetlands.

Construction of Alternative A would result in direct temporary and permanent impacts on waters of the U.S. The temporary construction effects on wetlands and nonwetland waters would involve substrate grading, excavation, and adjoining construction of cut-and-fill slopes, as well as shallow soil disturbance and compaction from heavy equipment passage through the aquatic areas. The permanent construction effects could extend for the entire construction period in a given area and would end with recontouring the disturbed areas to the original grade, soil scarification/soil decompaction, and revegetation of the disturbed area.

Indirect Impacts

Indirect impacts of Alternative A on the substrate of waters of the U.S. could occur as a result of sedimentation of waters from erosion of fill areas. The deposited sediment could differ in particle size than that of the substrate, would raise the elevation and bottom contours of the jurisdictional waters, and could cause a shift in wetland plant community. However, any such erosion would occur on a limited basis because measures would be implemented to control erosion and siltation.

Cumulative Impacts

The area evaluated for cumulative impacts is equivalent to the surface water RSA and consists of the San Francisco Bay (HUC 118050003) and Coyote (HUC 18050003) watershed subbasins (USEPA 2018). The natural hydrology of both watersheds has been substantially altered by dense urbanization. Based on observations made during the course of field surveys conducted in support of the *San Francisco to San Jose Project Section Aquatic Resources Delineation Report* (Aquatic Resources Delineation Report) (Authority 2020) for the aquatic RSA and the fact many of the mapped nonwetland waters features were classified as constructed watercourses, a large proportion of the disposal site substrates are either artificial or are highly modified from their pre-development condition.

Development and transportation projects within the surface water RSA would result in the discharge of fill material into waters of the U.S. Such discharge could result in the addition of fill material in waters of the U.S. so that existing substrate at each disposal site would be replaced with concrete or aggregate fill. While these projects would discharge fill into and replace the substrate of waters of the U.S., they would be subject to environmental regulations that require "no net loss" of such waters.

Secondary Effects

Secondary effects of Alternative A on the substrate of waters of the U.S. could occur as a result of sedimentation of waters from erosion of upland areas. The deposited sediment could differ in particle size than that of the substrate, would raise the elevation and bottom contours of the jurisdictional waters, and could cause a shift in wetland plant community. However, any such erosion would occur on a limited basis because measures would be implemented to control erosion and siltation.

D.3.1.2 Suspended Particulates/Turbidity (40 C.F.R. § 230.21)

Direct Impacts

Construction of HSR infrastructure under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. These disturbances would cause resuspension of bottom sediments and underlying materials at the location of the fill, reducing light penetration and lowering the rate of photosynthesis and the primary productivity of aquatic species.

However, the potential for permanent impacts from suspended particles and turbidity would be minimal as a result of the measures incorporated into the design of Alternative A. Measures would be implemented to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column at the location of fill. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work, consistent with (HYD-IAMF#3: Prepare and Implement a Construction Stormwater Pollution Prevention Plan) and the SWRCB CGP SWPPP. As a result, direct impacts on water quality associated with sedimentation or turbidity would be minimized or avoided.

Indirect Impacts

Construction of HSR infrastructure under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. These disturbances would cause

resuspension of bottom sediments and underlying materials, thereby increasing the likelihood that the disturbed particulates would be entrained by flowing water. Where the substrate disturbance occurs in waters of the U.S. stream channels, the suspended material could be carried downstream, causing turbidity plumes. The increased downstream turbidity could also reduce light penetration and lower the rate of photosynthesis and the primary productivity of aquatic species.

However, the potential for permanent impacts from suspended particles and turbidity would be minimal as a result of the measures incorporated into the design of Alternative A. Measures would be implemented to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work and installation of turbidity curtains to control downstream movement of particulates, consistent with HYD-IAMF#3 and the SWRCB CGP SWPPP. As a result, indirect impacts on water quality associated with sedimentation or turbidity would be minimized or avoided.

Cumulative Impacts

Under the cumulative condition, ongoing urban development is expected to continue within the surface water RSA. The projected population growth will translate into an increased intensification of existing developed land uses and a continued conversion of currently undeveloped lands to residential, small business, and light industrial uses, as well as the transportation infrastructure needed to support this development.

Construction of development and transportation projects in the surface water RSA would result in the discharge of fill material into jurisdictional waters, including wetlands and nonwetland waters. Such discharge could result in increased siltation and turbidity in streams and other waterbodies.

Direct impacts of these projects on jurisdictional waters include temporarily reduced channel capacity and reduced light penetration at the location of fill in waters of the U.S., leading to lower rates of photosynthesis and primary productivity in wetlands from elevated levels of suspended particulates in the water column. Indirect impacts of these projects on jurisdictional waters include increased pollution and decreased water quality downstream of fill placed in waters of the U.S. Cumulative impacts related to increased sedimentation and turbidity would occur due to the scale of anticipated development throughout the region, which would increase the overall amount of fill in waters of the U.S. and creation of new sources of pollutants that discharge into jurisdictional waters.

However, like Alternative A, other projects would be subject to regulations and permits required by the SWRCB and the RWQCB to minimize impacts on water quality (e.g., the statewide CGP and the statewide Industrial General Permit). In addition, compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. These regulations are in place to prevent new developments and infrastructure from resulting in violations of water quality standards. Alternative A includes measures that would minimize impacts related to increased sedimentation and turbidity by minimizing the contribution of Alternative A to local and regional impacts of erosion and non-point-source runoff through implementation of erosion control and runoff management measures. With implementation of the measures described in Section D.3.1.2 under the subheading Direct Impacts, the incremental contribution of Alternative A to cumulative impacts would be minimized.

Secondary Effects

Construction of Alternative A would require excavation, grading, and use of on-site and imported construction materials, and establishing construction staging areas in upland areas. The disturbed areas could be subject to erosion and transport of fine-grained particulates into adjacent waters of the U.S., thereby increasing the turbidity of the water column and causing a sediment plume.

Secondary effects of construction activities would be minimized through compliance with a variety of regulations. The construction activities would be conducted in accordance with the San Francisco Bay RWQCB dewatering requirements, CGP (HYD-IAMF#3), the California Department of Transportation (Caltrans) *Field Guide to Construction Dewatering* (Caltrans 2014; GEO-IAMF#10: Geology and Soils), and permits and approvals from applicable regulatory agencies, such as the U.S. Army Corps of Engineers (USACE), SWRCB, National Marine Fisheries Service (NMFS), and California Department of Fish and Wildlife (CDFW). These activities and regulatory permits and approvals would require best management practices (BMP) for dewatering options and management, erosion control, and soil stabilization to avoid discharging water in a manner and at rates that cause substantial changes in surface water hydrology, resulting in erosion and sedimentation, and to avoid corresponding impacts on jurisdictional waters. Additionally, the SWRCB would require receiving water quality monitoring for any construction activity in the wetted part of a stream or wetland to prevent construction activities causing substantial erosion or sedimentation.

Prior to construction, the construction contractor would be required to develop and implement a SWPPP compliant with the CGP (HYD-IAMF#3), which allows sediment production rates from construction sites during and after construction to be only marginally above pre-construction rates. The construction contractor's Qualified SWPPP Developer (QSD) would prepare the SWPPP, which would identify stormwater BMPs that minimize erosion and subsequent sedimentation of the aquatic environment that may result from construction activities. The construction contractor's Qualified SWPPP Practitioner would be responsible for implementing the SWPPP. As part of that responsibility, the effectiveness of construction BMPs must be monitored before, during, and after storm events. The QSD may prescribe additional BMPs as required so that water quality standards are met at the point where runoff leaves the construction site or enters receiving waters. Additionally, temporary drainage systems would be used in areas with major earthmoving activities to maintain existing drainage patterns while controlling erosion and sedimentation from runoff flowing over the disturbed soil and stockpiled material.

The potential for secondary effects from suspended particles and turbidity would be minimized or avoided as a result of these measures.

D.3.1.3 Contaminant Determinations (40 C.F.R. § 230.11(d))

Construction of Alternative A would entail placing materials (i.e., fill including imported well-graded soils, subballast [coarse-grained material], ballast [crushed stone] and slab [concrete]) in waters of the U.S. Culverts placed in natural and constructed watercourses would consist of precast, prestressed concrete pipe, corrugated steel culverts, or concrete box culverts.

Direct Impacts

Construction of Alternative A would require placement of fill in waters of the U.S. Alternative A includes measures that would reduce the potential for contaminants in fill material, and thus would reduce the potential for discharge of such contaminants to waters of the U.S. In particular, the California High-Speed Rail Authority (Authority) would implement HMW-IAMF#9 to identify hazardous substances in the material selection process and avoid and minimize the use of such material during construction of the HSR system, which would in turn avoid or minimize the potential for direct, permanent, and irreversible changes to the chemical characteristics of the substrates at the location of the fill.

Indirect Impacts

The placement of fill in waters of the U.S. could change current patterns and water circulation which could result in downstream substrate erosion. If downstream substrate that is eroded by changes in current patterns and water circulation contains contaminants, such contaminants could be resuspended and affect aquatic communities or wetland plant communities. Measures described in Section D.3.1.5 would minimize alterations to current patterns, which would avoid or minimize changes to substrate erosion. These measures would address the potential for resuspending potential contaminants. Therefore, Alternative A would not result in indirect impacts

related to the discharge of fill that would introduce, relocate, or increase contaminants in waters of the U.S.

Cumulative Impacts

Development and transportation projects in the surface water RSA would result in the discharge of fill material into jurisdictional waters, including wetlands (e.g., freshwater emergent wetlands, saline emergent wetlands, scrub-shrub wetlands). Such discharge could lead to water quality impacts on jurisdictional wetlands and nonwetland waters from the placement of contaminated fill material into waters of the U.S.

Under the cumulative condition, ongoing urban development is expected to continue in the surface water RSA. Between 2015 and 2040, population is projected to increase in San Francisco, San Mateo, and Santa Clara Counties by about 20 percent, 15 percent, and 22 percent, respectively. This substantial growth in population will translate into continued conversion of currently undeveloped or otherwise idle lands to residential, small business, light industrial, and freight rail uses, plus the transportation infrastructure needed to support the additional development. Reasonably foreseeable projects that would cumulatively contribute to impacts on jurisdictional waters include construction of shopping centers, residential developments, and planned transportation projects defined in the various regional transportation plans for each of the three counties, such as interchange reconstruction and auxiliary lane construction projects, terminal improvements at San Francisco International Airport (SFO), the Bay Area Rapid Transit to Silicon Valley Project, and Port of San Francisco Downtown Ferry Terminal Improvements. Direct impacts of these projects on jurisdictional waters could involve the introduction of new chemical constituents in suspended or dissolved form and in substrate disturbance. Additionally, these projects could contribute to the cumulative surface water quality degradation and the collective impact of development could degrade stormwater quality by contributing pollutants during placement of fill in waters of the U.S. within the surface water RSA.

Accordingly, construction of these projects would have the potential to result in cumulative impacts on surface water and stormwater quality. However, regulatory standards (i.e., National Pollutant Discharge Elimination System permit, municipal separate storm sewer system [MS4] permit, and local stormwater requirements), and measures required as conditions of individual project approvals would minimize water quality impacts associated with construction. With these measures in place, construction and operations of Alternative A in combination with other projects are not expected to violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.

Secondary Effects

Construction materials placed in upland areas as a result of construction of Alternative A would be subject to HMW-IAMF#9, which would reduce the potential for the material to contain contaminants, and therefore would also reduce the potential for indirect discharge of these contaminants into waters of the U.S. In addition, measures incorporated into the design of Alternative A would minimize alterations to drainage patterns in upland areas, which would minimize erosion of the substrate and subsequent discharge of contaminants into waters of the U.S.

Secondary effects of contaminants on waters of the U.S. could occur as a result of erosion or scour of upland fill material and subsequent movement of contaminants downstream. The material disturbed or placed in upland areas may contain contaminants, which could affect receiving waters downstream if subjected to erosion or scour.

Alternative A includes measures that would reduce the potential for contaminants in fill material, and thus would reduce the potential for discharge of such contaminants to waters of the U.S. In particular, the Authority would implement HMW-IAMF#9 to identify hazardous substances in the material selection process and avoid and minimize the use of such material during construction of the HSR system.

D.3.1.4 Water (40 C.F.R. § 230.22)

Direct Impacts

Potential impacts on the aquatic ecosystem as a result of changes in chemistry and physical characteristics of the receiving water at a disposal site include discharge of pollutants into waters of the U.S., reduced light penetration leading to lower rates of photosynthesis and the primary productivity of the aquatic area, increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand at the location of fill. Such changes could cause reduced dissolved oxygen levels, thereby potentially affecting the survival of many aquatic organisms. No direct impacts on human uses of waters of the U.S. (including municipal or private water supplies, recreational or commercial fisheries, water-related recreation, or aesthetics) would occur because these uses are either nonexistent or not dependent upon water quality in the RSA.

Impacts on water quality would be avoided or minimized through measures to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column at the location of fill as well as regulations and permits required by SWRCB and San Francisco Bay RWQCB to minimize impacts on water quality. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work, consistent with HYD-IAMF#3 and the SWRCB CGP SWPPP.

Indirect Impacts

The placement of fill in waters of the U.S. could result in changes in current patterns and water circulation which could result in downstream substrate erosion, leading to reduced light penetration and lower rates of photosynthesis and the primary productivity of the aquatic area, increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand. Such changes could cause reduced dissolved oxygen levels, thereby potentially affecting the survival of many aquatic organisms downstream of the location of fill in waters of the U.S.

Indirect impacts on water quality would be avoided or minimized through implementation of HYD-IAMF#3. Specifically, the SWRCB CGP SWPPP prepared in adherence to HYD-IAMF#3 would describe the stormwater and nonstormwater BMPs that would be executed to minimize or eliminate releases of (high-pH) concrete washwater, soil stabilization chemicals (e.g., lime), pesticides, fertilizers, and other deleterious substances directly or indirectly into waters of the U.S.

No indirect impacts on human uses of waters of the U.S. (including municipal or private water supplies, recreational or commercial fisheries, water-related recreation, or aesthetics) would occur because these uses are either nonexistent or not dependent upon water quality in the RSA.

Cumulative Impacts

The area evaluated for cumulative impacts is equivalent to the surface water RSA and consists of the San Francisco Bay (HUC 118050003) and Coyote (HUC 18050003) watershed subbasins (USEPA 2018). The natural hydrology of both watersheds has been substantially altered by dense urbanization. Based on observations made during the course of field surveys conducted in support of the Aquatic Resources Delineation Report (Authority 2020) for the aquatic RSA and the fact that many of the mapped nonwetland waters features were classified as constructed watercourses, a large proportion of the disposal site substrates are either artificial or are highly modified from their pre-development condition.

Development and transportation projects within the surface water RSA would result in the discharge of fill material into waters of the U.S. The placement of fill in waters of the U.S. could result in changes in current patterns and water circulation which could result in substrate erosion in streams and other waterbodies. These effects would reduce light penetration, leading to lower rates of photosynthesis and the primary productivity of the aquatic area, increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand. Such changes could cause reduced

dissolved oxygen levels, thereby potentially affecting the survival of many aquatic organisms. While these projects would discharge fill into and replace the substrate of waters of the U.S., they would be subject to regulations and permits required by the SWRCB and the RWQCB to minimize impacts on water quality (e.g., the statewide CGP and the statewide Industrial General Permit). In addition, compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. These regulations are in place to prevent new developments and infrastructure from resulting in violations of water quality standards. With adherence to permits and regulatory requirements as well as implementation of the measures described in Section D.3.1.2 under the subheading Direct Impacts, the incremental contribution of Alternative A to cumulative impacts would be minimized.

Minimal impacts on human uses of waters of the U.S. (including municipal or private water supplies, recreational or commercial fisheries, water-related recreation, or aesthetics) are anticipated to occur because water quality and the discharge of fill is highly regulated by federal, state, and regional regulations that would avoid or minimize impacts from cumulative projects.

Secondary Effects

Construction of Alternative A would require excavation, grading, and use of on-site and imported construction materials, and establishing construction staging areas in upland areas. The disturbed areas could be subject to erosion and transport of fine-grained particulates into adjacent waters of the U.S., thereby increasing the turbidity of the water column and causing a sediment plume, leading to reduced light penetration, lower rates of photosynthesis and the primary productivity of the aquatic area, increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand. Operations could also result in the indirect discharge of pollutants into waters of the U.S., including pesticides and fertilizers, which could degrade water quality. Such changes could cause reduced dissolved oxygen levels, thereby potentially affecting the survival of many aquatic organisms downstream of the location of fill in waters of the U.S.

Secondary effects on water quality would be avoided or minimized through the measures and permit conditions described in Direct Impacts, as well as HYD-IAMF#3. Specifically, the SWRCB CGP SWPPP prepared in adherence to HYD-IAMF#3 would describe the stormwater and nonstormwater BMPs that would be executed to minimize or eliminate releases of (high-pH) concrete washwater, soil stabilization chemicals (e.g., lime), pesticides, fertilizers, and other deleterious substances directly or indirectly into waters of the U.S.

No secondary effects on human uses of waters of the U.S. (including municipal or private water supplies, recreational or commercial fisheries, water-related recreation, or aesthetics) would occur because these uses are either nonexistent or not dependent upon water quality in the RSA.

D.3.1.5 Current Patterns and Water Circulation (40 C.F.R. § 230.23)

Most watercourses in the watersheds in the surface water RSA (i.e., the Bernal Heights, Candlestick Point, Oyster Point, and Coyote Point CalWater Planning Watersheds) are perennial, flowing year-round except in times of drought. Outside the surface water RSA, the mid to upper reaches of tributary streams are intermittent or perennial in summer, depending on the characteristics of local aquifers. However, historically (i.e., before urbanization), most watercourses in the surface water RSA were dry during the summer (Beller et al. 2012). As patterns of water use and water importation have evolved, many watercourses have experienced increased summer flow (Santa Clara Basin Watershed Management Initiative 2000). Today, some watercourses are perennial in their lower reaches as a result of urban runoff or high groundwater, while others flow because of artesian wells, springs, and water releases. Reservoir operators and water managers release some flows in the summer to promote groundwater recharge, contributing to the perennial nature of streams in the RSA.

Surface runoff in the vicinity discharges into a network of underground and surface drainage pathways (including the combined sewer system in San Francisco). Generally, these pathways converge into larger underground storm drains, drainage culverts, streams, or creeks, which

become progressively larger as the runoff moves downstream, eventually reaching a common discharge location, often near the San Francisco Bay.

The extensive development in the San Francisco Bay Area (Bay Area) has altered natural hydrology and drainage patterns. Historically, small watercourses in the aquatic RSA flowed primarily from west to east, draining to the San Francisco Bay. However, as the region urbanized, most of the watercourses in the aquatic RSA were channelized and covered over and now function as underground drains. Consequently, there are few remaining freshwater bodies or streams in the aquatic RSA that retain natural conditions (San Francisco Public Utilities Commission [SFPUC] 2008; Hermstad et al. 2009; Beller et al. 2012). Additionally, development has obscured and modified the historic watershed boundaries.

Alterations to both surface water and groundwater in the region have resulted in a decline in historical wetland areas, especially along the San Francisco Bay. This decline is reflected in "drained" or "partially drained" hydric soils that have been mapped in the area (see Section 3.6, Hydric Soils, of the Aquatic Resources Delineation Report [Authority 2020]).

Hydrologic conditions in the aquatic RSA have been highly manipulated in urban areas. Most of the surface water in the aquatic RSA is diverted by the numerous constructed and natural watercourses that are found throughout the San Francisco Peninsula and Santa Clara Valley. Consequently, most of the surface water in the aquatic RSA is found either in canals, ditches, reservoirs, channelized streams, or in water retention and detention basins but is occasionally found in streams, generally in their natural condition or in precipitation-fed wetlands. Many of the remaining wetlands in the aquatic RSA are largely unrelated to historical floodplains or regional aquifers.

Direct Impacts

Alternative A construction would require the placement of permanent fill in waters of the U.S., which could alter existing drainage patterns, and result in hydrologic and hydraulic impacts on waterbodies crossed by Alternative A. Placement of fill material in waters of the U.S., particularly in stream channels, could affect current patterns and water circulation with the channel by partly restricting the flow, changing the direction or velocity of water locally, and otherwise change the cross-sectional dimensions of the channel. The impacts of Alternative A on water circulation would be comparatively more pronounced where Visitacion Creek flows through the East Brisbane LMF site. Work at this site would entail relocating the alignment of and converting the 900-foot reach of the (now open) channel to an underground culvert. The new permanent fill and culverted channel could alter channel flow patterns and water circulation by constricting the flow and change the direction or velocity of the flow and water circulation. Such changes could affect the structure and dynamics of aquatic communities, increase or decrease shoreline and substrate erosion and deposition rates, alter rates of and location of deposition of suspended particulates, and modify the rate and extent of mixing of dissolved and suspended components of the affected waterbody.

At-grade crossings of stream channels would require bridge abutments on banks or, in some locations, the alignment would cross natural waterbodies using box culverts. Bridge components could obstruct the ability of the waterbody to convey peak flows by reducing its channel capacity and possibly by raising flood elevations locally, altering erosional rates of deposition and/or the location of deposition of suspended particulates, which could affect waters of the U.S. The Authority has established HYD-IAMF#1 to design the realigned Visitacion Creek and all other crossings in a manner that would maintain the existing current patterns and hydraulic capacity of the channels to avoid or minimize impacts.

Indirect Impacts

Alternative A could lead to changes in hydrology, which could result from construction activities associated with the placement of various structures (fill) within waters of the U.S. that are also within a flood zone designated by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program. Construction activities include the placement of fill in Zone A flood zones (i.e., areas with a 1 percent or greater annual chance of flooding) of Colma, San

Mateo, Laurel, Belmont, San Francisquito, Permanente, Stevens, Calabazas, and other creeks. Alternative A would cross approximately 54.2 acres of 100-year flood zone (Zones A, AE, AE [floodway], AH, and AO) areas. The Authority would comply with Flood Disaster Protection Act of 1973 and U.S. Presidential Executive Order 11988 (Floodplain Management) requirements for water crossings that enhance or maintain flood system and flood flow capacity, and reduce potential impedances of stormwater flows and flood risks and associated hydrology and hydromodification changes. The design of Alternative A, including flood and stormwater protection measures and the above regulations, would avoid the impacts of placing structures in the floodplains and floodways.

The impacts of Alternative A on water circulation would be comparatively more pronounced where Visitacion Creek would be converted to a culvert under the East Brisbane LMF. Visitacion Creek is a constructed, tidally influenced drainage channel with an approximate 1,000-acre watershed. The creek daylights from under the main tracks on the west side of the LMF site and flows in an open channel from a drainage structure west of Tunnel Avenue to a culvert under U.S. Highway (US) 101. Converting the creek from an open, semi-natural channel to a culvert would cause the stream flow to move through the site at a higher rate than presently occurs. The Authority has established HYD-IAMF#1 to design all crossings in a manner that would maintain the existing current patterns and hydraulic capacity of the channels to avoid or minimize impacts.

Cumulative Impacts

The cumulative RSA is defined as the CalWater Planning Watersheds that would be crossed by Alternative A. Under the cumulative condition, construction of development and transportation projects in the surface water RSA would result in discharge of fill material into jurisdictional waters, including wetlands and nonwetland waters.

Cumulative development involving placement of fill material would result in changes to existing on-site drainage patterns. However, design characteristics, regulatory standards (i.e., Section 404 of the CWA), and avoidance measures required as conditions of individual project approvals would minimize the impact on existing patterns of water circulation. Alternative A would incorporate measures to minimize impacts on drainage patterns from the placement of fill in waters of the U.S. Therefore, a cumulative impact would not occur.

Secondary Effects

Secondary effects of Alternative A construction include the introduction of impervious surfaces where they currently do not exist, which would have the potential to increase the rate and amount of stormwater runoff and cause erosion in areas adjacent to the new impervious surface and in new or existing drainage channels. However, the effects of the new impervious surfaces would be minimized as part of the design of Alternative A and requirements of CGP permit, MS4 permit, and local stormwater compliance, and other avoidance measures required as conditions of individual project approvals.

D.3.1.6 Normal Water Fluctuations (40 C.F.R. § 230.24)

The 100-year floodplain, or the areas inundated by a storm having a 1 percent annual chance of occurrence (known as the *base flood*), is designated as a special flood hazard area (SFHA). SFHAs represent high-risk areas (FEMA Flood Zones A or V). The SFHA is the land area covered by the base flood to which the FEMA floodplain management regulations apply (FEMA 2011). Development in an SFHA is restricted and regulated by federal, state, and local agencies.

The floodplain RSA boundary is made up of the FEMA 100-year and 500-year floodplain boundaries that overlap with Alternative A. FEMA-delineated 100-year floodplains exist along most of the minor creeks and streams in the floodplain RSA. In urban areas and along most of the reaches of the major rivers, the 100-year floodplains are generally contained within the riverbanks. Alternative A would cross 54.2 acres of 100-year flood zone areas. Most of the project footprint of Alternative A lies outside the 100-year floodplain; these areas are not considered SFHAs. Areas above the 500-year flood level are areas of minimal flood hazard (Zones C and X). Areas within the 500-year floodplain are considered of moderate risk or designated base

floodplains of lesser hazards or shallow flooding. FEMA defines a floodway as the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment so that the 100-year flood can be conveyed without a substantial increase in the base flood elevation (i.e., less than 1 foot) (FEMA 2009). Although there are regulated floodways in the floodplain RSA, none are located in the Alternative A project footprint; therefore, Alternative A activities would not cause an increase in base flood elevation.

Direct Impacts

Flood fluctuations occur in natural aquatic systems, and the biological and physical components of the system are either attuned to or characterized by these periodic water fluctuations. The discharge of fill material in waters of the U.S. could alter normal water-level fluctuation patterns of those waters that are surface water driven (as opposed to groundwater-driven waters), resulting in localized, prolonged periods of inundation, exaggerated variations in high and low water levels, or a static, nonfluctuating water level. Such water level modifications may also change salinity patterns and alter erosion and sedimentation rates of certain types of waters.

The Authority has incorporated HYD-IAMF#1, HYD-IAMF#2: Flood Protection, and HYD-IAMF#3 as part of the design and construction of Alternative A, which would reduce or avoid changes to normal water-level fluctuation patterns and reduce or avoid changes in erosion and sedimentation rates. Alternative A includes a requirement to maintain the existing hydraulic capacity and pre-project hydrology (HYD-IAMF#2) and to design each crossing in a manner that would minimize the impacts of bridge abutments and culverts on floodplains and floodways. In accordance with Section A.10 of the CGP, the documentation required to gain coverage under the CGP is a post-construction runoff management plan, which would specify measures to avoid excessive hydromodification. The design of Alternative A includes features to protect against floods and minimize impacts on stream crossings that would prevent temporary impacts on floodplains and flood risks. For example, construction contractors would prepare a SWPPP for construction activities (HYD-IAMF#3), which would require monitoring of weather conditions for high-rainfall events (and potential flood flows) and relocation of construction equipment to minimize the risk of such equipment obstructing flood flows.

Additional design characteristics include effective bridge and design components, drainage features, agency coordination, and a flood protection plan, which would minimize impedances or redirection of flood flows and avoid increases to flood depths that could result in permanent flooding or changes in flood flows. Based on this information, Alternative A would not result in short-term or long-term direct impacts on normal and flood-control functions and fluctuations in water level during flood events.

Indirect Impacts

Features that may be flood-prone include natural waterbodies, such as natural watercourses, and constructed waterbodies, such as constructed watercourses and constructed basins. Stream flows depend on precipitation runoff, groundwater discharge, regulated releases from reservoirs and stormwater facilities, and non-point-source discharges such as residential irrigation tailwater. Placement of fill in waters of the U.S. could alter normal water fluctuation patterns, increase erosion or sedimentation rates, or modify vegetation, which could in turn result in indirect impacts on downstream or upstream waters of the U.S. The Authority has incorporated HYD-IAMF#1, HYD-IAMF#2, and HYD-IAMF#3 as part of the design and construction of Alternative A that avoid or minimize the potential for flooding. In addition, in accordance with Section A.10 of the CGP, among the documentation that is required to gain coverage under the CGP is a post-construction runoff management plan, which would specify measures to avoid excessive hydromodification. Lastly, Alternative A would not result in placing structures within the 100-year SFHA that would impede or redirect flood flows. As such, indirect impacts related to the flood-control functions and fluctuations in water level on downstream or upstream waters of the U.S. are not anticipated.

Cumulative Impacts

The cumulative floodplain RSA comprises the FEMA 100-year and 500-year floodplain boundaries. Planned and reasonably foreseeable development including major construction

projects in the cumulative floodplain RSA could result in the placement of fill in waters of the U.S., which could impede flood flows or increase the number of people or structures affected by flooding. Reasonably foreseeable projects that could result in cumulative impacts include construction of shopping centers, residential developments, and planned transportation projects defined in the various regional transportation plans for each of the three counties, such as interchange reconstruction and auxiliary lane construction projects.

All ongoing and reasonably foreseeable projects are subject to and must comply with applicable federal, state, and local policies, programs, and ordinances, which would minimize the impact on floodplains and flood risks. Accordingly, these projects would not result in cumulative impacts on localized or regional flooding by impeding or redirecting flood flows. Furthermore, the design of Alternative A would also minimize potential impacts on flood-control functions and fluctuations in water level. Therefore, a cumulative impact would not occur.

Secondary Effects

Features that may be flood-prone include natural waterbodies, such as natural watercourses, and constructed waterbodies, such as constructed watercourses and constructed basins. Stream flows depend on precipitation runoff, groundwater discharge, regulated releases from reservoirs and stormwater facilities, and non-point-source discharges such as residential irrigation tailwater. Construction of Alternative A would result in an increase in impervious surfaces, and operations would include intermittently occurring floodplain impacts from occasional flooding during in-water bridge maintenance activities, such as those requiring temporary coffer dams, or other activities conducted in or near waters. An increase in impervious surfaces could result in an increase in the rate of surface water discharge during flood events, and in-water bridge maintenance activities could trigger short-term periodic changes in normal water levels. The Authority has incorporated HYD-IAMF#2 and HYD-IAMF#3 as part of the design and construction of Alternative A that would minimize intermittent flooding due to operations. In addition, in accordance with Section A.10 of the CGP, among the documentation that is required to gain coverage under the CGP is a post-construction runoff management plan, which would specify measures to avoid excessive hydromodification. Lastly, Alternative A would not result in placing structures within the 100-year flood-hazard area that would impede or redirect flood flows. These measures would avoid or minimize the potential for secondary effects from construction and operations of Alternative A on normal and flood-control functions and fluctuations in water level.

D.3.1.7 Salinity Gradients (40 C.F.R. § 230.25)

With the exception of Visitacion Creek and Guadalupe Valley Creek, salinity gradients exist in the Alternative A footprint where San Francisco Bay waters contact freshwater in jurisdictional waterways. In Visitacion Creek and Guadalupe Valley Creek, saline Bay waters do not affect inflowing freshwater inputs. Among all creeks except Visitacion Creek and Guadalupe Valley Creek, no changes to the existing conditions are expected because crossings of the waterways would be designed to provide for unobstructed tidal water exchange, thereby avoiding changes in the location and type of mixing of saltwater and freshwater.

Direct Impacts

Visitacion Creek would be culverted under the East Brisbane LMF, which is channelized in this reach. Although the creek would be “undergrounded” in this reach, the saline or brackish waters that presently enter the channel from tidal action would be subject to the same degree of mixing with freshwater inflows as presently occurs, causing no change in salinity levels and gradients from the existing condition. Guadalupe Valley Creek is tidally influenced, and there is an open box culvert under the current Caltrain tracks that would be extended as part of Alternative A. As with the planned culvert at Visitacion Creek, an extension of this culvert would be designed to provide for unobstructed tidal water exchange, and therefore saline or brackish waters that presently enter the channel would be subject to the same degree of mixing with freshwater inflows as presently occurs. No changes to existing salinity gradients would occur from Alternative A.

Indirect Impacts

There would be no direct impacts related to salinity gradients from construction of Alternative A; therefore, there would be no indirect impacts.

Cumulative Impacts

The cumulative RSA is defined as the CalWater Planning Watersheds that would be crossed by Alternative A. Under the cumulative condition, construction of development and transportation projects in the surface water RSA would result in discharge of fill material into jurisdictional waters, including wetlands and nonwetland waters, which could obstruct tidal water exchange and thus change the location and type of mixing of saltwater and freshwater. Reasonably foreseeable projects that could result in cumulative impacts include construction of shopping centers, residential developments, and planned transportation projects defined in the various regional transportation plans for each of the three counties, such as interchange reconstruction and auxiliary lane construction projects. Such cumulative development involving placement of fill material would result in changes to existing drainage patterns and possible obstruction of tidal water exchange. However, design characteristics, regulatory standards (i.e., Section 404 of the CWA), and measures required as conditions of individual project approvals would minimize the impact on existing patterns of water circulation. Furthermore, Alternative A incorporates measures to minimize impacts on drainage patterns from the placement of fill in waters of the U.S. Therefore, a cumulative impact would not occur.

Secondary Effects

Secondary effects of construction of Alternative A include the introduction of impervious surfaces where they currently do not exist, which would have the potential to increase the rate and amount of stormwater runoff and change the volume of freshwater in channels where it would mix with saltwater. However, the effects of the new impervious surfaces would be minimized as part of the design of Alternative A and requirements of the CGP, MS4 permit, and local stormwater compliance, and other avoidance measures required as conditions of individual project approvals. These measures would reduce the potential increase in freshwater volume and rate of discharge, avoiding or minimizing the potential to change the location and type of mixing of saltwater and freshwater.

D.3.2 Subpart D—Potential Impacts on Biological Characteristics of the Aquatic Ecosystem

D.3.2.1 Threatened and Endangered Species (40 C.F.R. § 230.30)

Table D-1 presents federally listed species that may be affected by the proposed discharge associated with Alternative A. The Authority has not yet initiated federal Endangered Species Act Section 7 consultation with U.S. Fish and Wildlife Service and NMFS. It is anticipated that the USACE Authority will initiate Section 7 consultation with the USFWS in 2020, and would then prepare a Biological Opinion describing how Alternative A would affect listed species and designated critical habitat. The Biological Opinion will include “reasonable and prudent” measures so Alternative A would not jeopardize the continued existence of listed species or modify critical habitat for such species. Alternative A would implement these measures parallel with, or in addition to, the measures described in this section. Issuance of the CWA Section 404 permit would therefore not jeopardize the continued existence of these species or result in the destruction or modification of critical habitat for central California coast steelhead.

Table D-1 Federally Listed Species with Potential to Occur in Aquatic Ecosystems in the Project Footprint

Common Name	Scientific Name	Status[1]	State Status	Habitat Type
Plants				
California seablite	*Suaeda californica*	FE	–	Coastal salt marshes and swamps.
Fish				
Steelhead—Central California coast distinct population segment	*Oncorhynchus mykiss*	FT, CH	—	Shallow, protected streams as newly emerged fry; deep fast runs or pools as juveniles; San Francisco tributaries as adults
Wildlife				
California red-legged frog	*Rana draytonii*	FT	--	Slow-moving streams or pools within streams and in seasonal or permanent waterbodies such as ponds used during the breeding season
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	FE	SE	Marshes, ponds, sloughs, small lakes, low-gradient streams, and other waterways and agricultural wetlands including irrigation and drainage canals, rice fields, and adjacent uplands

Sources: CDFW 2018; CNPS 2018
[1] CH = Critical Habitat, designated by the U.S. Fish and Wildlife Service
FE = Endangered
FT = Threatened

Direct Impacts

Alternative A would have direct impacts on habitat for one federally listed plant species associated with aquatic ecosystems: California seablite. Construction of Alternative A would take place within or adjacent to saline emergent wetland that provides marginal habitat for this species at Brisbane Lagoon. Direct impacts may result from the removal of vegetation associated with the placement of fill in saline emergent wetland that overlaps with the project footprint of Alternative A. If present in the area of overlap, individual California seablite plants could be smothered or crushed during construction. In total, Alternative A is estimated to result in 1.7 acres of direct impacts on saline emergent wetland from the placement of fill—habitat for federally listed as endangered California seablite.

To identify federally listed plants (i.e., individual plants or colonies) to be avoided during construction, the Authority would delineate environmentally sensitive areas or environmentally restricted areas on final construction plans and in the field as part of BIO-IAMF#5: Prepare and Implement a Biological Resources Management Plan. This measure would avoid some, but not all, direct impacts on endangered or threatened plants because it would make certain that contractors are aware of and would avoid affecting endangered or threatened plant occurrences during construction. The implementation of Alternative A could still permanently remove endangered or threatened plants, resulting in direct construction impacts where endangered or threatened plants are present in waters of the U.S. and impacts cannot be avoided through BIO-IAMF#8.

The following measures would be implemented to further reduce impacts on federally listed plants and their habitat:

- BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan
- BIO-MM#2: Prepare and Implement a Weed Control Plan
- BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones
- BIO-MM#4: Conduct Monitoring of Construction Activities
- BIO-MM#5: Establish and Implement a Compliance Reporting Program
- BIO-MM#6: Conduct Protocol-Level or Presence/Absence Pre-Construction Surveys for Special-Status Plant Species and Special-Status Plant Communities
- BIO-MM#7: Prepare and Implement Plan for Salvage, Relocation, or Propagation of Special-Status Plant Species
- BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat
- BIO-MM#9: Implement Measures to Minimize Impacts during Off-Site Habitat Restoration or Enhancement, or Creation on Mitigation Sites
- BIO-MM#10: Compensate for Impacts on Listed Plant Species

With incorporation of these measures, Alternative A would result in minor to moderate short-term and long-term direct impacts on federally listed plant species and their potential habitat.

Indirect Impacts

The placement of fill in waters of the U.S. could result in changes in current patterns and water circulation, which could result in downstream substrate erosion, leading to reduced light penetration and lower rates of photosynthesis and the primary productivity of the aquatic area, increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand. Such changes could cause reduced dissolved oxygen levels, thereby potentially affecting the survival of many aquatic organisms downstream of the location of fill in waters of the U.S.

Alternative A is not expected to cause indirect impacts on habitat for central California coast steelhead because there is no in-water work or culvert replacement proposed at the four streams that provide habitat. Therefore, there would be no discharge of fill that could affect water quality downstream of the project footprint, and therefore there would be no potential for degradation of California coast steelhead critical habitat.

Cumulative Impacts

The cumulative RSA for federally listed species includes the San Francisco Peninsula and the Santa Clara Valley. Endangered or threatened species occurring in aquatic ecosystems would be subject to impacts resulting from the discharge of fill into aquatic habitat associated with the construction and operations of Alternative A and other past, present, and foreseeable projects. Compliance with Section 7 of the federal Endangered Species Act would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. In the context of the cumulative losses of federally listed species habitat in the region resulting from past, present, and reasonably foreseeable projects, the incremental contribution of Alternative A to these cumulative impacts would be minimal because most habitat for the affected species occurs well outside the project footprint.

Secondary Effects

Secondary effects on federally listed plant species would potentially include:

- Habitat degradation through the introduction of noxious plant species (nonnative, detrimental species) resulting from ground disturbance
- Construction-related dust that reduces photosynthetic capability of plants
- Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could contaminate wetlands, resulting in degraded habitat for federally listed plants.

Alternative A would have secondary effects on habitat for one federally listed fish species and two federally listed wildlife species associated with aquatic ecosystems: central California coast steelhead, California red-legged frog, and San Francisco garter snake. Construction of Alternative A would take place adjacent to four streams that provide seasonal migratory habitat for central California coast steelhead—Mills Creek, San Mateo Creek, San Francisquito Creek, and Stevens Creek. Impacts on 0.4 acre of steelhead habitat may result from vegetation management activities inside the permanent right-of-way that result in the temporary loss of stream shading, which moderates water temperatures conducive for steelhead movement and steelhead food sources. Construction would also take place within or adjacent to streams and freshwater emergent wetlands that provide breeding habitat for California red-legged frog and San Francisco garter snake. Alternative A is not expected to cause secondary effects on habitat (e.g., habitat degradation from increased cover of nonnative invasive plants) for listed reptiles and amphibians because existing habitat is already disturbed and subject to routine maintenance activities associated with the existing Caltrain tracks and flood control channels that cross the project footprint.

Alternative A design would include requirements to prepare and incorporate BIO-IAMF#1: Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors; BIO-IAMF#3: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training; BIO-IAMF#5: Prepare and Implement a Biological Resources Management Plan; BIO-IAMF#6: Establish Monofilament Restrictions; BIO-IAMF#7: Prevent Entrapment in Construction Materials and Excavations, BIO-IAMF#8, and BIO-IAMF#11: Maintain Construction Sites. These measures would further avoid all secondary effects on federally listed fish, wildlife reptiles and amphibians and their associated breeding habitats.

BIO-IAMF#5 includes the preparation and incorporation of a biological resources management plan by the project biologist to minimize and avoid impacts on sensitive biological resources, including the spread of weeds during construction activities. Delineation of environmentally restricted areas under BIO-MM#3 would confirm the identification and contractor awareness and avoidance of sensitive biological resources adjacent to but outside the project footprint by delineating environmentally sensitive areas and environmentally restricted areas. These measures would help to minimize indirect impacts on endangered or threatened plants and other native vegetation occurring outside of but adjacent to the project footprint. Incorporation of BIO-IAMF#10: Clean Construction Equipment, would minimize the spread of invasive plants outside the project footprint by cleaning vehicles of mud and plant materials prior to working in new areas, confirming that invasive plant seeds are not carried between construction work areas. These measures would avoid, minimize, and reduce indirect impacts; however, indirect impacts may still occur because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

Implementation of HMW-IAMF#9 would avoid the use of hazardous materials when selecting materials for construction of new structures. Implementation of HYD-IAMF#1 would require that on-site stormwater management facilities are designed and constructed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. These measures would avoid or minimize secondary effects on federally listed species occurring in aquatic ecosystems.

The following measures would be implemented to further reduce impacts on federally listed fish and wildlife species and their habitat:

- BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan
- BIO-MM#2: Prepare and Implement a Weed Control Plan
- BIO-MM#3: Establish Environmentally Sensitive Areas and Non-Disturbance Zones
- BIO-MM#4: Conduct Monitoring of Construction Activities
- BIO-MM#5: Establish and Implement a Compliance Reporting Program
- BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat
- BIO-MM#9: Implement Measures to Minimize Impacts During Off-site Habitat Restoration or Enhancement, or Creation on Mitigation Sites
- BIO-MM#12: Work Stoppage
- BIO-MM#13: Restore Temporary Riparian Habitat Impacts
- BIO-MM#18: Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species
- BIO-MM#19: Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species
- BIO-MM#20: Install San Francisco Garter Snake and California Red-Legged Frog Exclusion Fencing at SFO West-of-Bayshore Property
- BIO-MM#21: Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat
- BIO-MM#33: Install Aprons or Barriers within Security Fencing

With incorporation of these measures, Alternative A would result in minor to moderate short-term and long-term secondary effects on federally listed fish and wildlife species and their potential habitat.

D.3.2.2 Fish, Crustaceans, Mollusks, and other Aquatic Organisms in the Food Web (40 C.F.R. § 230.31)

The RSA for aquatic organisms in the food web is the same as that for threatened and endangered fish and wildlife species, the habitat RSA. Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they depend. Aquatic ecosystems provide physical, chemical, and biological support for food web services, including nutrient cycling, and food production and availability for a variety of organisms. Alternative A's habitat RSA has limited habitat to support native fish, crustaceans, mollusks, insects, annelids, and planktonic organisms, and the plants and animals on which they feed and depend. Due to urbanization in the San Francisco Peninsula, most of the watercourses have been substantially altered. Many of the riverine habitats and adjacent floodplains have been channelized, diverted, and managed to support urban water uses in the in the region. Most watercourses in these watersheds are now perennial, flowing year-round except in times of drought. Surface runoff in the vicinity of the project footprint discharges into a network of underground and surface drainage pathways (including the combined sewer system in San Francisco). Generally, these pathways converge into larger underground storm drains, drainage culverts, streams, or creeks, which become progressively larger as the runoff moves downstream, eventually reaching a common discharge location, often into San Francisco Bay.

Federally managed fish species covered by the Magnuson-Stevens Fisheries Conservation and Management Act also have potential to occur in the habitat RSA. The open waters of San Francisco Bay in the habitat RSA area for the San Francisco to South San Francisco Subsection contain designated essential fish habitat for Pacific coast salmon (i.e., Chinook and coho salmon). These waters are outside of the project footprint but within 1,000 feet of it.

Direct Impacts

The introduction of fill material into waters of the U.S. as a result of construction of Alternative A would directly affect fish, crustaceans, mollusks, and other food web organisms. Table D-2 presents aquatic organisms in the San Francisco Bay food web with potential to occur in the habitat RSA. Impacts would occur through the following mechanisms:

- Suspended particulates settling on attached or buried eggs, smothering the eggs by limiting or obstructing their exposure to oxygenated water.
- The debilitation or death of sedentary organisms by smothering, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they depend.
- Modification of reproductive (i.e., spawning or nursery) or feeding habitats, leading to reduced populations.

Filled portions of the channel would also cease to provide habitat for these organisms.

The following measure would be applied to reduce impacts:

- BIO-MM#36: Restore Aquatic Resources Subject to Temporary Impacts

With implementation of these measures, the direct impacts of Alternative A on aquatic organisms would be avoided and minimized.

Table D-2 Examples of Aquatic Organisms in the Food Web that May Occur in Waters of the U.S.

Common Name	Scientific Name	Origin
Mollusks		
California horn snail	*Cerithidea californica*	Native
False sea lemon	*Doris montereyensis*	Native
Bubble snail	*Haminoea japonica*	Introduced
Eastern mudsnail	*Ilyanassa obsoleta*	Introduced
Atlantic macoma	*Macoma petalum*	Introduced
Baltic macoma	*M. balthica*	Introduced
Mouse ear snail	*Myosotella myosotis*	Introduced
Polychaetes (bristleworms)		
Pile worm	*Neanthes succinea*	Introduced
Bloodworm	*Glycera Americana*	Uncertain
Polychaete	*Glycinde picta*	Native
Rockworm	*Marphysa sanguinea*	Introduced
Bamboo worm	*Sabaco elongatus*	Introduced

Common Name	Scientific Name	Origin
Crustaceans		
Copepods	*Acartia* sp., *Oithona davisae*	Introduced
European green crab	*Carcinus maenas*	Introduced
Shore crab	*Hemigrapsus oregonensis*	Native
Opossum shrimp	*Neomysis kadiakensis*	Native
Bay ghost shrimp	*Neotrypaea californiensis*	Native
Fish		
Yellowfin goby	*Acanthogobius flavimanus*	Introduced
American shad	*Alosa sapidissima*	Introduced
Prickly sculpin	*Cottus asper*	Native
Common carp	*Cyprinus carpio*	Introduced
Western mosquitofish	*Gambusia affinis*	Introduced
Threespine stickleback	*Gasterosteus aculeatus*	Introduced
Channel catfish	*Ictalurus punctatus*	Introduced
Staghorn sculpin	*Leptocottus armatus*	Native
Rainwater killifish	*Lucania parva*	Introduced
Starry flounder	*Platichthys stellatus*	Native

Sources: Mooi et al. 2007; Brusati and Woo 2015; University of California Davis 2019

Indirect Impacts

Alternative A would indirectly affect fish, crustaceans, mollusks, and other aquatic organisms in the food web through the following mechanisms:

- The release of contaminants or pollutants that affect adults, juveniles, larvae, or eggs, or that result in the establishment or proliferation of undesirable competitive plant or animal species of at the expense of the desired resident species.
- Reduction of detrital feeding species or other representatives of lower trophic levels resulting in impairment of the flow of energy from primary consumers to higher trophic levels. This could lead to the reduction or potential elimination of food chain organism populations, decreasing the overall productivity and nutrient export capability of the ecosystem.

Section D.3.1.3 identifies measures incorporated into Alternative A to avoid the introduction of contaminants into waters of the U.S., which would also help to reduce effects on aquatic organisms. Therefore, indirect impacts would not occur.

Cumulative Impacts

The cumulative RSA is the San Francisco Peninsula and Santa Clara Valley. Where present, fish, crustaceans, mollusks, and other food web organisms would be subject to impacts from permanent habitat loss from the placement of fill in waters of the U.S. Compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. In addition, compliance with Sections 404 and 401 of the CWA would require that permanent and temporary impacts are mitigated by providing for on- or off-site creation, restoration, enhancement, or preservation of “in-kind” wetlands or nonwetland waters that provide the same functions and values as those affected by construction. In the context of the cumulative losses of aquatic habitats within the RSA resulting from past, present, and reasonably foreseeable projects, the incremental contribution of

Alternative A to these cumulative impacts would be minimal because of the limited aquatic resource habitat within the project footprint and the application of measures to avoid, minimize, and compensate for impacts.

Secondary Effects

Secondary effects of Alternative A on aquatic organisms in the food web would be the same as those identified in Section D.3.2.1, federally listed species in aquatic ecosystems. Implementation of the measures identified in Section D.3.2.1 would avoid or minimize secondary effects on aquatic organisms in the food web.

D.3.2.3 Other Wildlife (40 C.F.R. § 230.32)

Other Wildlife Associated with Aquatic Ecosystems, including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

The RSA for other wildlife species is the same as the habitat RSA for threatened and endangered wildlife species described in Section D.3.2.1. Table D-3 presents the other special-status wildlife species associated with aquatic ecosystems (including riparian habitat) that have a potential to occur in the habitat RSA. Other common wildlife assemblages known or expected to occur in aquatic ecosystems in the habitat RSA and that could be potentially affected by Alternative A are described below the table.

Table D-3 Special-Status Wildlife Species with Moderate to High Potential to Occur in the Habitat Resource Study Area

Common Name	Scientific Name	State Status[1]
Amphibians		
Western pond turtle	*Emys marmorata*	CSC
Birds		
Alameda song sparrow	*Melospiza melodia pusillula*	CSC
Saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	CSC
White-tailed kite (nesting)	*Elanus leucurus*	FP
Bats		
Pallid bat	*Antrozous pallidus*	CSC
Western red bat	*Lasiurus blossevillii*	CSC

Source: CDFW 2018
[1] State Status:
CSC = California Species of Special Concern designated by the California Department of Fish and Wildlife
FP = Fully Protected Species designated by the California Department of Fish and Wildlife

Amphibians and Reptiles

Most amphibian species likely to occur in the habitat RSA breed in streams, ponds, or seasonal pools and either remain near aquatic habitat or move into adjacent uplands in the dry season. Sierran treefrog (*Pseudacris sierra*), arboreal salamander (*Aneides lugubris*), and California slender salamander (*Batrachoseps attenuatus*) are fairly common in both developed and natural land cover types as long as seasonal pools or streams are available for breeding and ground cover (e.g., ornamental or native shrubs, dense ground cover or leaf litter) is present. Other species have narrower habitat requirements and only occur in natural land cover types (e.g., riparian and oak woodland/forest, scrub, chaparral, grassland), occasionally venturing onto rural residential lots within or adjacent to natural land cover. Species in this category include California newt (*Taricha torosa*), ensatina (*Ensatina eschscholtzii*), and western toad (*Bufo boreas*).

Several reptile species adapted to a variety of land cover types are expected to occur in the habitat RSA. Western fence lizard (*Sceloporus occidentalis*) and common garter snake (*Thamnophis sirtalis*) are common species in both developed and natural land cover types as long as hard surfaces for basking (e.g., fence posts, rocks, logs, sides of buildings) are present for the former and water is nearby for the latter.

Birds

The habitat RSA provides nesting habitat for a variety of terrestrial bird species. Many tree- or shrub-nesting species, including Anna's hummingbird (*Calypte anna*), downy woodpecker (*Picoides pubescens*), California scrub-jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), bushtit (*Psaltriparus minimus*), and California towhee (*Melozone crissalis*), are just as likely to nest in developed areas as in riparian habitat. Common tree-nesting raptors in the region include red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), Cooper's hawk (*Accipiter cooperi*), and great horned owl (*Bubo virigianaus*), all of which are capable of nesting in riparian habitat as long as suitable trees are present. Stands of freshwater emergent wetland vegetation provide nesting habitat for marsh wren (*Cistothorus palustris*), song sparrow (*Melospiza melodia*), and red-winged blackbird (*Agelaius phoeniceus*).

The San Francisco Bay estuary is well known as a major migratory stopover and wintering site for many species of waterfowl and shorebirds (Takekawa et al. 2000). It is included in the Western Hemisphere Shorebird Reserve Network as a site of "hemispheric" importance (i.e., supports more than 900,000 shorebirds annually) and provides wintering habitat for more than 50 percent of all diving ducks[1] in the Pacific Flyway (Takekawa et al. 2000). The open waters of San Francisco Bay and Brisbane Lagoon in the San Francisco to South San Francisco Subsection provide resting and foraging habitat for waterfowl such as greater scaup (*Aythya marila*), bufflehead (*Bucephala albeola*), and ruddy duck (*Oxyura jamaicensis*), and the shorelines provide roosting habitat for shorebirds such as western sandpiper (*Calidris mauri*), least sandpiper (*C. minutilla*), and dunlin (*C. alpina*).

Mammals

Several common bat species occur and may roost in the habitat RSA. Roost sites must have an appropriate temperature regime and offer protection from predators and weather. Roost sites fall into three general categories—crevices, cavities/caves, and foliage. In natural settings, cavity-roosting species roost in groups on open surfaces inside dark chambers, such as caves or large tree hollows; crevice-roosting species roost in a variety of narrow spaces (e.g., rock crevices, exfoliating tree bark, damaged wood in snags). While some species appear to prefer cavities or crevices for roosting, many species use a variety of roost sites. Species that may roost in larger tree hollows in riparian habitat in the habitat RSA include Mexican free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), and California myotis (*Myotis californicus*). Hoary bat (*Lasiurus cinereus*) is a highly migratory foliage-roosting species that may roost in riparian habitat during the spring, summer, and fall.

Direct Impacts

Alternative A would directly affect other wildlife associated with waters of the U.S. (including wetlands) from direct removal of habitat or mortality of individuals at locations where fill is placed within waters of the U.S. Several measures would help to avoid, minimize, or reduce direct impacts on other wildlife. BIO-IAMF#8 and BIO-MM#3 include requirements to identify habitats to be avoided during construction and to delineate habitat features as environmentally sensitive areas or environmentally restricted areas on final construction plans and in the field. Wildlife exclusion fencing would be installed around the perimeter of environmentally sensitive areas and environmentally restricted areas to prevent special-status species from entering the work area, reducing the likelihood of injury or mortality. The design of Alternative A would prohibit the use of plastic monofilament netting or similar materials in erosion control materials, reducing the

[1] Duck species that dive to the bottom of shallow bays to feed on invertebrates and fish. Common species in San Francisco Bay include greater scaup, ruddy duck, bufflehead, and canvasback.

likelihood of wildlife species getting caught in plastic netting and dying from desiccation, predation, or starvation (BIO-IAMF#6). BIO-IAMF#7 requires contractors to cover all excavated, steep-sided holes or trenches deeper than 8 inches at the end of each work day, as well as all pipes, culverts, or other materials greater than 3 inches in diameter stored for one or more overnight periods. All such materials would also be inspected by the project biologist prior to their movement, capping, or burial. BIO-IAMF#5 includes preparation of the biological resources management plan, which would include a compilation of the biological resources measures applicable to Alternative A. Although these requirements pertain primarily to special-status species, they would also benefit other wildlife species; therefore, the design of Alternative A would minimize, but may not entirely avoid, the direct impacts of construction activities, including mortality, injury, or harassment of individuals and permanent or temporary habitat loss.

The following measures would be implemented to further reduce impacts:

- BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan
- BIO-MM#2: Prepare and Implement a Weed Control Plan
- BIO-MM#3: Establish Environmentally Sensitive Areas and Non-Disturbance Zones
- BIO-MM#4: Conduct Monitoring of Construction Activities
- BIO-MM#5: Establish and Implement a Compliance Reporting Program
- BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat
- BIO-MM#9: Implement Measures to Minimize Impacts During Off-site Habitat Restoration or Enhancement, or Creation on Mitigation Sites
- BIO-MM#18: Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species
- BIO-MM#19: Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species
- BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds
- BIO-MM#30: Conduct Pre-Construction Surveys for Special-Status Bat Species
- BIO-MM#31: Implement Bat Avoidance and Relocation Measures
- BIO-MM#32: Implement Bat Exclusion and Deterrence Measures
- BIO-MM#33: Install Aprons or Barriers within Security Fencing

Indirect Impacts

Alternative A would indirectly affect other wildlife associated with waters of the U.S. (including wetlands) as a result of the following:

- The permanent or temporary loss or change of breeding and nesting areas, escape cover, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem resulting from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation
- Increased water turbidity, which can affect wildlife species that rely on sight to feed, as well as disrupting the respiration and feeding of certain aquatic wildlife and food chain organisms
- The availability of contaminants from the discharge of fill material, potentially leading to the bioaccumulation of such contaminants in wildlife species

The measures described in the subsection titled Direct Impacts would help reduce or avoid indirect impacts on special-status species (e.g., habitat degradation).

Cumulative Impacts

The cumulative RSA is the San Francisco Peninsula and Santa Clara Valley. Resident and transient fish, amphibians, reptiles, and birds would be subject to impacts from the near-term and long-term operation of Alternative A and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss and mortality of individuals. Compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. In the context of the cumulative losses of aquatic habitats within the RSA resulting from past, present, and reasonably foreseeable projects, the incremental contribution of Alternative A to these cumulative impacts would be minimal because all impacts on these resources would be avoided and minimized.

Secondary Effects

Secondary effects of Alternative A would include habitat degradation through the introduction of noxious plant species (i.e., nonnative, detrimental species) resulting from ground disturbance and construction activities in upland areas. Alternative A design would minimize the spread of invasive plants outside the project footprint by cleaning vehicles of mud and plant materials prior to working in new areas, thus preventing invasive plant seeds from being carried between construction work areas (BIO-IAMF#10). In addition, Alternative A includes requirements to prepare and implement a weed control plan (BIO-MM#2) to minimize and avoid the spread of weeds during construction activities. Therefore, the design of Alternative A would minimize the secondary effects of habitat degradation. These design characteristics would avoid some, but not all secondary effects on wildlife species and habitat because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

D.3.3 Subpart E—Potential Impacts on Special Aquatic Sites (Wetlands, Mudflats, Coral Reefs, Pool and Riffle Areas, Vegetated Shallows, Sanctuaries, and Refuges) (40 C.F.R. §§ 230.40–230.45)

The RSA for special aquatic sites is the aquatic RSA. Special aquatic sites in the aquatic RSA include seasonal wetlands as well as saline and freshwater emergent wetlands. Mudflats, coral reefs, pool and riffle areas, and vegetated shallows do not occur in the aquatic RSA. Sanctuaries and refuges consisting of areas designated under state and federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources do not occur in or adjacent to the project footprint.

D.3.3.1 Direct Impacts

Alternative A would directly affect approximately 6.1 acres of saline and freshwater emergent wetlands and other seasonal scrub wetlands. Most of these impacts would occur in Brisbane. Construction of the East Brisbane LMF would fill (i.e., direct permanent impact) approximately 0.4 acre of freshwater emergent wetlands and 0.3 acre of scrub/shrub wetlands north of the existing refinery west of Tunnel Avenue. The impact estimate includes 1.4 acres of saline emergent wetland at the northwestern and southwestern corner of Brisbane Lagoon because these areas are within the existing Caltrain right-of-way; it is expected that the majority of this wetland could be avoided during construction. Impacts in remaining portions of the project footprint south of Brisbane are primarily associated with crossings of drainage channels that support freshwater emergent wetlands. Again, these areas are included in the 6.1 acres of estimated impact because they overlap with the existing Caltrain right-of-way but actual impacts are expected to be very small to none due to the lack of in-water activities. BIO-MM#36 would require that aquatic resources subject to temporary impacts be restored to their prior condition, thus avoiding or minimizing impacts on these resources.

D.3.3.2 Indirect Impacts

The placement of fill in waters of the U.S. could result in changes in current patterns and water circulation, which could result in downstream substrate erosion, leading to reduced light penetration and lower rates of photosynthesis and the primary productivity of the aquatic area,

increased siltation, degraded water quality, changes to land elevations or bottom contours leading to increased water temperatures, and elevated biochemical oxygen demand. Such changes could cause reduced dissolved oxygen levels, thereby potentially affecting special aquatic sites downstream of the location of fill in waters of the U.S.

Indirect impacts on water quality would be avoided or minimized through implementation of HYD-IAMF#3. Specifically, the SWRCB CGP SWPPP prepared in adherence to HYD-IAMF#3 would describe the stormwater and nonstormwater BMPs that would be executed to minimize or eliminate releases of (high-pH) concrete washwater, soil stabilization chemicals (e.g., lime), pesticides, fertilizers, and other deleterious substances directly or indirectly into waters of the U.S.

D.3.3.3 Cumulative Impacts

The cumulative RSA for special aquatic sites is the surface water RSA. Together, Alternative A, development planned under land use plans, and other reasonably foreseeable future projects constitute the cumulative condition. Examples of other planned projects that would affect wetlands include the Baylands Specific Plan in Brisbane, the 1400 North Shoreline Boulevard development project in Mountain View, the SFO Expansion project in South San Francisco, and the San Jose to Merced Project Section. These developments could contribute cumulative impacts both directly and indirectly by disturbing or removing jurisdictional waters.

Minor and localized impacts on wetland resources are expected to continue in the cumulative RSA but large-scale habitat loss is not expected because very little undeveloped land remains to be lost. Most areas with high ecological integrity[2] and that support these resources are already protected by local, state, and federal agencies. For example, compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. However, development pressures are expected to continue in other portions of the cumulative RSA (e.g., Lower and Upper Santa Clara Valleys).

D.3.3.4 Secondary Effects

Potential secondary effects on emergent and seasonal wetlands include a number of temporary water quality impacts from construction activities that would occur in upland areas: erosion, siltation, and runoff into natural and constructed water features; soil and water contamination from construction equipment leaks; and construction-related dust that reduces photosynthetic capability (especially during flowering periods). The Authority would prepare a dewatering plan under BIO-IAMF#5 for review and approval by the resource agencies that includes appropriate measures to minimize turbidity and siltation. This measure would minimize the potential for secondary effects on emergent and seasonal wetlands because they would reduce the likelihood of excess sediment or contaminants entering these features during construction and potentially degrading downstream features.

D.3.3.5 Other Special Aquatic Sites Not Affected

No other special aquatic sites (e.g., mudflats, coral reefs, pool and riffle areas, and vegetated shallows, sanctuaries, or refuges) are present in the aquatic RSA of Alternative A. As such no direct impacts, indirect impacts, cumulative impacts, or secondary effects would occur.

D.3.4 Subpart F—Potential Impacts on Human Use Characteristics

D.3.4.1 Municipal and Private Water Supplies (40 C.F.R. § 230.50)

The RSA for municipal and private water supplies, including aquifer recharge, is the surface water RSA as defined in Section D.3.1. Alternative A is in a primarily urban area. Water suppliers that serve the area rely predominantly on surface water and obtain their water primarily from the

[2] Ecosystems have ecological integrity when their native components are intact, including abiotic components, biodiversity, and ecosystem processes.

streams and creeks that make up the San Francisco Bay Hydrologic Region. Within the San Francisco Bay Hydrologic Region, the RSA is in the South Bay and Santa Clara Hydrologic Units. The water suppliers in the RSA include Santa Clara Valley Water District, California Water Service Company, Mid-Peninsula Water District, City of Burlingame Public Works—Water Division, City of Millbrae Public Works—Engineering, City of San Bruno Public Works—Water Division, City of Brisbane Water District, and SFPUC.

According to USGS's California Water Sciences Center, while surface water is used when it is available, the Santa Clara Basin also relies heavily on groundwater. The groundwater RSA consists of the Downtown San Francisco, Islais Valley, South San Francisco, Visitacion Valley, Westside, and Santa Clara Groundwater Basins. Some aquifers in the groundwater RSA occur in shallow alluvium underlain by bedrock, near San Francisco, while some aquifers are quite deep near San Mateo and Santa Clara, extending more than 1,000 feet below ground surface before reaching bedrock. Natural recharge occurs primarily in stream channels and on coarse alluvial fans located where the streams exit their montane headwaters and enter the valley floor. Incidental recharges occur through leaking water and sewer systems and landscape irrigation. In addition, the Santa Clara Valley Water District operates an artificial groundwater recharge system that includes releases from dams and in-stream recharge facilities.

Direct Impacts

Construction of HSR track and systems under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. These disturbances would cause resuspension of bottom sediments and underlying materials at the location of the fill, which could as a result degrade surface water quality sources used by water suppliers in the study area. However, the potential for permanent impacts from suspended particles and turbidity would be minimal as a result of the measures incorporated into the design of Alternative A. Measures would be implemented to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column at the location of fill. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work, consistent with HYD-IAMF#3 and the SWRCB CGP SWPPP. As a result, direct impacts on water quality, and thus surface water supplies used by water suppliers in the region, would be minimized or avoided.

Indirect Impacts

Construction of HSR track and systems under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. These disturbances would cause resuspension of bottom sediments and underlying materials, thereby increasing the likelihood that the disturbed particulates would be entrained by flowing water. Where the substrate disturbance occurs in waters of the U.S. stream channels, the suspended material could be carried downstream, causing turbidity plumes and degrading water quality. However, the potential for permanent impacts from suspended particles and turbidity would be minimal as a result of the measures incorporated into the design of Alternative A. Measures would be implemented to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work and installation turbidity curtains to control downstream movement of particulates, consistent with HYD-IAMF#3 and the SWRCB CGP SWPPP. As a result, indirect impacts on water quality, and thus surface water supplies used by water suppliers in the region, would be minimized or avoided.

Cumulative Impacts

Under the cumulative condition, ongoing urban development is expected to continue within the surface water RSA. The projected population growth will translate into an increased intensification of existing developed land uses and a continued conversion of currently undeveloped lands to residential, small business, and light industrial uses, plus the transportation infrastructure needed to support this development. Construction of development and transportation projects in the

surface water RSA would result in the discharge of fill material into jurisdictional waters, including wetlands and nonwetland waters. Such discharge could result in increased siltation and turbidity in streams and other waterbodies.

Direct impacts of these projects on jurisdictional waters include temporarily reduced channel capacity and reduced light penetration at the location of fill in waters of the U.S., leading to elevated levels of suspended particulates in the water column. Indirect impacts of these projects on jurisdictional waters include increased pollution and decreased water quality downstream of fill placed in waters of the U.S. Cumulative impacts related to increased sedimentation and turbidity would occur due to the scale of anticipated development throughout the region, which would increase the overall amount of fill in waters of the U.S. and creation of new sources of pollutants that discharge into jurisdictional waters.

However, like Alternative A, other projects would be subject to regulations and permits required by the SWRCB and the RWQCB to minimize impacts on water quality (e.g., the statewide CGP and the statewide Industrial General Permit). In addition, compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. These regulations are in place to prevent new developments and infrastructure from resulting in violations of water quality standards. Alternative A includes measures that would minimize impacts related to increased sedimentation and turbidity by minimizing the contribution of Alternative A to local and regional impacts of erosion and non-point-source runoff through implementation of erosion control and runoff management measures. With implementation of the measures described in Section D.3.1.2 under the subheading Direct Impacts, the incremental contribution of Alternative A to cumulative impacts would be minimized.

Secondary Effects

Construction of Alternative A would require water during construction to prepare concrete, increase the water content of soil to optimize compaction for earthwork, clean equipment, apply soil binders, and to re-seed disturbed areas after construction. Construction of Alternative A would increase water demand at a rate equivalent to a small percentage of the existing water use, requiring 0.12 percent of the water that was used by local jurisdictions in 2015. The difference between the existing supply (water entitlements) and the amount of water that was used in 2015 is 43.7 million gallons per day. Thus, there are sufficient water entitlements to accommodate the water required during construction.

The total increase in water demand for the HSR stations and the LMF during operations would be approximately 114,000 gallons per day (gpd). In 2015, approximately 128,000,000 gpd of water (of the 184,000,000-gpd supply) were used by wholesale customers of the SFPUC (SFPUC 2016). Thus, in 2015, a total of 56,000,000 gpd of the wholesale water supply was still available. The total increase in water demand for the stations and the LMF of approximately 114,000 gpd represents a negligible amount (approximately 0.2 percent) of the remaining water supply. Furthermore, operation of stations and LMF would minimize the use of potable water through compliance with the Authority's Water Conservation Guidance (Authority 2015). This guidance includes specific requirements that would minimize the use of potable water, including requiring the use of efficient facilities; using nonpotable water for irrigation, wherever possible; and requiring reusing water from water flushing.

As a result, Alternative A would not require new or expanded water entitlements or the construction or expansion of water treatment facilities; therefore, no secondary effects would occur.

D.3.4.2 Recreational or Commercial Fisheries (40 C.F.R. § 230.51)

No commercial fisheries exist in areas where Alternative A would cross natural waterbodies, however there is a commercial fishery for herring in the San Francisco Bay. Recreational fishing opportunities exist in the vicinity of Alternative A at Bayview Hill Park, John McLaren Park, San Bruno Mountain State and County Park, and Brisbane Lagoon. These parks provide open-space areas with trails, fishing opportunities, campsites, and nature and wildlife viewing. Fishing is the

primary recreation activity at Brisbane Lagoon. The fishing area at Brisbane Lagoon has benches and parking on the east bank of the lagoon on Sierra Point Parkway, a distance of 1,800 feet east of the tracks adjacent to US 101.

Direct Impacts

Construction of HSR track and systems under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. Because there are no recreational or commercial fisheries at the location of planned fill, no direct impacts would occur.

Indirect Impacts

Construction of HSR track and systems under Alternative A would entail discharge of fill material into and excavation of the substrate in waters of the U.S. These disturbances would cause resuspension of bottom sediments and underlying materials, thereby increasing the likelihood that the disturbed particulates would be entrained by flowing water. Where the substrate disturbance occurs in waters of the U.S. stream channels, the suspended material could be carried downstream, causing turbidity plumes and degrading water quality. However, the potential for permanent impacts from suspended particles and turbidity would be minimal as a result of the measures incorporated into the design of Alternative A. Measures would be implemented to limit the extent of substrate disturbance in jurisdictional waters to minimize the potential for resuspension of particulates and subsequent increases in turbidity of the water column. Such measures could include, for example, construction of coffer dams to avoid the need for in-water work and installation turbidity curtains to control downstream movement of particulates, consistent with HYD-IAMF#3 and the SWRCB CGP SWPPP. As a result, indirect impacts on water quality, and thus impacts on the fishing area at Brisbane Lagoon would be minimized or avoided.

Cumulative Impacts

Under the cumulative condition, ongoing urban development is expected to continue within the surface water RSA. The projected population growth will translate into an increased intensification of existing developed land uses and a continued conversion of currently undeveloped lands to residential, small business, and light industrial uses, plus the transportation infrastructure needed to support this development. Construction of development and transportation projects in the surface water RSA would result in the discharge of fill material into jurisdictional waters, including wetlands and nonwetland waters. Such discharge could result in increased siltation and turbidity in streams and other waterbodies.

Direct impacts of these projects on jurisdictional waters include temporarily reduced channel capacity and reduced light penetration at the location of fill in waters of the U.S., leading to elevated levels of suspended particulates in the water column. Indirect impacts of these projects on jurisdictional waters include increased pollution and decreased water quality downstream of fill placed in waters of the U.S. Cumulative impacts related to increased sedimentation and turbidity would occur due to the scale of anticipated development throughout the region, which would increase the overall amount of fill in waters of the U.S. and creation of new sources of pollutants that discharge into jurisdictional waters.

However, like Alternative A, other projects would be subject to regulations and permits required by the SWRCB and the RWQCB to minimize impacts on water quality (e.g., the statewide CGP and the statewide Industrial General Permit). In addition, compliance with Sections 404 and 401 of the CWA would be required for each project, including the HSR project, which would reduce impacts to the maximum extent practicable. These regulations are in place to prevent new developments and infrastructure from resulting in violations of water quality standards. Alternative A includes measures that would minimize impacts related to increased sedimentation and turbidity by minimizing the contribution of Alternative A to local and regional impacts of erosion and non-point-source runoff through implementation of erosion control and runoff management measures. With implementation of the measures described in Section D.3.1.2 under the subheading Direct Impacts, the incremental contribution of Alternative A to cumulative impacts on

water quality, and corresponding impacts on recreational and commercial fisheries, would be minimized.

Secondary Effects

Construction of Alternative A would require excavation, grading, and use of on-site and imported construction materials, and establishing construction staging areas in upland areas. The disturbed areas could be subject to erosion and transport of fine-grained particulates into adjacent waters of the U.S., thereby increasing the turbidity of the water column and causing a sediment plume.

Secondary effects of construction activities would be mitigated through compliance with a variety of regulations. The construction activities would be conducted in accordance with the San Francisco Bay RWQCB dewatering requirements, CGP (HYD-IAMF#3), the Caltrans *Field Guide to Construction Dewatering* (Caltrans 2014; GEO-IAMF#10), and permits and approvals from applicable regulatory agencies, such as USACE, SWRCB, NMFS, and CDFW. These activities and regulatory permits and approvals would require BMPs for dewatering options and management, erosion control, and soil stabilization to avoid discharging water in a manner and at rates that cause substantial changes in surface water hydrology that results in erosion and sedimentation, and avoiding corresponding impacts on jurisdictional waters. Additionally, the SWRCB would require receiving water quality monitoring for any construction activity in the wetted part of a stream or wetland to prevent construction activities causing substantial erosion or sedimentation.

Prior to construction, the construction contractor would be required to develop and implement a SWPPP compliant with the CGP (HYD-IAMF#3), which allows sediment production rates from construction sites during and after construction to be only marginally above pre-construction rates. The construction contractor's QSD would prepare the SWPPP, which would identify stormwater BMPs that minimize erosion and subsequent sedimentation of the aquatic environment that may result from construction activities. The construction contractor's Qualified SWPPP Practitioner would be responsible for implementing the SWPPP. As part of that responsibility, the effectiveness of construction BMPs must be monitored before, during, and after storm events. The QSD may prescribe additional BMPs as required to meet water quality standards at the point where runoff leaves the construction site or enters receiving waters. Additionally, temporary drainage systems would be used in areas with major earthmoving activities to maintain existing drainage patterns while controlling erosion and sedimentation from runoff flowing over the disturbed soil and stockpiled material.

The potential for secondary effects on water quality from suspended particles and turbidity, and thus impacts on recreational or commercial fisheries, would be minimized or avoided as a result of these measures.

D.3.4.3 Water-Related Recreation (40 C.F.R. § 230.52)

There are no formalized recreation facilities at the locations where Alternative A crosses natural waterbodies or in the waterbodies that are crossed. Thus, the placement of fill within waters of the U.S. would have no direct impacts, indirect impacts, cumulative impacts, or secondary effects on water-related recreational facilities.

D.3.4.4 Aesthetics (40 C.F.R. § 230.53)

The aesthetics RSA is the viewshed of the project footprint, or the area that could potentially have views of the features of Alternative A, and the area potentially viewed from the project footprint. Aesthetics of the aquatic ecosystem relates to the perception of beauty of the ecosystem and to the quality of life enjoyed by the general public and property owners. The field study of existing visual resources included landforms, vegetation, land uses, buildings, transportation facilities, overhead utility structures and lighting, open space, viewpoints and views to visual resources, waterbodies, historic structures, developed areas, and apparent upkeep and maintenance of property. Visual character is an impartial description of the defining features, landscape pattern and distinctive qualities of the landscape and is defined by the relationships between the existing

visible natural and built landscape features and the overall pattern (in terms of dominance, scale, diversity, and continuity). Visual character-defining resources and features include landforms, vegetation, land uses, buildings, transportation facilities, overhead utility structures and lighting, open space, viewpoints and views to visual resources, waterbodies, historic structures, and skylines.

Visual resources include locally designated scenic routes, views toward or within natural areas, typical views from residential areas, and long views across the landscape that are evocative of the natural environment of the greater Bay Area. Alternative A would cross rivers, sloughs/lagoons, and varied streams throughout the RSA. The riparian forest canopy of these waterways is a distinctive natural element of the RSA landscape.

Direct Impacts

The placement of fill in waters of the U.S. as a result of construction of Alternative A would result in minimal visual changes, or no visual changes, at the location of discharge.

Indirect Impacts

No indirect impacts on aesthetics of the aquatic ecosystem would occur from the discharge of fill under Alternative A.

Cumulative Impacts

The cumulative RSA for aesthetics is the same as the aesthetics RSA. Construction of Alternative A and other past, present, or reasonably foreseeable future projects could result in construction activities that result in the discharge of fill within waters of the U.S. The visual changes at the location of discharge would be minimal, if they are visible at all. No cumulative impact would occur.

Secondary Effects

Construction of Alternative A would result in temporary and permanent impacts on aesthetics and visual quality. Temporary construction activities that would result in aesthetics and visual impacts would include the demolition of existing structures; clearing and grubbing; handling, storing, excavating, and placing fill; and construction of aerial structures, bridges, and HSR track and systems. Throughout the construction period, construction equipment storage, earthmoving, construction of structures, and concrete plant operations would degrade the visual aesthetics of the aquatic ecosystem for adjacent viewers. Construction activities would cause dust and material stockpiles that could create an untidy appearance, collectively degrading the visual unity and intactness of the surroundings. Construction would also introduce new sources of light and glare that could temporarily affect daytime and nighttime views. With implementation of AVQ-MM#1: Minimize Visual Disruption from Construction Activities, and AVQ-MM#2: Minimize Light Disturbance during Construction, temporary construction impacts would be reduced.

Alternative A would pass through heavily urbanized areas of the San Francisco Peninsula and the Santa Clara Valley, and would be largely located within the existing Caltrain corridor. The RSA landscape units are densely developed with the exception of several parks and open spaces designated for public use and crossings of natural waterbodies along the alignment. Construction of Alternative A could also result in permanent impacts on visual quality by introducing new features into the viewshed of aquatic ecosystems, including embankments, HSR alignment fencing, widened bridge structures, radio towers, and HSR trains. These features would be compatible and in line with the existing visual character in many locations along the existing railway. As a result, Alternative A would result in minor aesthetics and visual quality impacts on landscape units and key viewpoints throughout the RSA.

The East Brisbane LMF under Alternative A would convert vacant lands containing aquatic ecosystems between San Francisco and Brisbane to an industrial use. The LMF would provide storage capacity for trains and accommodate light maintenance activities, and would include large industrial buildings and parallel outdoor storage tracks. The East Brisbane LMF under Alternative A would be visible from residential areas on San Bruno Mountain. These residential

viewers would be located approximately 1 mile from the East Brisbane LMF, which would limit their exposure, resulting in a moderate viewer sensitivity. Overall, visual quality for the Brisbane Landscape Unit under Alternative A would remain moderate.

The Authority has incorporated AVQ-IAMF#1: Aesthetic Options, into the design of Alternative A, which would apply design approaches to integrate structures within a community and to reduce the intrusiveness of large, elevated structures and berms. Additionally, the Authority has committed to the following measures:

- AVQ-MM#3: Incorporate Design Aesthetic Preferences into Final Design and Construction of Non-Station Structures
- AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas
- AVQ-MM#5: Replant Unused Portions of Lands Acquired for the HSR
- AVQ-MM#6: Provide Noise Barrier Treatment

These measures would soften and obscure the conflicting aesthetic of the HSR track and systems, and reduce the impact on aesthetics of the aquatic ecosystem. Alternative A would be built adjacent to the existing Caltrain corridor, and would result in an expansion of that existing right-of-way, but would not require any new bridges or new substantial structures over or adjacent to aquatic ecosystems.

D.3.4.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (40 C.F.R. § 230.54)

The parks, recreation, and open-space RSA for analyzing impacts from the track alignment encompasses the project footprint plus 1,000 feet, while the RSA for stations and the LMF includes the project footprint for these facilities plus 0.5 mile. The type and character of the parks, recreational facilities, open space, and school district play areas within the RSA include small urban parks consisting of landscaped or paved areas with benches, neighborhood parks with grassy areas and playgrounds, community parks with aquatic centers, sports fields and courts, gardens, and larger regional parks with active sports and open-space areas with a wide variety of recreation opportunities. However, there are pockets of open space throughout the corridor, with the largest area west of Brisbane at San Bruno Mountain State and County Park. The school district play areas in the RSA belong to 13 school districts: San Francisco Unified, Brisbane School District, San Bruno Park, Millbrae Elementary, San Mateo Union High, Burlingame, San Mateo–Foster City, Belmont–Redwood Shores Elementary, Redwood City, Sequoia Union High, Palo Alto Unified, Sunnyvale Elementary, and Santa Clara Unified. Stanford University and Bellarmine College Preparatory are both within the RSA, but these institutions are private and do not offer public play areas or recreational facilities.

Forty-four resources are in the San Francisco to South San Francisco Subsection, 21 resources in the San Bruno to San Mateo Subsection, 38 resources in the San Mateo to Palo Alto Subsection, and 14 resources in the Mountain View to Santa Clara Subsection. No planned resources were identified in the RSA that are currently publicly owned, except for portions of the Bay Trail. No national and historic monument sites, national seashores, wild and scenic rivers, wilderness areas, or research sites are located in the RSA.

Direct Impacts

The placement of fill in waters of the U.S. as a result of construction of Alternative A would not result in direct impacts on parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves, at the location of discharge because they are not in the same geographic location.

Indirect Impacts

The placement of fill in waters of the U.S. as a result of construction of Alternative A would not result in indirect impacts on parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves, downstream or upstream of the location of discharge because the discharge of fill would not have the potential to result in construction-related impacts on access, and temporary or operations-related impacts on noise, air quality, and visual character.

Cumulative Impacts

The cumulative RSA for parks, recreation, and open space would be the project footprint plus 1,000 feet, while the RSA for stations and the LMF includes the project footprint for these facilities plus 0.5 mile. The discharge of fill into waters of the U.S. from construction and operation of Alternative A and other past, present, or reasonably foreseeable future projects would not result in temporary construction-related impacts on access, and temporary or intermittent permanent impacts on noise, air quality, and visual character, and would not have the potential to result in the acquisition of parkland, recreational facilities, or open-space resources. Therefore, there would be no cumulative impacts on parks, recreation, and open space.

Secondary Effects

Alternative A construction activities would generate temporary and localized noise, vibration, and construction emissions affecting 76 of the 117 parks, recreational facilities, and open-space resources in the RSA. Alternative A would comply with Federal Transit Administration and Federal Railroad Administration guidelines for minimizing construction noise and vibration impacts when work is conducted within 1,000 feet of sensitive receptors, which includes the parks, recreation facilities, and open-space resources where uses are noise and vibration sensitive. Construction practices stipulated by NV-IAMF#1: Noise and Vibration, would include building noise barriers (e.g., temporary walls, piles on excavated materials) between noisy activities and noise-sensitive resources. In addition, Alternative A would create and implement a fugitive dust control plan to control dust emissions from equipment, materials, and construction activities (AQ-IAMF#1: Fugitive Dust Emissions).

Construction of Alternative A would require temporary construction easements to facilitate construction activities that could temporarily reduce access along roadways, affecting access to and use of parks. Alternative A construction would likely take up to 2 years at a given location, but the duration of construction activities would vary depending on the specific activity at a given location. For example, construction of the four-quadrant gates at at-grade crossings would take 2–4 weeks and only require closing one lane of traffic during that time. The longest construction durations would be at the Brisbane LMF (1 year), and 4th and King Street and Millbrae Stations (2 years). Temporary changes to access or use of parks, recreational facilities, and open-space areas would occur at 20 resources under Alternative A. For example, in Brisbane, Alternative A would extend Lagoon Road to the relocated and reconstructed Tunnel Avenue overpass, affecting access to Brisbane Lagoon Fisherman's Park. Lagoon Road would be closed for up to 3 months, temporarily blocking access to the northern shore and Fisherman's Park on the eastern shore from Lagoon Road. However, access to the lagoon from Sierra Point Parkway would not be affected and use of the lagoon for fishing would not be affected. Moreover, construction would not result in permanent changes in access or circulation at any parks, recreational facilities, or open-space resources.

The Authority would locate and design components and station features to provide safe and attractive access to and use of parks, recreation facilities, and open-space resources (PK-IAMF#1: Parks, Recreation, and Open Space) and would require detours and signage so that motorists and pedestrians would continue to have access to local parks and recreation areas during construction and operations (TR-IAMF#2: Construction Transportation Plan, TR-IAMF#4: Maintenance of Pedestrian Access, TR-IAMF#5: Maintenance of Bicycle Access). With implementation of these measures, temporary impacts under Alternative A would be minimized.

Construction of Alternative A would also introduce temporary changes related to noise, vibration, fugitive dust emissions, and access to school district play areas associated with clearing, grading, track shifts, and installation of track and systems. Additionally, Alternative A would permanently change access to or circulation in and around some school district play areas, but would not permanently acquire any land from these resources. Operations would permanently change the visual and noise environment by adding more trains along the alignment and at the two existing stations where HSR service would be provided, as well as at the Brisbane LMF, which could affect the user experience at school district play areas. With implementation of the same measures listed above for access, noise, dust, and visual barriers, these temporary impacts under Alternative A would be minimized.

HSR would be required to obtain a consistency determination and permits for Alternative A within Bay/tidal waterways and the shoreline band jurisdictions of the BCDC prior to commencement of construction activities.

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